

CITY OF PORTLAND, MAINE

PLANNING BOARD



Maggie Stanley, Chair
Brandon Mazer, Vice Chair
Justin Barker
Marpheen Chann
Sean Murphy
David Silk
Austin Smith

AGENDA PORTLAND PLANNING BOARD MEETING

The Planning Board will hold a remote meeting on **Tuesday, October 11, 2022, 4:30 p.m.** This meeting will take place remotely using Zoom pursuant to the Remote Meeting Policy adopted by the Planning Board and as authorized under 1 M.R.S. 403-B because of the existence of an emergency or urgent issue that requires the committee to meet by remote methods. Allow your computer to install the free Zoom app to get the best meeting experience.

If you are not able to attend live, a recording will be available following the meeting. For public comment, you will need to use the "raise your hand" feature. To raise your hand via the telephone, please hit *9. You will be unmuted by the host when it is time for public comment.

For more information on submitting written public comments and participating in the remote meeting, please refer to the document, A Guide to Public Comment, Remote Mtg. and Public Participation, which can be found at <https://www.portlandmaine.gov/485/Development-Review>. Public comments will be taken for each item on the agenda during the estimated allotted time.

Written Public Comment

Written comments received by email by 12:00 p.m. **the day before** the scheduled meeting date will be included in the agenda backup materials ("agenda packet").

Written comments received **by the aforementioned deadline** will be published in the agenda packet no later than 12:00 p.m. the day of the meeting. Written comments must be submitted to planningboard@portlandmaine.gov. If you have any questions or feedback regarding this process, please email citymanager@portlandmaine.gov

Please note that the placement of each item on the agenda is subject to change. Please check the Agenda & Minutes Center prior to the meeting for the item start time here: <https://www.portlandmaine.gov/602/Agendas-Mintues>.

ZOOM MEETING INSTRUCTIONS

You are invited to a Zoom webinar.

When: Oct 11, 2022 04:30 PM Eastern Time (US and Canada)

Topic: Planning Board Workshop and Public Hearing 10/11/2022

Please click the link below to join the webinar: <https://portlandmaine-gov.zoom.us/j/89233440871>

Or One tap mobile : US: +19292056099,,89233440871# or +13017158592,,89233440871#

Or Telephone: Dial(for higher quality, dial a number based on your current location): US: +1 929 205 6099 or +1 301 715 8592 or +1 309 205 3325 or +1 312 626 6799 or +1 646 931 3860 or +1 719 359 4580 or +1 253 215 8782 or +1 346 248 7799 or +1 386 347 5053 or +1 564 217 2000 or +1 669 444 9171 or +1 669 900 6833

Webinar ID: 892 3344 0871

International numbers available: <https://portlandmaine-gov.zoom.us/j/89233440871>

1. **ROLL CALL AND DECLARATION OF QUORUM**
2. **COMMUNICATION AND REPORTS**
3. **REPORT OF ATTENDANCE AT THE MEETING HELD ON SEPTEMBER 27, 2022**

Afternoon Workshop

31 Forest Street: Barker, Chann, Mazer, Murphy, and Stanley present; Silk and Smith absent.

Evening Hearing

343 Cumberland Avenue: Barker, Chann, Mazer, and Stanley present; Murphy recused; Silk and Smith absent.

780 Stevens Avenue: Barker, Chann, Murphy, and Stanley present; Mazer recused; Silk and Smith absent.

4. **REPORTS OF DECISIONS AT THE MEETING HELD ON SEPTEMBER 27, 2022**

- i. Conditional Use; 343 Cumberland Avenue; Preble Street, Applicant. Mazer moved and Barker seconded a motion to find the proposed conditional use meets the standards of Sections 6.5.2 and 6.5.6(B) of the Land Use Code. Vote 4-0, Silk and Smith absent, Murphy recused.
- ii. Major Site Plan and Conditional Use; 780 Stevens Avenue; The University of New England, Applicant. Chann moved and Murphy seconded a motion to waive Technical Manual Section 12.3.5 to allow the installation of lighting fixtures between 4000K and 5000K CCT. Vote 4-0, Silk and Smith absent, Mazer recused. Chann moved and Murphy seconded a motion to waive Technical Manual Section 1.7.2.7 to allow the main driveway to be located 38 feet of the existing, neighboring driveway. Vote 4-0, Silk and Smith absent, Mazer recused. Chann moved and Murphy seconded a motion to find the proposed conditional use meets the standards of Sections 6.5.2 and 6.5.6(F.8) of the Land Use Code. Vote 4-0, Silk and Smith absent, Mazer recused. Chann moved and Murphy seconded a motion to approve the site plan with three conditions of approval. Vote 4-0, Silk and Smith absent, Mazer recused.

WORKSHOP - 4:30 PM

- i. Major Site Plan; 165 Lambert Street; Maine Cooperative Development Partners, Applicant. (estimated time 4:30 – 6:00 p.m.) The Planning Board will hold a remote workshop to consider the development of a Planned Residential Unit Development (PRUD) with 165 affordable units totaling 143,935 square feet of floor area, along with associated site improvements, located at 165 Lambert Street and 622 Auburn Street. The subject properties total 17.95 acres in size and are zoned R-3 Residential. A project and plan summary are available for viewing on the city's CSS Portal (<https://css.portlandmaine.gov/>) by referencing Plan Number PL-002078-2022.
- ii. Zoning Map and Text Amendment; 1 Bean Pot Circle; IDEALS (The Initiative for Digital Engineering and Life Sciences), Applicant. (estimated time 6:00 – 7:30 p.m.) The Planning Board will hold a remote workshop to consider a zoning map and text amendment application to facilitate the creation of an Institutional Development Plan (IDP) and Institutional Overlay Zone (IOZ) for their Portland campus, to be located at 1 Bean Pot Circle. The IOZ, if approved, will include the 13-acre property located at 1 Bean Pot Circle (parcels 447-A-001 and A-002), currently zoned I-M Moderate Impact Industrial. A related text amendment to modify Land Use Code Section 8.5.2 to add the applicant's parcels to the list of eligible IOZ areas has been provided. A project and plan summary are available for viewing on the city's CSS Portal (<https://css.portlandmaine.gov/>) by referencing Plan Number ZN-001934-2022.
- iii. Zoning Map Amendment; 1772 Westbrook Street; Touchstone Enterprises, Inc., Applicant. (estimated time 7:30 p.m.) The Planning Board will hold a remote workshop to consider the rezoning of a 52-acre parcel from I-L Low Impact Industrial to I-M Moderate Impact Industrial to

allow the future siting of warehousing, storage and distribution facility uses greater than 10,000 square feet at this location. A project and plan summary are available for viewing on the city's CSS Portal (<https://css.portlandmaine.gov/>) by referencing Plan Number ZN-002163-2022.

5. THERE ARE NO PUBLIC HEARING ITEMS SCHEDULED FOR THIS AGENDA

To: Chair Stanley & Members of the Planning Board
From: Sean King, Urban Designer
Date: October 7, 2022
Re: Lambert Woods Housing Development
Project ID: PL-002078-2022; CU-002083-2022
CBL: 385 A001001
Meeting Date: October 11, 2022

I. INTRODUCTION

Maine Cooperative Development Partners have submitted a Major Site Plan and Inclusionary Zoning Conditional Use application to facilitate construction of **fourteen** new residential buildings totaling **125,338** square feet of floor area and creating **162** affordable units at 165 Lambert Street. The proposed development is bisected by Washington Avenue Extension, with the north and south development to include a mix of residential housing types with 3-story rowhouses and 3-story community flat buildings. The site is located in the North Deering neighborhood and within the R-3 Residential zone.



Figure 1: Development Site

This application is being referred to the Planning Board for compliance with the City of Portland's Land Use Code Site Plan Standards, Section 14.1 and Inclusionary Zoning Conditional Use Standards, Section 18.2.3. The workshop will focus specifically on design-related elements of the project, including the latest site layout, materials, architecture and requested waivers. Since the last Planning Board workshop held August 9, 2022, the applicant submitted revised plans and documents on September 27, 2022 that included changes to reduce the number of dwelling units, off-street parking stalls, removal of townhouse building type, rearrangement of buildings, landscape / material / grading plan updates, street section alternatives and preservation of trees within development limit of work.

The Planning and Urban Development Department mailed 261 notices advertising this meeting to property owners within 500 feet of the site. A legal advertisement ran in the September 29th and 30th editions of the *Portland Press Herald*, along with the agenda posted to City of Portland webpage October 10, 2022.

Applicants: Liz Trice, Maine Cooperative Development Partners
Engineer: Sam Lebel, Acorn Engineering
Architects: Phil Kaplan, Kaplan Thompson Architects
Landscape Architect: Nick Aceto, Aceto Landscape Architects

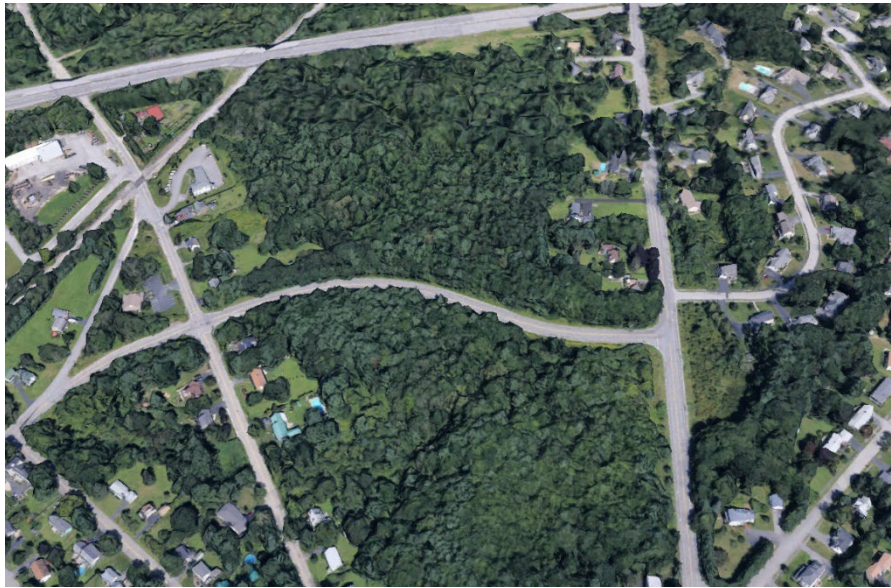


Figure 2: Aerial View of Site (facing north)

II. REQUIRED REVIEWS

<i>Review</i>	<i>Applicable Standards</i>
Site Plan	Section 14.6
Inclusionary Zoning Conditional Use	Section 18.2.3
Design Review	City of Portland Design Manual Section (h) Planned Residential Unit Development (PRUD)

<i>Waiver Requests</i>	<i>Applicable Standards</i>
Request: To reduce drive aisle width from 24 feet to 22 feet.	Technical Manual, Section 1.7.2.3 & 1.14.3: Drive aisle and parking lot layout shall provide a minimum drive aisle of 24 feet.
Request: To provide a curbed sidewalk along project's frontage on Washington Ave. Ext. and at intersections of Auburn and Lambert Streets. There is no existing sidewalks along the street frontages on Auburn and Lambert Streets.	Land Use Code 14.6.1.B.3.a: All development shall provide curb and sidewalks along all frontages.
Request: To impact a portion (7,200sf total) of wetland area to preserve higher value wetlands located adjacent to existing stream and to increase residential density on site.	Technical Manual 8.2 Standards: Design the development to minimize wetland impacts by either avoiding direct wetland impacts or minimizing them when they are unavoidable.
Request: To provide (2) driveways at the south site and (1) driveway at the north site.	Technical Manual 1.7.2.8: No more than (2) driveways shall be permitted for ingress and egress purposes to any residential (with 10 or more parking spaces) site.

III. PROJECT DATA

Existing Zoning	R-3 Residential
Property Size	17.95 acres (Portland)
Existing Use	Vacant Lot
Proposed Use	Planned Residential Unit Development (PRUD), Multi-family housing

	<i>Existing</i>	<i>Proposed</i>	<i>Net Change</i>
Dwelling Units	<i>0</i>	<i>162 units</i>	<i>+162 units</i>
Building Footprint	0	48,496 SF	+48,496 SF
Building Floor Area	0	125,338 SF	+125,338 SF
Impervious Surface Area	0	112,810 SF	+112,810 SF
Parking Spaces	0	65	+65
Bicycle Parking Spaces	0	65	+65
EV Charging Stations	0	13	+13

IV. BACKGROUND

A. RFP for Disposition of 165 Lambert Street

In 2020, the City of Portland released an RFP to dispose of two separate City-owned properties, with the property at 165 Lambert divided by Washington Avenue Extension. (Attachment A11). The criteria for consideration centered around the ability to provide high quality, age inclusive, mixed income affordable homeownership or rental housing that should be integrated within the environmental value of the property.

The RFP identified the current R-2 Residential zoning, which allows single-family detached dwelling units, as an impediment to a future buildout of this site for affordable housing development and recommended a rezoning may be necessary for the property to accommodate higher density that further City goals to increase the overall supply of housing city-wide.

On December 21, 2020, the City Council approved the sale of the property (Resolve 140-20/21) located at 165 Lambert Street to Maine Cooperative Development Partners LLC based on a recommendation from the City Council's Housing Committee to market the property to help meet the City's goals of constructing affordable housing.

B. Purchase and Sales Agreement for 165 Lambert Street

On January 4th, 2021 & May 10th, 2022 the applicant entered into a Purchase and Sale agreement with the City and conducted an Environmental Site Assessment to define the existing wetlands on the property site. The sale is contingent upon a number of conditions, one of which requires a 25-month due diligence period, so the transfer of the property from the City to the applicant is expected to occur no later than June of 2024.

The agreement specifies additional contingencies that include financing obligation, rezoning (R-3 approved July 19, 2021), development restrictions on existing wetlands, creation of no less than (44) forty-four dwelling units with total units no to exceed 100% AMI being deed restricted for affordability.

C. Zoning Map Amendment

On June 8th, 2021 the Planning Board unanimously recommended to the City Council a Zoning Map Amendment to rezone the site from an R-2 zone to an R-3 zone as well as Zoning Text Amendments to

allow vertical or horizontal unit configurations within PRUDs, to amend the definition of ‘Neighborhood Center’ to allow food-service as part of a neighborhood center, and to simplify requirements for common open space requirements associated with PRUDs to include passive and active recreation, including natural, landscaped or hardscaped elements. On June 19th, 2021 the City Council approved the Zoning Map Amendment (Order 302-20/21) and Zoning Text Amendments (Order 303-20/21).

V. EXISTING CONDITIONS AND SURROUNDING AREA

The subject property is addressed as 622 Auburn Street and 165 Lambert Street and bisected by Washington Avenue Extension, which is classified as a major collector and was originally constructed to accommodate car and truck traffic to connect the Riverside community and industrial uses with access to I-95. Washington Avenue Extension currently lacks sidewalks and includes a single travel lane with a shoulder in each direction. The property is bounded by City roadways Auburn Street & Lambert Street and bordered by single-family residential abutting the property on all sides.

The existing site is 17.95 acres in size, currently vacant and entirely forested, with **5.15 acres** of delineated wetlands within the City of Portland. An additional parcel of land in the City of Falmouth is 13.3 acres under ownership of the applicant (Document C) does not contribute to the net land area calculation and is not developed under this major site plan review.

The site is located along existing METRO service (routes 9A, 9B) at Washington Avenue Extension that connects to Portland center in either direction. The surrounding context of the neighborhood has a suburban character of lower density with the majority of housing being single-family on lot sizes ranging from .25 – 1 acres in the R-2 zone. Areas of industrial and commercial uses exist both to the west along Riverside Industrial Parkway and Riverside Street, and to the north and south, and along Auburn Street.

VI. PROPOSED DEVELOPMENT

The applicant has provided an overall development plan (Plan 6) proposing **fourteen** new buildings that will create **162** affordable residential units.

The applicant has submitted plans and documents for the full development proposal to include **65** off-street parking spaces, 13 EV charging stations, **65** bicycle racks and 49,995 square feet of open space area.



Figure 3: Development rendering along Washington Avenue Extension

The proposal includes constructing a collection of **fourteen** residential buildings that range in typologies to include eight 3-story rowhouses with a total of 100 dwelling units, and six 3-story community flat buildings with a total of 62 dwelling units for a total of 162 dwelling units. The composition of dwelling units includes (2) studios, (74) 1-bedrooms, (30) 2-bedrooms, and (56) 3-bedrooms. All dwelling units are for sale under the affordable housing requirement of 100% AMI with 25% of the units as workforce housing units at 80% AMI with 41 deed restricted pursuant to the Inclusionary Zoning requirements (Section 18.2.3). According to the applicant, the development is structured as a limited equity cooperative model managed by Maine Cooperative Development Partners LLC, in partnership with Cooperative Development Institute (CDI) & The Urban Homesteading Assistance Board (UHAB).

A shared use path ranging from 5-feet to 8-feet is proposed along Washington Avenue Extension at each side to connect residents to an existing Portland Trail link for the Sebago to Sea Trail. The proposed street improvements along Washington Avenue Extension also include on-street parking, curbed sidewalks, shared roadway bike markings, two raised crosswalks with curbed bulb outs to reduce traffic speed for pedestrian safety. Internal site circulation includes a loop and turnaround for emergency vehicles to/from the site, three driveways into the site and off-street parking lots with 65 reserved parking stalls. The proposed open-space includes common lawn areas, a network of pedestrian pathways and a “Mews” to connect residents to parking areas and unit entries allocated at both the north and south development with buildings proposed to activate the edges of the common space.

VII. PREVIOUS WORKSHOP

The project was introduced to the Planning Board by the applicant and staff at a workshop held on August 9, 2022. The Board provided initial feedback about pedestrian safety at intersection crossings, on-street parking, snow ban parking location, shared use path width, buffering at adjacent properties, emergency vehicle access and open space requirements which is as follows:

Street intersection crossing – The Board questioned the proposed crosswalk design to provide safe pedestrian movement from the residential development to the existing sidewalk along the east side of Auburn Street with a recommendation for a RRFB to signalize pedestrian crossing. Further consideration

for traffic signal to be determined after applicant submits a traffic analysis for the Washington Avenue Extension and Auburn Street intersection.

On street parking – The Board questioned the need for on-street parking along Washington Avenue Extension, stating that the current proposal prioritizes the development and does little for the neighboring community.

Snow ban parking – The Board questioned the applicants on-street parking operations during the winter season, with concerns over where residents would park during City snow bans. The applicant offered potential parking lot locations at Lyman school and Riverside golf course, noting that these locations are not ideal based on distances over one mile.

Shared use path – The Board requested clarification on the proposed shared use path related to width restrictions stated by the applicant.

Buffers at adjacent properties – The Board had concerns about public comment received for the visual impact of parked vehicles that face neighboring properties, applicant shall mitigate impact of car headlamps.

Emergency vehicle access – The Board requested the City staff review to confirm aisle width, curb cuts and snow storage proposed for emergency vehicles.

Open space requirements – The Board expressed concern about the recreation and open space proposed in relationship to the density proposed, without spaces for residents to recreate this will likely push people off-site.

VIII. RIGHT, TITLE, & INTEREST

The City of Portland is currently under a purchase and sale agreement for the land at 622 Auburn Street in Portland, Maine, 165 Lambert Street in Portland, Maine & o Gray Street in Falmouth, Maine with Maine Cooperative Housing Partners LLC which serves as sufficient right-title-interest documentation for the purposes of reviewing a site plan application (Attachment C).

The applicant's documents summarize existing drainage easements benefitting MaineDOT as recorded in the Cumberland County Registry of Deeds Books 3901/31. The City of Portland Council Order 226-21/22 approved the first amendment to the purchase and sale agreement to identify (4) drainage easements with rights on the western side line of Auburn Street, recorded in City Clerk Volume 43, Page 77 / City Clerk Volume 154, Pages 10 & 11 and eastern side line of Lambert Street, recorded in the Cumberland County Commissioners Record Volume 10, Page 46. (Attachment C)

IX. FINANCIAL & TECHNICAL CAPACITY

The applicant has submitted a letter of financial capacity from each applicant's financial institutions as well as documentation from the Secretary of State stating both applicants are in good standing.

The applicant's representatives have provided descriptions for each property as indicated by Lambert Woods North at 622 Auburn Street and FHA financing for the Lambert Woods Cooperative demonstrating their ability to undertake the project (Attachment G).

X. ZONING ANALYSIS

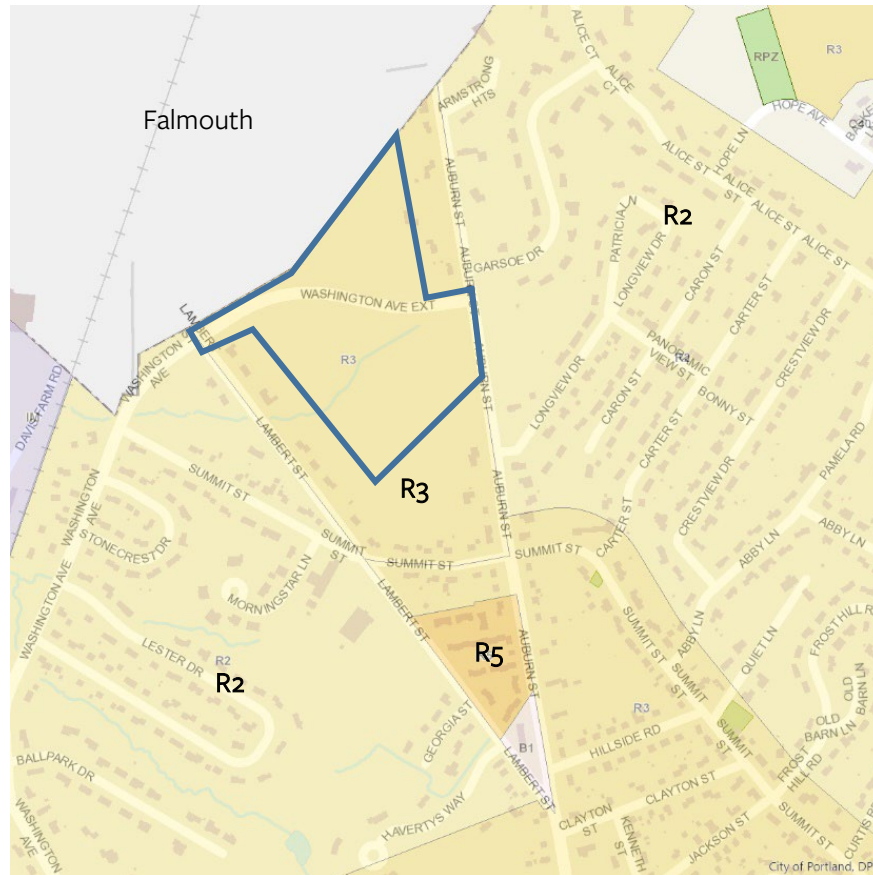


Figure 4: Zoning Map with Subject Parcel Outlined in Blue

The subject property is located in the R-3 Residential zone (Figure 4).

The proposed development proposes **162** units of housing which falls under a Planned Residential Unit Development (PRUD) use. According to Land Use Code Table 6-A, PRUDs are a permitted use in the R-3 Residential Zone.

Table 7-B of the City's Land Use Code, describes the PRUD dimensional standards. In addition to the base dimensional standards, any PRUD in which more than 50% of the units are low-income or workforce units for rent or for sale may utilize affordable housing density and dimensional bonuses and reductions as described in Section 18.2.4.B. and include the following provisions:

1. Minimum lot area per dwelling unit is reduced by 50%.
2. Maximum number of units and maximum length of buildings do not apply but may be set through site plan review.
3. Minimum building setbacks may be reduced to 10 feet.
4. The PRUD may cross public rights of way provided that the right of way does not count towards the minimum lot size nor towards any open space requirements.

5. Minimum recreation open space area is reduced to 200 square feet per dwelling unit of common area designated for recreational purposes by the residents. Minimum contiguous size and setbacks do not apply and shall be set through site plan review.
6. The Planning Board's Design Manual, design standards, and guidelines with respect to PRUDs shall apply in full to PRUDs utilizing this subsection.

The project provides more than 50% of the units as low-income or workforce units for rent or for sale¹ and therefore it may utilize dimensional bonuses available to PRUD developments under Section 18 of the City's Land Use Code, which is incorporated into the zoning review. Staff analyzed the proposal and found that the project complies with all dimensional requirements for principal structures which are summarized below:

<i>R-3 Residential Zone</i>	<i>Permitted</i>	<i>PRUD Dimensional Bonus Applied¹</i>	<i>Proposed</i>
Street Frontage (min.)	50 feet	N/A	>50 feet
Lot Width (min.)	65 feet	N/A	>65 feet
Front Setback (min.)	25 feet	10 feet	<10 feet
Rear Setback (min.)	25 feet	10 feet	>25 feet
Right Side Setback (min.)	14-16 feet (varies)	10 feet	>16 feet
Left Side Setback (min.)	14-16 feet (varies)	10 feet	>16 feet
Stepbacks	N/A	N/A	N/A
Lot Coverage (max.)	35%	N/A	21%
Off Street Parking Spaces	N/A	N/A	65 spaces
Lot Area (min.)	3 acres	N/A	17.95 acres
Net land area per dwelling unit (min.)	6,500 sq. ft.	3,250 sq. ft.	3,316 sq. ft.
Units per building (max) PRUD > 5 acres	6	N/A	16
Average number of units per building (max.) PRUD > 5 acres	5	N/A	11.5
Structure Height	35 feet	N/A	35 feet
Building length (max.)	100 feet	N/A	N/A
Bldg setback from external subdivision property lines (min.) 4 or more D.U. in bldg.	35 ft.	10 feet	24.5 feet
Distance between detached PRUD dwelling units (min.)	16 ft.	N/A	16 feet
Common recreation open space area (min.)	300 sq.ft./D.U	(200 sq. ft./D.U - Minimum contiguous size and setbacks do not apply and shall be set through site plan review)	309 sq. ft./D.U.

¹ Planned Residential Unit Developments (PRUD) developments with more than 50% of the units as low-income or workforce units for rent or for sale may utilize dimensional bonuses and changes listed under Land Use Code Section 18.2.4.B.

XI. CONDITIONAL USE INCLUSIONARY ZONING (IZ)

As required by Section 18.2.3 of the City's Land Use Code, the City's Inclusionary Zoning Ordinance, residential developments with ten or more units are required to provide a minimum of twenty-five percent of the dwelling units as Workforce Housing units. Alternatively, the applicant may pay a fee-in-lieu for those units.

Given the project proposes a total of **162** units, a minimum of 41 workforce housing units (25% at 80% AMI) are required to meet the IZ requirement. The applicant proposes making the remaining 124 units low-income (affordable) units (75% at 100% AMI).

The City's Housing Program Manager reviewed the application (Attachment A1,A2, A3) and determined the proposed project would meet the minimum requirements set forth in Section 18.2.3.2 to require 25% workforce housing units at 80% AMI and low-income housing units per section 18.2.4.B to allow for density and dimensional bonuses and reductions for PRUD developments.

XII. SITE PLAN REVIEW STANDARDS (Section 14.6)

The proposed development has been reviewed by staff for conformance with the relevant review standards of the City of Portland's Site Plan Ordinance, Section 14.6. Staff comments are below.

1. Transportation Standards (Section 14.6.1)

A. Impact on surrounding street systems

The proposed development is located off of Washington Avenue Extension, a major collector, which connects Auburn Street, a principal arterial to the east and Lambert Street, a major collector, to the west.

The site is along Metro transit routes 9A and 9B on Washington Avenue Extension and the applicant is proposing two transit shelters on each side of the street along with restroom facilities for Metro drivers during layover periods. The site has existing bus stops immediately available at the intersection of Auburn Street that Metro is requiring to remain in place. Metro has indicated that this will facilitate convenient access to bus service clockwise and counter-clockwise into downtown Portland.

The application anticipates minimal increases to traffic, and to mitigate truck turning at the intersections to accommodate proposed sidewalks and parking along Washington Avenue Extension. The applicant's traffic analysis has been reviewed by the City's Consulting Traffic Engineer who finds it to be reasonable to anticipate the proposed project to generate 60 vehicle trips in the weekday morning peak hour, 83 vehicle trips during the weekday evening peak hour, and 83 trips during the Saturday peak hour, below the Traffic Movement Permit (TMP) threshold of 100 trips at peak hour.

Additional investigation into high crash locations at Washington Avenue Extension & Lambert has been provided by the applicant to mostly include angle crashes from intersection streets that City's Consultant Traffic Engineer will continue to review this issue. The applicant has provided the requested traffic analysis to convey an increase delay per vehicle (159.8 seconds to 231 seconds) due to development from Washington Avenue Extension onto Auburn Street, with preliminary analysis indicates a traffic signal is warranted. The applicant will conduct a vehicle speed survey on Auburn Street to inform whether a new signal is warranted. The City's Consulting Traffic Engineer supports the reduction of two approach lanes to a single lane along Washington Avenue Extension at Auburn Street

and supports the analysis at Washington Avenue Extension & Lambert Street intersection to operate at an acceptable level of service.

The applicant has prepared a concept plan for a pedestrian crossing and RRFB at Auburn Street south of Washington Avenue Extension that is generally supported by the City's Consulting Traffic Engineer to improve pedestrian safety.

The applicant has proposed to include three driveways from Washington Avenue Extension to provide access into the site. The applicant has provided the requested traffic analysis that the City's Consulting Traffic Engineer has indicated the proposed driveways onto Washington Avenue Extension to operate at an acceptable level of service. Applicant has requested a waiver to support the three driveways proposed that is generally supported by the City's Consulting Traffic Engineer and City staff continues to review the waiver request.

New site circulation through the site includes main drive aisles connecting to parking areas throughout the site and shared "Mews" that provide restricted access lane kept clear for emergency vehicles and pedestrians. Fire access is proposed with two points of access through the main drive aisles towards the center of the site and provide a continuous loop to grass pavers that distinguish emergency access only. Infrequent loading for residents is proposed at the shared "Mews" with turn-around areas for vehicles. The majority of drive-up services and drop-off needs is concentrated to Washington Avenue Extension where a pull-off is proposed in tandem with bus loading to be striped per Metro standards. The application also includes providing common open space areas with lawn, shaded pavilion, concrete paver plazas at "Mews" and pedestrian paved pathways throughout the site.

B. Access and circulation

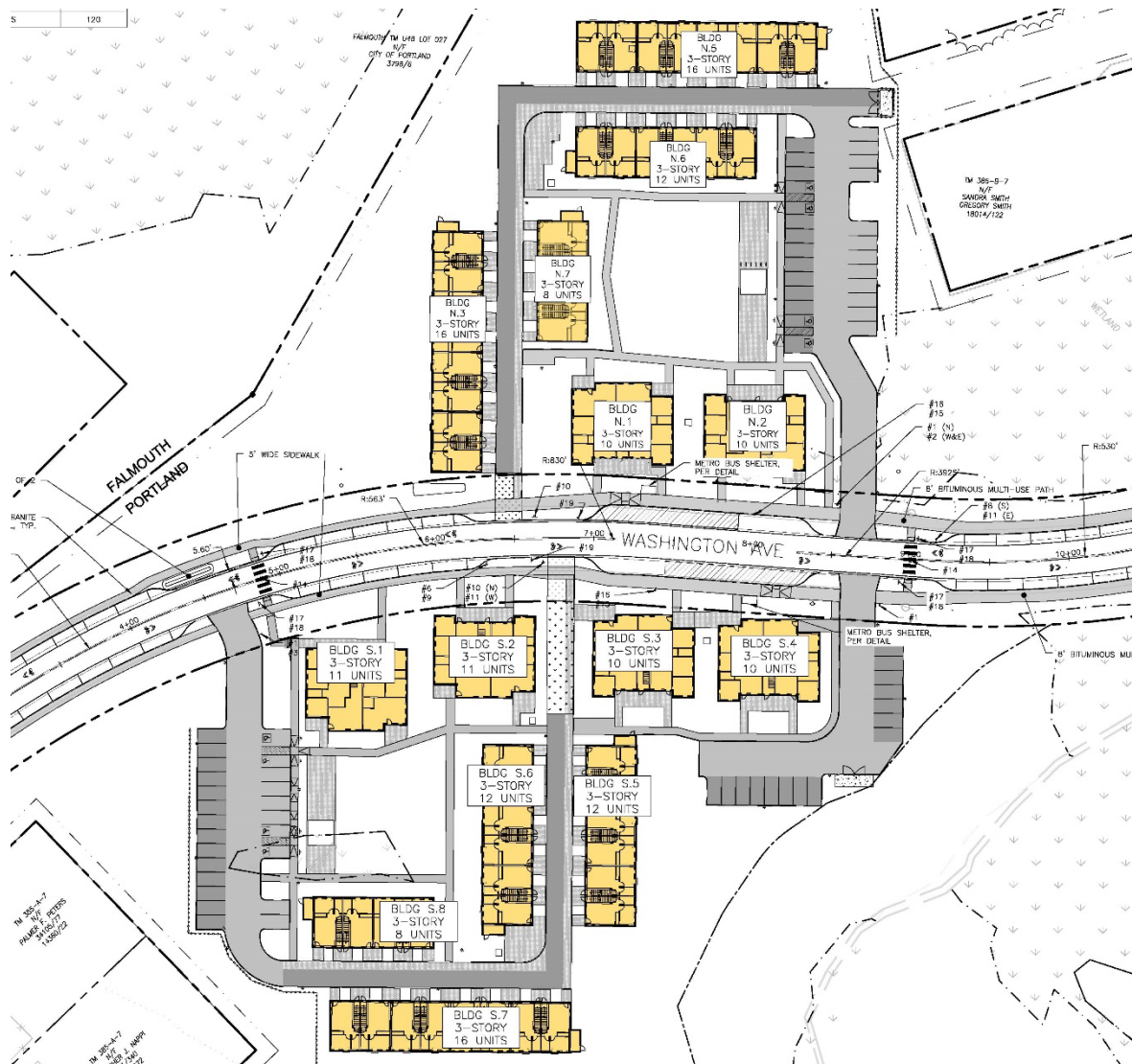


Figure 5: Overall Site Plan

The applicant has requested one waiver relevant to the parking lot and space design:

Technical Manual Section 1.14.3 – Drive Aisle Width

The applicant is requesting to reduce the minimum drive aisle width from the required 24 feet to 22 feet, a two foot reduction.

The applicant has requested one waiver relevant to the amount of driveways allowed:

Technical Manual 1.7.2.8 – Number of driveways

The applicant is requesting to provide (2) driveways at the south site and (1) driveway at the north site. Section 1.7.2.8 of the City's Technical Manual requires that no more than (2) driveways shall be permitted for ingress and egress purposes to any residential (with 10 or more parking spaces) site.

C. Public transit access

Existing transit access along Washington Avenue Extension includes Route 9A & 9B, along with existing bus stops at the Auburn Street intersection. The applicant will provide two bus shelters located towards the center of the development with convenient access, live feed display screens, and restroom facilities for Metro drivers during laydown periods. The City's Consultant Traffic Engineer has suggested further review for the two crosswalk locations for origin and destination routings specific to pedestrian access to/from the bus stops.

D. Parking

In general, residential units are required to provide one parking space per dwelling unit unless the project is eligible for parking requirement exceptions listed in Table 19-B of the Land Use Code. Per Table 19-B, transit proximate development and uses categorize an exception for no off-street parking required within ¼ mile of fixed route transit service, along with new uses of more than 10,000 square feet to require a Transportation Demand Management plan to access this provision. The applicant has chosen to seek the off-street parking exception, and has included **65** off-street parking throughout the north and south developments. According to the applicant they will prioritize parking for residents at the 60% AMI range and allocate remaining parking permits for a monthly cost. In addition, 55 on-street parking spaces are proposed within the public right-of-way to accommodate for additional residence and guest parking to require additional analysis by DPW's project engineer with major concerns about parking management during snow bans, parking allocation based on fee model for residents and winter operations.



E. Transportation demand management (TDM)

The applicant has resubmitted a TDM plan as a requirement for the categorical vehicular exception listed in Table 19-B of the Land Use Code. (Attachment U). The City's Transportation Program Manager is generally supportive of the TDM plan and observes a 25% multimodal trip target for all resident trips to and from the site for 3 years, clear strategies for infrastructure, incentives and information and annual surveying of residents to produce an annual TDM monitoring report.

2. Environmental Quality Standards (Section 14.6.2)

A. Preservation of significant natural features

The site is undeveloped and forested with extensive invasive species and several wetlands that are considered significant due to period of establishment. The contiguity of wetlands is proposed to be preserved to the greatest extent, and the development includes minimal disturbance with proposed grading and site improvements.

The applicant has requested one waiver relevant to existing wetlands and preservation of significant natural features:

Technical Manual 8.2 Standards:

The applicant is requesting an impact to a portion (7,200sf total) of wetland area to preserve higher value wetlands located adjacent to an existing stream and to increase residential density on site.

B. Landscape preservation

The site includes multiple existing tree species and thus the development shall minimize tree loss to the greatest extent possible. The City Arborist has reviewed the revised landscape plans to generally support the preservation of existing trees to remain within the development limit of work and native

plant palette to mimic the wooded character of the existing site. The applicant has provided documents to outline invasive plant management per City Arborist's recommendations.

C. Site landscaping and buffers

The applicant has submitted revised Planting (Plans 46, 47, 48, 49) plans which include locations and quantities for tree, shrub, groundcover and select preservation of existing trees. Existing trees loosely buffer all sides of the property site, the City Arborist encourages a high percentage of native species that reinforce the woodlands character of the site with groupings of plant material and more natural arrangement. The applicant has submitted revised plans that propose a privacy fence and screening plants at the adjacent properties that City staff will continue to review to meet standards.

The creation of 162 residential units requires either planting a total of 162 street trees or an acceptable alternative as recommended by the City Arborist. The applicant has provided updated quantities of existing to remain and proposed trees that total to approximately 48 to be accepted as street trees.

D. Water quality/storm water management/erosion control

The project proposes managing stormwater by a series of systems including underdrained subsurface soil filters, porous pavement, proprietary rain gardens, and routing all stormwater outfalls and pipe sizes proposed at the existing drainage swale within the public right-of-way.

The applicant has submitted a Stormwater Management Report and Erosion and Sedimentation Control Report, which has been reviewed by the City's consulting civil engineer for compliance with MaineDEP Chapter 500 and City of Portland Section 5 for stormwater management requirements (Attachment J). The City's Consulting Stormwater Reviewer has requiring erosion and sedimentation controls on proposed work along Washington Avenue Extension, depth of groundwater for additional underdrained subsurface sand filter system, and further evaluation of the proposed soil filters proposed along Washington Avenue Extension. Additional concerns related to flooding standards including the method of evaluating flow through porous pavement, post-development models in TC value, adequate naming distinction of drainage structures, and revisions to the drainage structure rim elevations. The City's Consulting Stormwater Reviewer will continue to provide additional comments to meet standards.

Public Works and Water Resources is generally supportive of the revised stormwater management and erosion and sedimentation control plans and documents. The City of Portland has requested a permanent drainage easement on private property that is still outstanding from the applicant.

3. Public Infrastructure and Community Safety Standards (Section 14.6.3)

A. Consistency with City Master Plans

Portland's Plan 2030 Comprehensive Plan goals and policies (state and local) relevant to the proposed development are included below. The development proposal aligns with these vision statements and goals, by creating a new opportunity for an affordable, and well-connected new housing development accessible to public transit supporting the Plans goal of *increasing, preserving, and modifying the overall supply of housing city-wide*. In addition, the proposed project supports the City's desire to *leverage underused properties* owned by the City. The proposed development allows for maximizing development on an underutilized lot, which creates the opportunity to provide affordable homes, with access to public transit, services, and open space. Relevant Comprehensive Plan goals have been excerpted below:



Vision Statements:

- Secure - We will be committed to accessible housing and healthy food for all our residents.
- Authentic - The uniqueness and integrity of our neighborhoods will be maintained and enhanced.
- Connected - We will foster accessible linkages between where we live, work, shop, and play.
- Connected - We will enable meaningful access to the natural world and recreational opportunities as a central component of community health.
- Sustainable – Growth should respect and seek to preserve our spectacular natural resources.

Housing: A Livable City

- Increase, preserve, and modify the overall supply of housing city-wide to meet the needs, preferences and financial capabilities of all Portland residents.
- Pursue policies to enable people who work in Portland to have the option to live in Portland.
- Reinforce existing housing tools, policies, and programs while continuing to explore emerging best practices.
- Consider the sale of City-owned land that may be appropriate for housing development.
- Consider incentivizing affordability restrictions as part of City-owned property transactions, as well as the potential to return improved properties to the City's tax rolls.
- Create, promote, and facilitate safe, affordable, and practical housing solutions that will meet the evolving needs of Portland residents as they age.

Recreation & Open Space

- Pursue opportunities, in collaboration with partners, to create new open spaces in areas that are currently underserved.
- Pursue opportunities for new and enhanced walking and biking trails as a means of filling existing gaps and investigate paper streets, vacant land, medians, and other often overlooked areas for the potential for park linkages, trails, and other improvements to the urban landscape.
- Prioritize open space acquisition and programming toward creating linkages where there are gaps in the network.

Future Land Use

- *Connecting the Chain* – Portland's Plan recognizes that physically integrated transportation systems, utilities, and open spaces provide the structure for the city's growth, and that a well-connected system is more efficient and more resilient. An integrated transportation system allows

residents to access jobs, food, healthcare, and recreation from their homes while planning for an unbroken network of open space connects neighborhoods and improves access to the outdoors.

- *One Portland* - Portland's Plan is a vision for One Portland, where the form and characteristics of neighborhoods vary, but the city functions as a cohesive whole. No one area of the city carries all the expectations for accommodating development and all areas can expect appropriate City services and amenities.

B. Public safety and fire prevention

The applicant has stated that the project has been designed to promote safe and inviting public access connections to the development site with sidewalks, as well as providing adequate emergency access to new buildings via the restricted access loop road. The applicant has submitted a lighting plan, photometric and cut sheets for fixtures. City staff will continue to review the application for compliance with this standard for emergency vehicles and pedestrian pathways to unit.

The proposal includes a new public hydrant assembly at the south side of Washington Avenue Extension to serve the buildings onsite within 450 feet from the furthest structure. The City's Fire Marshal will confirm that this location and single hydrant is sufficient.

The City's Fire Marshal has reviewed the application materials, and generally finds the project to provide adequate emergency access based on the precedent of Douglass Commons but shall incorporate the Fire Department's feedback from staff comments and **provide an Autoturn analysis at the secondary parking area to confirm sufficient maneuvering is available for emergency vehicles.**

C. Availability and capacity of public utilities

The applicant has submitted ability to serve letters to all respective utility providers with official responses forthcoming. The applicant proposes installing a new 8" sewer lateral from the existing 10" sewer line in Washington Avenue Extension at both the north and south development to accept the wastewater from each unit. Wastewater Capacity Authorization from Public Works is under review.

The applicant proposes electrical and communications (telephone, fiber and cable) service underground via a new pad-mounted transformers to serve each unit, single phase pole and riser proposed at both north and south development.

The applicant proposes new 6" water service at both the north and south development to tap into existing 12" water main along Washington Avenue Extension.

4. Site Design Standards (Section 14.6.4)

A. Massing, ventilation, and wind impact

The massing of the proposed rowhouses and community flats address the abutting single-family residents by use of landscape buffers and preservation of several existing trees. The 3-story buildings are located more central to Washington Avenue Extension and internal common spaces. The City Arborist has provided comments to recommend appropriate landscape buffering to achieve a more wooded quality with native plant material and groupings that the applicant has addressed within the latest plan submittal.

B. Shadows

A shadow study has not been submitted, as any shadows cast by the buildings at the site will not affect adjacent properties or City-owned parkland.

C. Snow and ice loading

The applicant has resubmitted locations for snow storage areas on the plans and stated that structures will not distribute snow and ice onto adjacent properties. Staff will continue to review the application for compliance with this standard in conjunction with reviewing the stormwater management and emergency access standards above.

D. View corridors

There are no designated view corridors within the project vicinity.

E. Historic resources

The proposed development is not located in or within 100 feet of a historic district or historic landmark. Not applicable.

F. Exterior lighting

The applicant has submitted a lighting plan, photometric analysis and lighting cut sheets for City staff review for compliance with this standard contained in Section 12 of the City's Technical Manual.

G. Noise and vibration

The applicant has stated that the HVAC system will meet the applicable state and federal emissions requirements and will also be screened and directed away from abutters. The applicant will provide HVAC locations and details/cut sheets at each proposed location for staff review.

H. Signage and wayfinding

Wayfinding signage is proposed within the latest submitted plans related to vehicular and pedestrian access. City staff continues to review for compliance with this standard.

I. Zoning-related design standards

The proposal is subject to meeting the applicable PRUD design standards under Section (h) of the City's Design Manual. The applicant has submitted revised elevations and floor plans with an accompanying architectural narrative that identifies proposed variation in the facades to meet design standards (Attachment Y). The City's Urban Designer generally finds the proposed building types, placement and materiality to be consistent with the PRUD design standards (Attachment 13) that support the neighborhood character the applicant has submitted.

XIII. PUBLIC COMMENT

At the time this report was written Planning staff has received six written comments (PC1 through PC6) to date. In general feedback included concerns of improvements proposed along Washington Avenue Extension related to the existing truck route, seeking more information about snow management operations, and concerns about landscape buffering at adjacent residential properties.

XIV. NEXT STEPS

At this time City staff are specifically seeking Board feedback on the proposed architectural design, as it relates to the PRUD design standard for buildings with more than two dwelling units or greater than forty

feet in length shall provide variation in roof and façade character. In addition, City staff are specifically seeking Board feedback for the recreation and open space requirement that shall include external buffers, internal buffers, passive recreational open space, active recreational open space, private open spaces and integration of the proposed “Mews” as a designated shared circulation feature. Further consideration by the Board for the waivers being sought is requested.

Following the workshop, the application will:

1. Continue to address staff and Board review comments
2. Prepare follow-up plan and document submission
3. Schedule and hold a Planning Board public workshop or hearing

XV. ATTACHMENTS

REPORT ATTACHMENTS

- A1. Inclusionary housing
- A2. Inclusionary housing-supplemental
- A3. Inclusionary housing-supplemental
- A4. Zoning review
- A5. City arborist review
- A6. Traffic analysis
- A7. Public Works review
- A8. Metro transit review
- A9. Consulting Stormwater Engineer review
- A10. Staff comment letter
- A11. RFP-165 Lambert Street
- A12. Transportation program manager review
- A13. PRUD Design review memo
- A14. City arborist review on resubmitted materials
- A15. Public works senior engineer on resubmitted materials
- A16. Traffic consultant review on resubmitted materials

APPLICANT'S SUBMITTAL

- A. Cover letter
- B. Site plan checklist
- C. Right, title and interest – Purchase and sale agreement
- D. Zoning assessment
- E. Easements
- F. Waivers
- G. Financial capability
- H. Technical capability
- I. Conformity with land use ordinance
- J. Stormwater management report
- K. Erosion and sedimentation control
- L. Fire department letter
- M. Wastewater capacity

- N. Lighting
- O. Architectural design narrative
- P. Utility cover letter
- Q. Construction management plan
- R. Solid waste
- S. Traffic report
- T. Turning templates
- U. Transportation demand management report
- V. Public meeting notice sign – 07-27-2022
- W. Applicant comment response letter 8-2-2022
- X. Applicant comment response letter 9-26-2022
- Y. Architectural design review response
- Z. Alternative street design analysis
- AA. Public meeting notice sign – 09-29-2022

PLANS

- 1. Cover sheet and legend
- 2. General notes
- 3. Existing conditions plan
- 4. Construction management and erosion control plan
- 5. Overall site plan
- 6. Site plan – North
- 7. Site plan – South
- 8. Utility plan – North
- 9. Utility plan – South
- 10. Grading and drainage plan – North
- 11. Grading and drainage plan – South
- 12. Right of Way grading and site plan - +0 - +6
- 13. Right of Way grading and site plan - +6 - +12
- 14. Right of Way grading and site plan - +11 - +13.5
- 15. Right of Way grading and site plan – Auburn intersection
- 16. Subdivision Plat
- 17. Site details – 1
- 18. Site details – 2
- 19. Site details – 3
- 20. Utility details – 1
- 21. Utility details – 2
- 22. Drainage details – 1
- 23. Drainage details – 2
- 24. Drainage details – 3
- 25. Erosion and sedimentation control notes
- 26. Erosion and sedimentation control details
- 27. Architectural cover sheet
- 28. A-01 Wall types
- 29. A-0.2 Floor types and roof types
- 30. A-1.1 Community flats plans
- 31. A-1.3 Rowhomes plans

32. A-1.2 Community flats Enlarged ground floor
33. A-1.3 Community flats Enlarged second floor
34. A-1.4 Community flats Enlarged second floor
35. A-1.2 Rowhomes Enlarged ground floor
36. A-1.3 Rowhomes Enlarged second floor
37. A-1.4 Rowhomes Enlarged third floor
38. A-2.1 Community flats elevations
39. A-2.1 Rowhomes elevations – 8 unit
40. A-2.1 Rowhomes elevations - 16 unit
41. A-3.1 Building sections
42. A-4.1 Wall sections
43. Landscape cover sheet
44. Landscape notes
45. Landscape overall materials plan
46. Landscape overall planting plan
47. Landscape North site planting plan enlargement
48. Landscape South site planting plan enlargement
49. Landscape enlarged Right of Way planting plans
50. Landscape site details
51. Landscape planting details

PUBLIC COMMENT

- PC1- Ed Eggleston
- PC2- Anonymous
- PC3- Phil Requia
- PC4 – Lauren Manera
- PC5 – Ruth Bettinger
- PC6 – Ed Eggleston

165 Lambert Street

Victoria Volent <vvolent@portlandmaine.gov>

Mon, Jul 11, 2022 at 2:09 PM

To: Sean King <sking@portlandmaine.gov>, Ann Machado <amachado@portlandmaine.gov>

Hi Sean and Ann,

A Phase I Environmental Site Assessment was conducted on the site on March 26, 2021. The following information is from the report:

Site location: 165 Lambert

Upland Area: 4.53 acres

1,830 feet from the Presumpscot River

Site is not located in a FEMA Special Flood Hazard Area

An tributary stream (MEDEP Category B stream) flows from the east to the west of the site (see attached map)

Also attached is the wetland sketch by Jones Associates; narrative from the zoning amendment application; and "developable area" map from New paradigm.

As for the Citizens' Referendum; attached is the ballot enclosure indicating the proposed amendments. Please note, on page 8, the definition of "workforce housing unit for rent" and "workforce housing unit for sale" were proposed for amended from 100% to 80% and 120% to 80% respectively. The definition of low-income housing for sale was not proposed for amendment which I believe was an oversight by the people who drafted the referendum rather than an error by Corporation Counsel and the City Clerk.

Thank you,

Victoria

Victoria Volent
Housing Program Manager

[City of Portland](#)

[389 Congress Street](#)

Phone: 207-482-5028

www.portlandmaine.gov



5 attachments



Perennial stream.pdf

286K



Jones Associates Report 165 Lambert Street.pdf

1333K



Lambert Woods - Zoning Matrix.pdf

506K



Developable-Area-12-11-2020.pdf

232K



City of Portland Ballot Enclosure 9 10 20 V3.pdf

125K

165 Lambert Street

Ann Machado <amachado@portlandmaine.gov>
To: Victoria Volent <vvolent@portlandmaine.gov>
Cc: Sean King <sking@portlandmaine.gov>

Mon, Jul 11, 2022 at 3:57 PM

Thanks Victoria.

This information is helpful.

Whether those drafting the "green new deal" omitted changing the definition of low-income housing by accident, section 18.2.4.B allows the developers to use the density and dimensional bonuses and reductions for a PRUD. They are providing more than 50% of low income housing units for sale that are affordable to a household earning 100% or less of AMI.

Maybe the 25% of workforce housing units at 80% AMI are to satisfy section 18.2.3.2.that was changed as part of the green new deal.

The report from Jones Associates states that there is approximately 236,727.92 sf (5.43 acres) of delineated wetlands on the two properties. That is part of what needs to be subtracted from the net land area, but we still need to know the square footage of the watercourse (stream) and the slopes of 25% or greater. The overall site plan (sheet C-09) under Net Land Area states that 244,738 sf has been deducted from the property area to reach the netland area of 537,251 sf. The number deducted is less than the delineated square footage of the wetland area.

Ann

Ann Machado
Zoning Administrator
Permitting and Inspections Department
City of Portland, Maine
(207) 874-8709
amachado@portlandmaine.gov

[Quoted text hidden]

165 Lambert Street

Ann Machado <amachado@portlandmaine.gov>
To: Victoria Volent <vvolent@portlandmaine.gov>
Cc: Sean King <sking@portlandmaine.gov>

Mon, Jul 11, 2022 at 3:57 PM

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Maybe the 25% of workforce housing units at 80% AMI are to satisfy section 18.2.3.2.that was changed as part of the green new deal.

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Ann

Ann Machado
Zoning Administrator
Permitting and Inspections Department
City of Portland, Maine
(207) 874-8709
amachado@portlandmaine.gov

On Mon, Jul 11, 2022 at 2:10 PM Victoria Volent <vvolent@portlandmaine.gov> wrote:
Hi Sean and Ann,

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The following information is from the report:

Site location: 165 Lambert
Upland Area: 4.53 acres
1,830 feet from the Presumpscot River
Site is not located in a FEMA Special Flood Hazard Area
An tributary stream (MEDEP Category B stream) flows from the east to the west of the site
(see attached map)

Also attached is the wetland sketch by Jones Associates; narrative from the zoning amendment application; and "developable area" map from New paradigm.

As for the Citizens' Referendum; attached is the ballot enclosure indicating the proposed amendments. Please note, on page 8, the definition of "workforce housing unit for rent" and "workforce housing unit for sale" were proposed for amended from 100% to 80% and 120% to 80% respectively. The definition of low-income housing for sale was not proposed for amendment which I believe was an oversight by the people who drafted the referendum rather than an error by Corporation Counsel and the City Clerk.

Thank you,

Victoria

Victoria Volent
Housing Program Manager
City of Portland
389 Congress Street
Phone: 207-482-5028
www.portlandmaine.gov



165 Lambert St - PL-002078-2022

Ann Machado <amachado@portlandmaine.gov>
To: Sean King <sking@portlandmaine.gov>

Mon, Jul 11, 2022 at 2:08 PM

Sean -

Here are some of my initial zoning comments for the site plan.

1. As discussed with Victoria, what is the "correct" definition of low-income housing unit for sale? Article 3 defines low-income housing as: *A dwelling unit for which:*

- A. The sale price is affordable to a household earning 100% or less of Area Median Income (AMI).*
- B. The unit is sold to a household earning 100% or less of AMI.*
- C. The requirements of (A) and (B) above are limited by deed restriction or other legally binding agreement for future sales for the applicable length of time in this ordinance.*

Was there a definition for a low-income housing unit for sale in the "green new deal" referendum that changed the definition for low-income housing from a household earning 100% AMI to a household earning 80% of AMI, and it was not changed in the ordinance in Article 3? Victoria is looking into this. This is important because it determines whether the applicants can use section 18.2.4.B.

2. They need to provide their net land area calculations and show the areas on a site plan.

3. With the dimensional requirements, Table 7-B outlines the R-3 PRUD requirements. If 50% or more of the units in the development are low income or workforce housing, then section 18.2.4.B can be used to reduce the minimum net land area by 50% per dwelling unit and setbacks and open space area can be reduced as well.

3. Section 18.2.4.B does not allow for the minimum distance of 16' between buildings in Table 7-B to be reduced. The developer needs to confirm that there is a minimum distance of 16' between the footprints of each building.

4. The applicant needs to designate the recreation open space areas and provide the overall square footage of recreation open space.

5. The applicant is going to need to provide the elevation from average grade for each of the buildings.

6. Table 19-A requires one space per dwelling unit. There are two exceptions under Table 19-B. Under affordable housing the Planning Board can establish a parking requirement that is less than one space per workforce or low-income housing unit. The second is for Transit Proximate development and uses but a Transportation Demand Management Plan must be provided to allow this exception.

We will continue to work together on this review as we receive more information.

Ann

165 Lambert Street

Jeff Tarling <jst@portlandmaine.gov>

Thu, Jul 14, 2022 at 1:15 PM

To: Sean King <sking@portlandmaine.gov>

Cc: "Issett@woodardcurran.com" <Issett@woodardcurran.com>, Jodie Keene <jkeene@portlandmaine.gov>, Alex Marshall <amarshall@portlandmaine.gov>

Hi Sean -

This is a big project site on a challenging somewhat native forest with numerous invasive plants as well.

The proposed 165 Lambert Street residential project on both the north and south sides of the Washington Avenue connector road is located on an existing forested landscape that also contains wetlands.

Thus we would ask as a condition of approval that recommendations include:

a) TREE SAVE / Limit of Work - The final plan should include a 'Tree Save' / Limit of Work designation and plan to be used prior to clearing and during construction. This would include a written plan, signage and construction fencing to prevent off site storage or materials and equipment. 'Tree Save' trees should be protected with signage and fencing around the drip line. To date the plan does not show either a tree save or limit of work. The proposed project clears an extensive amount of existing forest without any tree saves or forest management suggestions? The site work clearing should include nearby forest thinning improvements for sustainable landscape and safety.

b) Invasive plant management - The northern side of the project especially contains extensive Common Buckthorn shrubs, the project should identify, plan and remove all invasive plants as part of their clearing portion of site work. This has been a standard on other project sites where high numbers of invasive plants are located.

c) Tree & Landscape treatment - We encourage high percentage use of native plants on wood sites like the proposed 165 Lambert Street project. Stevens Commons for example next to Baxter Woods successfully modified their landscape plan to a higher percentage of native species. This should be a condition of approval. The site is surrounded by natural appearing woodlands, the project should appear part of the surrounding landscape vs 'suburban'. The 'Woods at Canco' development is another successful landscape example.

Thus we would ask the project not to use plants like 'Feather Reed Grass' and 'Maiden Grass' for example, and increase the native grasses like 'Little Bluestem', 'Prairie Dropseed' and other plants compatible to the New England region. The proposed tree pallet should also diversify, currently over 100 trees using only four species, recommend reducing numbers on the 'Armstrong' Red Maples from 40 to perhaps half of that and consider other tree types like the 'Beacon' and 'Regal Prince' Oak, though they are cultivars it would be nice to have a greater mix of tree types. Tree types missing: Red Oak, Swamp White Oak (use instead of the hard to establish White Oak), Tupelo, Shagbark Hickory, River Birch, Yellow Birch, White Spruce, Larch, 'Bowall', 'Red Pointe', 'Karpick' Red Maples offer a variety of other maple types depending on the desired planting space size.

Tree planting spacing and sizes - While regular spaced trees all in certain order adds a degree of structure to the landscape, this site might be better served by including groves of trees in a more natural arrangement. This might include a mix of plant heights like 5-6' conifers and 2" caliper trees with the larger sizes proposed. Knowing the more orderly plantings might be closer to the buildings and the natural groves of trees near the edges.

Street trees - We would like to work closer with the project team to review the public 'Street tree' portion of the project. This would include species types, spacing.

Buffering - The proposed site contains existing residential boundaries with Auburn Street, and Falmouth properties on the North side and Auburn Street and Lambert Street residents on the South side, the landscape plan should address adequate buffer planting and treatment.

Wetlands / drainage treatment - the use of restored wetlands, intermittent streams, raingardens was not noticed during my review and wanted to check to see if the project is favoring natural drainage features?

d) Recreational / Open Space - It is essential to include a variety of on site recreational and trail amenities for this project. The geographic location is out of walking distance to existing playgrounds and trails. (The future Haverty Field may in time offer somewhat close trails). Recreation features for youngsters could include playground structure, adventure play items, benches. Walking trails on or around the existing site should be a requirement and could match up with Fire Safety access.

I am willing to meet to discuss and recommend modifications.

Thanks,
Jeff

=====

Extras -

https://www.maine.gov/dacf/mnap/features/invasive_plants/invasives.htm

Buckthorn -
https://www.maine.gov/dacf/mnap/features/invasive_plants/rhamnus.htm

Invasive Plants - Why should you care?

Invasive plants are a direct threat to what we value about Maine's natural and working landscapes. The aggressive growth of invasive plants increases the costs of agriculture, can affect forest regeneration, threatens our recreational experiences, and potentially decreases property values. Species like Japanese barberry and multiflora rose can form thorny, impenetrable thickets in forests and agricultural fields. Aquatic invasives can choke waterways, making it difficult to boat or swim.

Invasive species are the second-greatest threat to global biodiversity after loss of habitat. Invading plants outcompete native species by hogging sunlight, nutrients, and space. They change animal habitat by eliminating native foods, altering cover, and destroying nesting opportunities. Some invaders are so aggressive they leave no room for our natives.

[Quoted text hidden]

Lambert Woods Residential Development - Initial Traffic Review Comments DRAFT

Tom Errico <thomas.errico@tylin.com>

Mon, Jul 18, 2022 at 9:34 AM

To: Sean King <sking@portlandmaine.gov>

Cc: Jeremiah Bartlett <jbartlett@portlandmaine.gov>, Bruce Hyman <bhyman@portlandmaine.gov>, Justin Pellerin <jrp@portlandmaine.gov>

Sean - These are **draft** for others to comment on. I wanted to be sure that we don't have conflicting comments from the reviewers. Thanks

Hi Sean – Please find below my initial traffic review comments following a review of the application materials.

- The following comments are related to the Traffic Assessment prepared by Barton & Loguidice dated June 28, 2022.
 - The applicant has conducted a Trip Generation analysis and assuming an Affordable Housing development 83 peak hour trips will be generated by the project during the worst-case peak hour. I find the methods used to estimate trip generation to be reasonable. I would further note that this level of trip generation does not require a Traffic Movement Permit.
 - As noted in the report acceptable sight distance will be provided from the proposed driveways assuming vehicle speeds of 25MPH. I find conditions to be acceptable.
 - The Traffic Assessment did not identify any High Crash Locations. Although the Washington Avenue/Lambert Street intersection is not a High Crash Location (Historically it has been a High Crash Location), I would like to understand the contributing factors for crashes. The applicant shall provide the requested information.
 - Given the level of traffic generation by the project, the applicant shall conduct a traffic analysis at the Auburn Street/Washington Avenue Extension and Lambert Street/Washington Avenue Extension intersections. This shall include conducting existing traffic counts. The counts and analysis shall be performed for the weekday AM and PM peak hours.
- Three driveways are proposed to the development. The applicant shall provide information in support of a waiver from the City's Technical Standards. I would note that Washington Avenue Extension is classified as a Major Collector and thus minimizing access points is preferred.
- The plans depict a shared use path from the site to Auburn Street. The minimum width for a shared use path without constraints is 10 feet.
- The use of on-street parking spaces to meet parking demand requirements for a project has not been permitted during project reviews. It is also my understanding that zoning requires parking demand to be accommodated on site.
- If parking is provided on-site – I don't see a need for on-street parking. I would suggest on-road bike facilities.
- The number of crosswalks – I think two would seem sufficient from a spacing perspective.
- The waiver for aisle width (24' to 22') is being justified on reducing impervious surface. This has come up several times on Acorn projects. Any project can make this case – reducing pavement.
- In terms of cross-section – they are proposing 11-foot lanes and 8-foot parking lanes. The exception is at the bus stop where it will be 10.5' lanes and 10-foot shoulders. This seems okay to me.
- The improvements at Auburn Street need a detailed review and approval. ADA ramps need to be revised. I don't understand the truck apron and curbing (I understand they are trying to narrow the intersection). I would like to see turning templates and assumed design vehicle. They are eliminating an approach lane (I asked for a traffic analysis previously).
- Lambert also need detailed design review. They are also proposing a truck apron. And the curb alignment is strange. Again, understanding turning template movements is important.
- They are proposing slipform concrete curbing.

Please contact me if you have any questions.

Best regards,

Tom Errico, PE

NE TRAFFIC ENGINEERING DIRECTOR

T +1 207.347.4354

M +1 207.400.0719

E thomas.errico@tylin.com



PL-002078-2022 165 Lambert DPW Preliminary Review Comments

Justin Pellerin <jrp@portlandmaine.gov>

Wed, Jul 27, 2022 at 1:25 PM

To: Sean King <sking@portlandmaine.gov>

Cc: "Thomas.errico@tylin.com" <thomas.errico@tylin.com>, Lauren Swett <lszett@woodardcurran.com>, Jeremiah Bartlett <jbartlett@portlandmaine.gov>

Hi Sean

Please see DPW's preliminary review comments below for the Lambert Woods Project. Let me know if you want me to put these on the project Dev Rev spreadsheet.

Project Number: PL-002078-2022

165 Lambert Street (Lambert Woods)

DPW Development Review Comments

Justin Pellerin, P.E- DPW

7/27/2022

DPW Transportation Comments

- Accommodations for on-road bike facilities in this section of Washington Avenue Extension shall be implemented as part of the design. There appear to be two outcomes to provide consistent bike facilities through this corridor:
 - Eliminate the proposed curb extensions and on-street parking to provide an 8' wide dedicated bike lane on each side of the street.
 - Create shared bike/motor vehicle travel lanes as currently being proposed with additional traffic calming measures such as reducing the travel lane widths down to 10'-10.5' in an effort to provide more space between on-street parking stalls and the travel lane. This could be accomplished by striping an outer fog lane line to the desired width.
 - DPW would like further rationale for the development's proposed parking strategy before providing formal comments/acceptance of the proposed Washington Avenue Extension layout.
- The applicant should revise the width of the proposed curb extensions to 6'-7' to provide more lane width for cyclists using the proposed shared travel lane on Washington Avenue Extension. The applicant should provide a minimum transition length of 20' at the start/end of each curb extension.
- DPW suggests eliminating the easterly and westerly mid block Washington Avenue Extension crossings and consider creating one raised crosswalk at the crossing location near station 6+80 to provide enhanced pedestrian visibility and further traffic calming in this corridor.
- DPW will not be supportive of the applicant's waiver request to utilize slip form concrete curbing on Washington Avenue Extension in lieu of granite curbing. The applicant should also note that the full radius of each driveway entrance shall be constructed of granite curbing per tech manual standard 1.7.2.5.
- DPW is requesting that the applicant install a RRFB unit at the proposed Auburn Street at Garsoe Drive crosswalk location.
- **DPW is requesting to meet with the applicant's engineer to better understand the design intent of the proposed horizontal alignment and curbing changes being proposed at the Washington Avenue intersections with Lambert Street and Auburn Street.**
- Changes to the design of the Washington Avenue ADA ramps at Lambert Street should be considered to better align the ramp with the direction of egress across the proposed crosswalk.
- DPW is requesting further information to better understand the design intent of the multi-use path being proposed on the northside of Washington Avenue Extension. If implemented, the path would ideally be a minimum of 10' wide and extend the entire length of Washington Avenue from Lambert Street to Auburn Street to help provide further connectivity for the Portland Trail network.
- The applicant should consider ways to provide a 3' minimum esplanade for the proposed sidewalks and pathways being proposed on Washington Avenue extension.

- The applicant should provide further information on how proposed tree placement within the Washington Avenue Extension right of way could affect site line visibility of pedestrians at proposed crosswalk ramp locations.
- The site plan refers to a driveway detail which could not be located in the plan set. The applicant should provide this driveway detail and provide information how the proposed driveway designs will meet sidewalk ADA requirements.
- Per section 10 of the City's technical manual *"Developments subject to site plan review, with the exception of minor residential or low impact site development projects, as defined in Chapter 16 of this Technical Manual, that are on an existing or proposed street that is not currently illuminated with street lighting meeting City standards shall install the requisite type and number of street lights along all frontages."* The applicant should address this standard.

DPW Water Resources Comments:

- DPW is seeking further clarification and rationale for the number of stormwater outfalls and the corresponding pipe sizes being proposed to tie into the City's existing ditch lines on Washington Avenue Extension. It appears that the applicant is anticipating greater stormwater flows leaving the development site than what is indicated in the stormwater management report post development POI # 1 flow rate. The existing closed storm drain system at the SW corner of Lambert and Washington is a 15" circular pipe. DPW is concerned that any additional flows may cause downstream system capacity issues especially during large/high intensity rain events.
- The applicant shall provide further information regarding flows anticipated within the ditch lines and shall complete an analysis to determine if further improvements to the existing ditch lines are necessary to accommodate the additional stormwater flow and to protect against potential scouring of the ditch channel and embankments.
- The storm water pipe discharge angles of SD 1.1, 6.1 and 8.1 into the Washington Avenue Extension ditch lines should be revised such that flow is discharged more in line with the main flow line of the ditch.
- DPW has concerns that the proposed south side level spreader # 2 discharge will flow towards private property.
- The applicant shall provide further detail about the proposed catch basin inlet improvements at the end of the southerly and northerly Washington Ave extension ditch lines. The applicant should specify a beehive grate with proper inlet capacity to drain the proposed ditch line flows. These proposed inlets should be surrounded with a 5' riprap/geotextile fabric perimeter at least 12"-18" thick below the proposed inlet rim elevations. The applicant should provide a detail in the plan set for the proposed improvements to this inlet.
- The applicant shall submit further information and design detail for the rip-rap energy dissipation pads at locations where the development's proposed storm drain systems daylight into the existing Washington Avenue ditch line.
- The applicant should specify on the plans how the southerly and northerly ditch lines will be permanently stabilized.
- The applicant should update the project erosion control and construction management plans to include work in the right of way and specify measures to prevent erosion of the City's ditchline and sediment transport into the City's separated storm drain system.
- DPW Water Resources is not supportive of the proposed rain gardens located within the Washington Avenue Extension right of way. If further treatment/flow attenuation is needed to meet regulatory requirements, it shall be provided on the development site.
- DPW is requesting that the applicant grants the City of Portland permanent drainage easements for any proposed stormwater inlet or discharge points on private property providing drainage for the Washington Avenue Extension Street right of way. These drainage easements shall be a minimum of 30' long by 30' wide.

DPW General Site Comments:

- It appears that a fire truck will have trouble circulating through the site without driving over proposed curbing based on a review
- DPW suggests moving the development's proposed internal sanitary sewer outside of the footprint of the proposed porous pavement system.
- The applicant should consider signage to discourage on-site drivers from driving down and parking along the proposed emergency access roads corridor.



Re: Fore Street

Mike Tremblay <mtremblay@gpmetro.org>
To: Justin Pellerin <jrp@portlandmaine.gov>
Cc: Sean King <sking@portlandmaine.gov>

Wed, Jul 27, 2022 at 10:12 AM

Justin (and Sean, copied):

This applicant has regularly engaged Metro in discussions about this project, including in the site design and in discussions about providing residents with discounted or free Metro fares.

This project is located along two existing Metro routes, the 9A and 9B, which run clockwise and counterclockwise, respectively. While not obvious from the schedules, both routes often use this segment of Washington Avenue as a brief layover spot, as it is the turnaround point for both routes before they converge again near Morrill's Corner. The Applicant has enthusiastically offered to make this layover location more formal, with dedicated pull-offs and shelters for buses, and a restroom that would be available to drivers during most or all of the service period. The applicant would also provide shelter pads for both the 9A and 9B. No written agreement has been signed, but we believe the Applicant is enthusiastic about a transit-oriented site here, despite its suburban location.

Metro plans to improve off-peak service on the 9A and 9B routes with ARPA funding in the short term. Assuming that is successful, we would hope to maintain this improved service. This would mean that residents of this development would have bus service roughly every 15 minutes throughout the day, if they are not picky about which direction they are going (e.g. if their destination is downtown Portland). That said, GPCOG is conducting a study called Transit Together, which is recommending route changes. We do not expect the 9A/9B service to change substantially; however, there is a possibility that these routes, including service to this site, would be affected by system service optimizations. In this case, Metro would likely look to serve this area with an on-demand transit alternative, which can be more efficient at serving low-density areas. Recommendations on Transit Together are expected this fall.

Comments on the site plan:

- Bus shelters should be placed closer to the front of the bus stop pull-offs, if possible. Passengers wait to board the bus, which occurs at the front door.
- Metro supports the lower parking ratio proposed. The additional ridership generated by residents who are not exceedingly incentivised to drive due to being provided abundant parking will support continued, and hopefully improved, bus service to this area in the future.
- Metro supports the aprons being proposed at the intersections as a traffic calming measure. These aprons should be sized so that buses do not need to mount them in order to turn, which would be very uncomfortable for bus passengers. The turns in question are the right turn from Lambert onto Washington, and the right turn from Washington onto Auburn.
- Existing bus stop signs should be used.
- Bus stops may be denoted with specialty pavement markings (BUS STOP legends) to help reinforce that no parking is permitted in bus stops (this is recommended city/systemwide).
- The Applicant will be required to submit a Transportation Demand Management (TDM) plan as part of this project. Metro-specific items to support reduced automobile dependence include, but are not necessarily limited to, providing bus passes to all residents; providing shelter infrastructure as proposed, providing real-time information signage at shelters and in common spaces, and providing bus schedules and maps in common spaces.

Please let me know if you have any questions. I'm happy to review again if anything changes to the transit elements on this plan.

-Mike

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Mike Tremblay, P.E. *(he, him, his)*

Director of Transit Development

Greater Portland Metro

114 Valley Street | Portland, ME 04102

Office: 207.517.3023 | Mobile: 508.451.0208

e-mail: mtremblay@gpmetro.org | website: www.gpmetro.org

165 Lambert Street Comments

Lauren Swett <lszett@woodardcurran.com>
To: Sean King <sking@portlandmaine.gov>
Cc: Justin Pellerin <jrp@portlandmaine.gov>

Wed, Jul 27, 2022 at 4:51 PM

Hi Sean,

I have reviewed the 165 Lambert Street project, and have the following comments.

- The project is required to comply with MaineDEP Chapter 500 and City of Portland Section 5 standards for stormwater management.
 - Basic Standards – The project is providing for erosion and sedimentation controls on the site, and has provided two plans one each for the areas north and south of Washington Avenue. On Plan C-04, some of the work area extends off of the page and there is also an area where site drainage could exit the site that does not have perimeter erosion control – these areas should be updated. Work is also proposed for areas along Washington Avenue, and similar erosion control measures should be identified for those impact areas as well.
 - General Standards – Stormwater treatment is being provided on the site using underdrained subsurface sand filters and porous pavement.
 - The Applicant should address the depth of groundwater. The subsurface sand filter and soil filter details include an impermeable liner, but the porous pavement detail does not.
 - The report does not address the design of the proposed soil filters along Washington Avenue. The City has expressed some concern with utilizing these underdrained soil filters, so further coordination will be required.
 - Flooding Standards – The Applicant has noted that the Flooding Standard has been met, primarily maintaining flows at the pre-development condition. I have reviewed the HydroCAD model and have the following comments.
 - The Applicant is utilizing a method of evaluating flow through porous pavement with a large time of concentration that I am not familiar with, but I am continuing to review. I am specifically interested in understanding more about how the use of the large time of concentration works with also separately modeling the porous pavement's storage and flow-through. I will continue to review and will provide additional comment as required.
 - The Applicant should review the time of concentration calculations for areas that are remaining as undeveloped. In some cases it appears that surface types may have been modified from the pre-development to post-development models resulting in larger TC values in the post-development condition.
 - The North and South grading and drainage plans both include drainage structures and stormdrain pipes. The numbering of these structures and pipes includes the same numbers on both the north and south project areas. It is suggested that the Applicant consider some kind of naming distinction as there could be some confusion when distinguishing the different project areas.
 - The Applicant should review the drainage structure rims with the proposed site grading that is shown on the plans – in some areas of the site the grades seem to be different than the structure rims. For example, CB6 on the southern project area appears higher than site grades; similarly CB2 on the northern project area is also slightly higher. The catch basins will provide the overflow backup for the permeable pavement, so they should be set at low points to be able to collect stormwater in higher intensity storm events or in the event that areas of the permeable pavement becomes clogged.
- The utility plan shows the proposed locations of an electric utility pole and guywire east of the driveway and north of Washington Avenue. Please clarify what work may be necessary to install this utility infrastructure, and if this is part of the identified wetland impacts.
- The potential snow storage locations that have been identified on the plans should be reviewed with proposed landscaping for conflicts. It appears that some areas may overlap with proposed trees.
- The proposed landscape plans for the Washington Avenue work should be coordinated with the site plans. The landscape plans do not appear to show the entire area, they do not account for proposed stormwater features, and it appears that trees are proposed within stormwater swales, and in some cases on slopes that are identified on the site plans as rip rap. Any proposed on-street vegetation should also be coordinated with utilities.
- City of Portland Department of Public Works has provided a number of comments about the proposed stormwater management system, in particular for the work proposed within the Washington Avenue Right of Way. I would echo their comments, and would note that one area that needs some further clarification is the section from stations 9+00 to 13+50. Based on the grading plan, it is not completely clear where drainage will be directed, and what impacts drainage may have on off-site areas.

Please let me know if you have any questions!

Thanks,

Lauren Swett, PE

Technical Manager | Principal



 207-558-3763  207.219.3591  woodardcurran.com

 lswett@woodardcurran.com

 41 Hutchins Drive, Portland, ME 04102

Project: 165 Lambert Street (PL-002078-2022)

Planner: Sean King

Comments (originally shared with applicant 7/22/2022, items in red dated 7/27/2022):

Planning

- Kevin Kraft (Deputy Director)
 - Document the existing conditions by boundary and ownership of the 0 Gray Street property in Falmouth, ME. Indicate the property and acreage for conservation use on a surveyed plan.
- Sean King (Urban Designer)
 - Advance design of proposed facilities for the Community Pavilion, and include the intent for use. With the majority of household services (ie. grocery, playground, community and social such as child care services) are beyond the 1-mile radius, consider community pavilion as building for access to essential goods and services within the development.
 - Maine Cooperative Development Partners plans to provide a list of major employers within a 1/4 mile of bus stops on the 9A/9B, for sharing with residents and to conduct outreach to those employers regarding housing availability at Lambert Woods.
 - Provide rationale for the proposed surface material selection, consider the addition of more concrete pavers (potentially permeable) for the mews to connect building entries and assist to delineate vehicular and pedestrian use. Maintain parking and driveways as asphalt.
 - Clarify the interior circulation pathway materials, it appears asphalt is proposed at the north and concrete pavers proposed at the south. Consider a unified surface material of concrete for the interior pathways and building entries with concrete pavers.
 - Provide site lighting locations and photometrics. Provide street lighting locations and photometrics along Washington Ave Extension.
 - Indicate where storage is provided for each dwelling unit per building type.
 - Building design comments:
 - Confirm Guest suite as Studio apartments in Community Flats
 - Provide variation in façade character along building facades that face Common (Building B.5, B.4, B.2 & B.1) as a more activated elevation. Consider delineation of first floor (ie. window awning, secondary entry or variation in façade material) that breaks horizontal scale of buildings longer than 40 feet.
 - Outline the organization structure of the Co-op development to acknowledge common area maintenance vs. tenant responsibilities. Applicant to describe or direct planner to documents submitted.

Transportation & Traffic

- Tom Errico (traffic consultant with TYLin)

The following comments are related to the Traffic Assessment prepared by Barton & Loguidice dated June 28, 2022.

- The Traffic Assessment did not identify any High Crash Locations. Although the Washington Avenue/Lambert Street intersection is not a High Crash Location (Historically it has been a High Crash Location), I would like to understand the contributing factors for crashes. The applicant shall provide the requested information.
 - Given the level of traffic generation by the project, the applicant shall conduct a traffic analysis at the Auburn Street/Washington Avenue Extension and Lambert Street/Washington Avenue Extension intersections. This shall include conducting existing traffic counts. The counts and analysis shall be performed for the weekday AM and PM peak hours.
- Three driveways are proposed to the development. The applicant shall provide information in support of a waiver from the City's Technical Standards. I would note that Washington Avenue Extension is classified as a Major Collector and thus minimizing access points is preferred.
 - The plans depict a shared use path from the site to Auburn Street. The minimum width for a shared use path without constraints is 10 feet, although existing constraints by drainage system shall be considered. Applicant shall provide the design intent of the proposed multi-use path on the north side of Washington Avenue Extension. Confirm if share use path provides linkage of the Portland Trails Sebago to the Sea trail head and the Presumpscot Falls portion of the trail.
 - The use of on-street parking spaces to meet parking demand requirements for a project has not been permitted during project reviews, zoning requires parking demand to be accommodated on site. Applicant to provide rationale behind the proposal to include the amount of on-street parking along with further justification for the amount of total parking provided for the development with the exemption for 1/4 mile from a fixed transit route.
 - Suggest on-road bike facilities in this section of Washington Avenue Extension with the following options:
 - 1.) Eliminate the proposed curb extensions and on-street parking to provide a dedicated 8' wide bike facility (6' width bike lane, 2' width buffer) on each side of the street.
 - 2.) Create a shared lane bike facility as they are proposing with additional traffic calming measures such as reducing the travel lane width's down to 10.5' to provide more space between the on-street parking stalls and the travel lane by striping an outer fog lane line.
 - The waiver for aisle width (24'to 22') is being justified on reducing impervious surface. Any project can make this case – reducing pavement. The development is proposing to create 2.69 acres of impervious area. The threshold of a Maine DEP SLODA permit is the creation of 3 acres of impervious area. So that could be the angle here.

Public Works & Engineering

- Justin Pellerin (Public Works Senior Engineer)

- Recommend to eliminate the easterly and westerly crossing and have one dedicated crossing at the middle location with an RRFB, it seems like westerly and easterly crossing locations are in very close proximity to driveways being proposed.
- DPW will **NOT** supportive of slip form curbing to be installed on a major collector such as Washington Avenue Extension.
- Accommodations for on-road bike facilities in this section of Washington Avenue Extension shall be implemented as part of the design. There appear to be two outcomes to provide consistent bike facilities through this corridor:
 - Eliminate the proposed curb extensions and on-street parking to provide an 8' wide dedicated bike lane on each side of the street.
 - Create shared bike/motor vehicle travel lanes as currently being proposed with additional traffic calming measures such as reducing the travel lane widths down to 10'-10.5' in an effort to provide more space between on-street parking stalls and the travel lane. This could be accomplished by striping an outer fog lane line to the desired width.
 - DPW would like further rationale for the development's proposed parking strategy before providing formal comments/acceptance of the proposed Washington Avenue Extension layout.
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- The applicant should consider ways to provide a 3' minimum esplanade for the proposed sidewalks and pathways being proposed on Washington Avenue extension.

- The applicant should provide further information on how proposed tree placement within the Washington Avenue Extension right of way could affect site line visibility of pedestrians at proposed crosswalk ramp locations.
- The site plan refers to a driveway detail which could not be located in the plan set. The applicant should provide this driveway detail and provide information how the proposed driveway designs will meet sidewalk ADA requirements.
- DPW General Site Comments:
 - It appears that a fire truck will have trouble circulating through the site without driving over proposed curbing based on a review
 - DPW suggests moving the development's proposed internal sanitary sewer outside of the footprint of the proposed porous pavement system.
 - The applicant should consider signage to discourage on-site drivers from driving down and parking along the proposed emergency access roads corridor.
- Jeremiah Bartlett (Public Works Transportation Systems Engineer)
 - Current configuration of Washington Ave Ext. not sufficient. Cross section needs revisions by the applicant to consider curb bump out to account for a reduced bike lane width, striping travel lane and reduce to 10', elevated crosswalks for traffic calming. On-street parking should accommodate the development and not create overflow into the adjacent neighborhood.

DPW Water Resources Comments:

- DPW is seeking further clarification and rationale for the number of stormwater outfalls and the corresponding pipe sizes being proposed to tie into the City's existing ditch lines on Washington Avenue Extension. It appears that the applicant is anticipating greater stormwater flows leaving the development site than what is indicated in the stormwater management report post development POI # 1 flow rate. The existing closed storm drain system at the SW corner of Lambert and Washington is a 15" circular pipe. DPW is concerned that any additional flows may cause downstream flooding issues, especially during large events.
- The applicant shall provide further information regarding flows anticipated within the ditch lines and shall complete an analysis to determine if further improvements to the existing ditch lines are necessary to accommodate the additional stormwater flow and to protect against potential scouring of the ditch channel and embankments.
- The storm water pipe discharge angles of SD 1.1, 6.1 and 8.1 into the Washington Avenue Extension ditch lines should be revised such that flow is discharged more in line with the main flow line of the ditch.
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- DPW is requesting that the applicant grants the City of Portland permanent drainage easements for any proposed stormwater inlet or discharge points on private property providing drainage for the Washington Avenue Extension Street right of way. These drainage easements shall be a minimum of 30' long by 30' wide.

Stormwater

- Lauren Swett (Stormwater management consultant with Woodard and Curran)
 - The project is required to comply with MaineDEP Chapter 500 and City of Portland Section 5 standards for stormwater management.
 - Basic Standards – The project is providing for erosion and sedimentation controls on the site, and has provided two plans one each for the areas north and south of Washington Avenue. On Plan C-04, some of the work area extends off of the page and there is also an area where site drainage could exit the site that does not have perimeter erosion control – these areas should be updated. Work is also proposed for areas along Washington Avenue, and similar erosion control measures should be identified for those impact areas as well.
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 - The Applicant should address the depth of groundwater. The subsurface sand filter and soil filter details include an impermeable liner, but the porous pavement detail does not.
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 - The Applicant is utilizing a method of evaluating flow through porous pavement with a large time of concentration that I am not familiar with, but I am continuing to review. I am specifically interested in understanding more about how the use of the large time of concentration works with also separately

modeling the porous pavement's storage and flow-through. I will continue to review and will provide additional comment as required.

- The Applicant should review the time of concentration calculations for areas that are remaining as undeveloped. In some cases it appears that surface types may have been modified from the pre-development to post-development models resulting in larger TC values in the post-development condition.
 - The North and South grading and drainage plans both include drainage structures and stormdrain pipes. The numbering of these structures and pipes includes the same numbers on both the north and south project areas. It is suggested that the Applicant consider some kind of naming distinction as there could be some confusion when distinguishing the different project areas.
 - The Applicant should review the drainage structure rims with the proposed site grading that is shown on the plans – in some areas of the site the grades seem to be different than the structure rims. For example, CB6 on the southern project area appears higher than site grades; similarly CB2 on the northern project area is also slightly higher. The catch basins will provide the overflow backup for the permeable pavement, so they should be set at low points to be able to collect stormwater in higher intensity storm events or in the event that areas of the permeable pavement becomes clogged.
 - The utility plan shows the proposed locations of an electric utility pole and guywire east of the driveway and north of Washington Avenue. Please clarify what work may be necessary to install this utility infrastructure, and if this is part of the identified wetland impacts.
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 - The proposed landscape plans for the Washington Avenue work should be coordinated with the site plans. The landscape plans do not appear to show the entire area, they do not account for proposed stormwater features, and it appears that trees are proposed within stormwater swales, and in some cases on slopes that are identified on the site plans as rip rap. Any proposed on-street vegetation should also be coordinated with utilities.
 - City of Portland Department of Public Works has provided a number of comments about the proposed stormwater management system, in particular for the work proposed within the Washington Avenue Right of Way. I would echo their comments, and would note that one area that needs some further clarification is the section from stations 9+00 to 13+50. Based on the grading plan, it is not completely clear where drainage will be directed, and what impacts drainage may have on off-site areas.
-
- Jodie Keene (Public Works Stormwater Coordinator)
 - Recommends a realistic limit of work to include staging, equipment and earthwork anticipated adjacent to wetlands to accurately depict disturbance area. Riprap is not recommended as a permanent solution and promotes a robust vegetated solution and

erosion matting solution at steep grades adjacent to wetland. Consider appropriate vegetated buffers at wetland edges.

Open Space & Trails

- Jeff Tarling (Parks Operational Manager / City Arborist)
 - Advocate for trails in passive wooded areas, applicant to clarify how open space requirement is being met. Coordinate with Falmouth Land Trust & Portland Trails for potential opportunities for trail connections and future recreation use.
 - **TREE SAVE / Limit of Work** - The final plan should include a 'Tree Save' / Limit of Work designation and plan to be used prior to clearing and during construction. This would include a written plan, signage and construction fencing to prevent off site storage or materials and equipment. "Tree Save" trees should be protected with signage and fencing around the drip line. To date the plan does not show either a tree save or limit of work. The proposed project clears an extensive amount of existing forest without any tree saves or forest management suggestions? The site workclearing should include nearby forest thinning improvements for sustainable landscape and safety.
 - **Invasive plant management** - The northern side of the project especially contains extensive Common Buckthorn shrubs, the project should identify, plan and remove all invasive plants as part of their clearing portion of site work. This has been a standard on other project sites where high numbers of invasive plants are located.
 - **Tree & Landscape treatment** - We encourage high percentage use of native plants on wood sites like the proposed 165 Lambert Street project. Stevens Commons for example next to Baxter Woods successfully modified their landscape plan to a higher percentage of native species. This should be a condition of approval. The site is surrounded by natural appearing woodlands, the project should appear part of the surrounding landscape vs 'suburban'. The 'Woods at Canco' development is another successful landscape example. Thus we would ask the project not to use plants like 'Feather Reed Grass' and 'Maiden Grass' for example, and increase the native grasses like 'Little Bluestem', 'Prairie Dropseed' and other plants compatible to the New England region. The proposed tree pallet should also diversify, currently over 100 trees using only four species, recommend reducing numbers on the 'Armstrong' Red Maples from 40 to perhaps half of that and consider other tree types like the 'Beacon' and 'Regal Prince' Oak, though they are cultivars it would be nice to have a greater mix of tree types. Tree types missing: Red Oak, Swamp White Oak (use instead of the hard to establish White Oak), Tupelo, Shagbark Hickory, River Birch, Yellow Birch, White Spruce, Larch, 'Bowall', 'Red Pointe', 'Karpick' Red Maples offer a variety of other maple types depending on the desired planting space size.
 - **Tree planting spacing and sizes** - While regular spaced trees all in certain order adds a degree of structure to the landscape, this site might be better served by including groves of trees in a more natural arrangement. This might include a mix of plant heights like 5-6' conifers and 2" caliper trees with the larger sizes

proposed. Knowing the more orderly plantings might be closer to the buildings and the natural groves of trees near the edges.

- **Street trees** - We would like to work closer with the project team to review the public 'Street tree' portion of the project. This would include species types, spacing. Applicant to include total tree count proposed.
- **Buffering** - The proposed site contains existing residential boundaries with Auburn Street, and Falmouth properties on the North side and Auburn Street and Lambert Street residents on the South side, the landscape plan should address adequate buffer planting and treatment.
- **Wetlands / drainage treatment** - the use of restored wetlands, intermittent streams, raingardens was not noticed during my review and wanted to check to see if the project is favoring natural drainage features?
- **Recreational / Open Space** - It is essential to include a variety of on site recreational and trail amenities for this project. The geographic location is out of walking distance to existing playgrounds and trails. (The future Haverty Field may in time offer somewhat close trails). Recreation features for youngsters could include playground structure, adventure play items, benches. Walking trails on or around the existing site should be a requirement and could match up with Fire Safety access.

Fire & Life Safety

- Jason Grant (Fire Prevention staff)
 - Fire truck access shall be well marked and visible from public street.
 - Indicate appropriate snow storage and maintenance agreement to ensure fire access is clear at all times.
 - Consider loop connection at the south development lot to gain access behind back of buildings to eliminate backing out onto Washington Ave Extension.
 - Prefer alignment of fire truck access lanes where grasscrete is proposed, applicant to justify design intent.

Zoning

- Ann Machado (Zoning Administrator)
 - Applicant to quantify and show on plans the net land area. The report from Jones Associates states that there is approximately 236,727.92 sf (5.43 acres) of delineated wetlands on the two properties. That is part of what needs to be subtracted from the net land area, but we still need to know the square footage of the watercourse (stream) and the slopes of 25% or greater. The overall site plan (sheet C-09) under Net Land Area states that 244,738 sf has been deducted from the property area to reach the netland area of 537,251 sf.

- Applicant to confirm density bonus under section 18.2.4.B for PRUDs. Applicant to outline minimum lot area per dwelling unit in table.
- Applicant to confirm if seeking minimum recreation open space reduction to 200/square feet of common area.
- Proposed 122 parking (67 off street, 55 on street). The proposed 55 on-street parking stalls would not be counted towards required parking. R3 requires 1 parking stall per unit. Planning Board may establish a parking requirement less than 1 per unit based on affordable housing development. Applicant has provided TDM to pursue Land Use Code, Article 19, Table 19-B: Categorical Exceptions to Off-Street Parking Minimums, "No off-street parking shall be required within ¼ mile of fixed route transit service. New uses or changes of use of more than 10,000 SF taking advantage of this exception shall be required to provide a Transportation Demand Management Plan if they use this provision in lieu of parking requirements."
- Confirm the minimum building setbacks being observed for the development, zoning requirement for PRUD is 16 foot separation between buildings. Affordable housing of more than 50% can be reduced to 10 feet.

Inclusionary Housing

- Victoria Volent (Housing Coordinator)
 - 165 Lambert Street would meet the IZ requirement of 25% of the units being workforce housing at 80% AMI and over 50% low income housing at 100% AMI for the density allowed under section 18.2.4.B. There will be 12 two-story townhouses, 48 three-story rowhomes, and 105 three-story flats - consisting of a total of 5 studios, 64 one-bedroom, 50 two-bedroom, and 46 three-bedroom units.

Observations:

Transportation & Traffic

- Tom Errico (traffic consultant with TYLin) –

The following comments are related to the Traffic Assessment prepared by Barton & Loguidice dated June 28, 2022.

- The applicant has conducted a Trip Generation analysis and assuming an Affordable Housing development 83 peak hour trips will be generated by the project during the worst-case peak hour. I find the methods used to estimate trip generation to be reasonable. I would further note that this level of trip generation does not require a Traffic Movement Permit.
- As noted in the report acceptable sight distance will be provided from the proposed driveways assuming vehicle speeds of 25MPH. I find conditions to be acceptable.

- In terms of cross-section – they are proposing 11-foot lanes and 8-foot parking lanes. The exception is at the bus stop where it will be 10.5' lanes and 10-foot shoulders. This seems okay to me.

Further Review Required:

Planning

- R3 PRUD Design Review Memo

Transportation & Traffic

- The improvements at Auburn Street need a detailed review and approval. ADA ramps need to be revised.
- The improvements at Lambert Street need a detailed review and approval. DPW observes that the curbing alignment at this intersection might have an adverse impact on plowing operations.

CITY of PORTLAND, MAINE
Request for Proposals for Disposition of City-Owned Property
Located at 165 Lambert Street

I. NOTICE AND SPECIFICATIONS

The City of Portland, Maine seeks proposals from qualified developers for the creation of residential housing at 165 Lambert Street. The site is designated on the City of Portland Tax Assessor's Map as lots CBL 385 A001, and 386 C001.

Sealed proposals for the project, including an original, seven (7) copies, and one (1) digital copy, as specified herein, will be received by the Purchasing Office, Room 103, City Hall, 389 Congress Street, Portland, Maine 04101, until 3:00 p.m., Tuesday May 12, 2020, at which time they will be publicly opened.

Proposals shall be submitted, and returned in sealed envelopes plainly marked on the outside "Disposition and Development of Property Located at 165 Lambert Street".

Proposals that are late, unsigned or submitted via fax will not be accepted. Proposals from individuals not registered with the Purchasing Office may be rejected; receipt of this document directly from the City of Portland indicates registration. Should a person receive this Request from a source other than the City, please contact 207-874-8654 to ensure that you are listed as a recipient for this proposal.

All questions must be submitted in writing to the Purchasing Office. These may be mailed, hand delivered, faxed to (207) 874-8652 or e-mailed to mff@portlandmaine.gov and be received no later than five (5) business days prior to the opening date. Questions received after this time will not be addressed. Any interpretation, correction, or change of this document will be made only by written addenda. Changes in any other manner will not be binding on the City and proposers should not rely on. Proposers should not have contact with any City staff with regard to this proposal unless to obtain general public information as specified in the document.

The disposal of this real estate shall be on the basis of a negotiated proposal, with the City of Portland reserving the right to refuse any and all proposals. *All proposers are advised that the property will be sold "as-is" and "where is", in its existing condition, with no warranties either expressed or implied.* The City makes no representations or warranties about of any of the information about the property set forth herein, which is provided to proposers for their convenience only. The successful proposer shall be responsible to inspect the property, or to hire its own professionals to do so. The City, and its agents, make no representations or warranties with respect to the title of the property, the accuracy of any statement as to boundaries or acreage, or as to any other matters contained in any description of the property, or as to the fitness of the property for a particular purpose, or as to development rights, merchantability, habitability, or as to any other matter, including without limitation, land use, zoning and subdivision issues or the environmental, mechanical, or structural condition of the property. The City disclaims any and all responsibility for injury to proposers, their agents or others while examining the property or at any other time. The City will not be responsible for any broker's commission.

Any and all improvements made to said property must be done in accordance with existing City Codes and Ordinances.

II. GENERAL INFORMATION

Summary of Request:

The City of Portland is committed to providing housing opportunities and has set a goal to evaluate the use of City-owned property to construct housing. As one-step in accomplishing this goal, the City of Portland will accept proposals for the development of housing on the lot located at 165 Lambert Street, which currently is vacant.

This request for proposals results from the December 16, 2019 approval by the Portland City Council (Resolve 10-19/20) of the recommendations of the Housing Committee to market the City-owned vacant property located at 165 Lambert Street.

The City of Portland uses the RFP process to ensure that public resources are utilized for maximum public benefit while accomplishing specific objectives and providing fair access to all applicants.

Site Information:

- a. **Location:** 165 Lambert Street, as identified in the City of Portland Assessor's records as lot CBL 385 A001 and 386 C001 (See Attachment 2).
- b. **Existing Conditions:** 165 Lambert Street is located on two parcels totaling 13.3874 acres with frontage on Lambert Street in the North Deering neighborhood. The surrounding context is predominantly residential with the majority of homes in the area being one-family structures. The topography is quite steep and much of the parcel is designated as wetlands. A large portion of Auburn Street storm drain discharges to this area.
- c. **Current use:** Vacant lot.
- d. **General Dimensions:** Together these lots are approximately 13.3874 acres or 583,157 square feet.
- e. **Current Zoning:** R-2. The R-2 zone allows for the creation of single-family detached dwelling units on minimum lot sizes of 10,000 square feet. At 13.39 acres (583,157 square feet), this parcel could permit a maximum residential density of 58 single-family homes. However, there are extensive wetlands on approximately 8 acres on the site that will limit maximum development potential. For complete zoning requirements, please refer to Chapter 14, Land Use, of the City Code.
- f. **Rezoning:** Higher density zoning that furthers exceptional projects and city goals as outlined in Section III will be considered. For example, the R-3 residential zone allows for Planned Residential Unit Development (PRUD) on properties of 3 acres or more, and a higher maximum residential density of 6,500 square feet per dwelling unit. A PRUD would allow for alternative site layouts, and the ability to avoid impacts to on-site wetlands. It should be noted that changes to zoning require both Planning Board and City Council approval.
- g. **Condition of the property at the time of disposition:** Wetlands present. See Boyle

Associates report and Jones Associates report available online.

- h. Environmental Conditions:** Boyle Associates conducted a wetland delineation in July of 2009 and prepared a wetland sketch plan for the City of Portland; 4.53 acres of uplands were identified during their review. During a site visit in October of 2019, Jones Associates confirmed there had been no changes to the wetlands and the wetland delineations done by Boyle Associates were still appropriate to use. The City of Portland reserves the right to establish a conservation easement on the non-developable portions of the parcel. The Jones Associates report is available on-line.
- i.** Proposers are urged to investigate water sources and utility connection requirements with the Department of Public Works.

III. CITY GOALS

The City's primary goals for the use of the property are:

1. Developments shall provide mixed income units. All units must be affordable to households earning 60% to 120% of the area median income – which 60% is now \$55,800 for a family of four and 120% is now \$111,600 for a family of four.

Affordable means that the percentage of income a household is charged in rent and other housing expenses including utilities, or must pay in monthly mortgage payments (including real estate taxes, mortgage insurance, condominium/HOA fees, insurance and utilities), does not exceed 30% of a household's gross income, or other amount established in city regulations that does not vary significantly from this amount.

Restrictions on the affordability of units must be in place for a minimum of 30 years for homeownership units, and the longest period allowed by law for rental units.

2. Development of mixed income homeownership or rental housing of excellent building and site design. Design principles should promote efficient use of land to create a development that is compatible with the existing pattern, scale, massing, and materials of the surrounding neighborhood. The development's buildings shall be designed to meet the City's Green Building Code.
3. Environmental preservation should be identified to retain a balance between development and conservation of open space important for wildlife, ecological, and environmental values.
4. Rezoning may be considered to support increase housing development opportunities or maximize the number of allowable housing units on the property.
5. Developments shall create housing options that are age inclusive.

The general terms for this real estate transaction include:

- Units must be used as the principal residence of the owner/tenant and owner/tenant shall not use the unit for the conduct of business (except for a home occupation allowed under the City of Portland zoning ordinance) or as an investment property. Units shall not be rented for short-term periods of one to thirty days.
- The sale or long term lease of the property below fair market value may be considered to support housing development that meets the City's stated goals.
- Alternative Ownership Models. Alternative ownership models that will encourage a mixed income community with long term affordability for the maximum number of units, such as limited equity units, co-housing, cooperative, or a community land trust, may be considered in order to ensure the units affordability over time.
- Proposals must outline how they will maintain affordability.
- Other City Incentives. Other city financial incentives may be considered to support increase housing development opportunities or maximize the number of allowable housing units on the property.

IV. PROPOSED SCORING

An internal staff Committee will review proposals received, and will apply the following selection criteria in reviewing and scoring the applications.

Proposed use to achieve the City of Portland's goals

40

points

1. Market Demand - 20 points
 - a. 20 points - all units meet the City's Goals and Terms noted in Section III
 - b. 15 points - at least 75% of the units meet the City's Goals and Terms noted in Section III
 - c. 10 points - at least 50% of the units meet the City's Goals and Terms noted in Section III
 - d. 0 points - project does not does not meet the City's Goals and Terms noted in Section III
2. Economic diversity - 10 points
 - a. 10 points - creates housing options which promote economic diversity in the neighborhood in which the development is located
 - b. 0 points - does not promote economic diversity
3. Age Inclusive – 10 points
 - a. 10 points – creates housing which is age inclusive
 - b. 0 points – does not create housing which is age inclusive

Impact on surrounding neighborhood, including design.

25 points

1. Project Design - 15 points
 - a. 15 points - the proposal is consistent with design characteristics
 - b. 10 points - the proposal is an adequate fit with neighborhood characteristics
 - c. 0 points - the design is a significant outlier
2. Amenities and unit design -- 10 points
 - a. 10 points - amenities & unit design are well thought out and appropriate for residents
 - b. 5 points - amenities & unit design are adequate

- c. 0 points - amenities and unit design raise significant concerns that resident needs will not be adequately addressed

Applicant's ability to complete project, including financial feasibility, development team experience, capacity, and timeframe for completion. 35 points

1. Readiness to proceed - 15 points
 - a. 15 points - all projected sources of funding include letters of commitment or interest are projected at terms and conditions consistent with the City's prior experience with the funder
 - b. 10 points - most projected sources of funding include letters of commitment, letters of interest, or, if no letter is included, are projected at terms and conditions consistent with the City's prior experience with this funder
 - c. 0 points - one or more sources are projected on terms that are not consistent with the City's prior experience with the funder and are not documented by letter(s) from funder(s)
2. Track record of development team - 10 points
 - a. 10 points - every development team member has a successful track record with this type of project and at this scale
 - b. 8 points - all but one development team members have a successful track record with this type of project and at this scale; one development team member has relevant experience but at a smaller scale or not of this project type
 - c. 5 points - two development team members, while having relevant experience, are new to this type of project or this scale of development
 - d. 0 points - the development team does not meet the criteria above
3. Current Capacity of development team - 10 points
 - a. 10 points - development team members have exceptional depth of human and financial resources to complete this project
 - b. 8 points - development team members have the human and financial resources to complete this project
 - c. 5 points - development team has a staffing gap in a significant role and a plan to address that gap, OR there are some concerns about the financial resources of the team to move the development forward
 - d. 0 points - the development team does not meet the criteria described above

SUBMISSION INFORMATION

Interested parties are asked to submit a concept development (including preliminary drawings) and a brief description of the project, no longer than two pages, to include the number and type of units, occupants (owners/renters) to be served, special features, the impact on the neighborhood and other ways the proposal meets the primary goals of the City. A general project budget with projected funding sources, development timeline, and development team qualifications and financial capabilities is also required. This RFP does not require detailed architectural drawings or development pro formas.

Photographs and maps of the site and area are required.

- a) **Developer:** Name, address, telephone, email, fax number of the proposed owner/developer and the name(s) of an alternative contact person(s).

- b) **Proposal:** Each proposal submitted must specifically outline the proposed use of the property and any proposed rezoning requests.
- c) **Financial Feasibility:** Provide a business plan, which shall include prospective and committed sources of funding, development and operating budgets; a letter from a lending institution indicating the applicant's ability to finance the projected costs; and provide examples of prior projects that indicate the proven ability to develop a project of similar type and scale from a fiscal perspective.
- d) **Timetable:** Provide an overview of how the proposal will be implemented. Include approximate schedule for completion of each element, closing, construction start-up, substantial completion, final completion, and occupancy. Include applications for public or private financing.
- e) **Developer Capacity:** Identify the qualifications and experience of the development team for the project including a list of previously completed projects similar to the proposed project. This team may include key staff of the developer, architect, general contractor and future property management. Also, discuss the ability to complete the project including the qualifications of the development team, management plan, experience, capacity, project readiness to proceed, and timeframe for completion.
- f) **Occupancy and Management Plan:** Present a plan detailing the ownership structure (condominium, cooperative, etc.), resale restrictions and resale process to ensure mixed income and long-term affordability.
- g) **Purchase Price or Lease Terms:** Proposed purchase price or lease terms for this property.
- h) **Copies:** Seven (7) copies, with the original so marked, of each proposal shall be submitted.

V. DISPOSITION INFORMATION

After proposals are opened, city staff will make a recommendation to the City Council's Economic Development Committee (EDC) and the Housing Committee (HC). The EDC and HC will make a recommendation to the City Council.

VI. OTHER INFORMATION

Confidentiality: Proposals received by the City shall become a matter of public record, subject to public inspection, except to the extent, which an applicant designates in writing, proprietary data to be confidential and submits that data under separate cover, such information may, to the extent permitted by law, be held from public inspection, as provided in applicable Maine law, including, without limitation, 5 MRSA Sections 13119-A and 13119-B.

VII. LEGAL REQUIREMENTS

The contract for the disposition of the property will be executed only after review and final approval by the City Council.

VIII. RESERVATION of RIGHTS

The City of Portland reserves the right, at its sole discretion, to award as well as reject any and all proposals for the city-owned property, based on the quality and merits of the proposals received, or when it is determined to be in the public interest to do so. Furthermore, the City may extend deadlines and timeframes, as needed.

The City reserves the right to substantiate any proposer's qualifications, capability to perform, availability, past performance records, and to verify that the proposer is current in its financial obligations to the City.

The City of Portland, Maine, reserves the right to waive any informalities in proposals, to accept any proposal or portion thereof, and, to reject any and all proposals, as well as negotiate with the successful proposer(s) should it be in the best in the best interest of the City to do so for a final purchase and sale agreement and ultimate sale or lease of the property.

Pursuant to City procurement policy and ordinance, the City is unable to contract with businesses or individuals who are delinquent in their financial obligations to the City. These obligations may include but are not limited to real estate and personal property taxes and sewer user fees.

Proposers who are delinquent in their financial obligations to the City must do one of the following: bring the obligation current, negotiate a payment plan with the City's Treasury office, or agree to an offset, which shall be established by the contract, which shall be issued to the successful proposer

April 1, 2020

Matthew F. Fitzgerald
Purchasing Manager

Attachments:

- A. Proposal Signature Page
- B. Portland Assessor's Record
- C. GIS Map
- D. Boyle Report available online
- E. Jones Associate Report available online

PROPOSAL

NOTE: THIS PAGE IS TO BE COMPLETED AND RETURNED

The UNDERSIGNED hereby declares that he/she or they are the only person(s), firm or corporation interested in this proposal as principal, which it is made without any connection with any other person(s), firm or corporation submitting a proposal for the same.

The UNDERSIGNED hereby declares that they have read and understand all conditions as outlined in the Request for Proposals, and that the proposal is made in accordance with same.

The UNDERSIGNED hereby declares that any person(s) employed by the City of Portland, Maine, who has direct or indirect personal or financial interest in this proposal or in any portion of the profits which may be derived therefrom has been identified and the interest disclosed by separate attachment. (Please include in your disclosure any interest which you know of. An example of a direct interest would be a City employee who would be paid to perform services under this proposal. An example of an indirect interest would be a City employee who is related to any officers, employees, principal or shareholders of your firm or to you. If in doubt as to status or interest, please disclose to the extent known).

The proposer acknowledges the receipt of Addenda numbered _____
If Applicable

COMPANY NAME: _____
(Individual, Partnership, Corporation, Joint Venture)

AUTHORIZED SIGNATURE: _____ DATE: _____
(Officer, Authorized Individual or Owner)

PRINT NAME & TITLE: _____

ADDRESS: _____

TELEPHONE: _____ E-MAIL: _____

FEDERAL TAX ID #: _____ DUNS #: _____

STATE OF INCORPORATION _____
(If incorporated in another State, businesses must be authorized to do business in the State of Maine.)

In your organizations preceding completed fiscal year, did the organization receive:

(1) 80 percent or more of its annual gross revenues in U.S. federal contracts, subcontracts, loans, grants, subgrants, and/or cooperative agreements; AND

(2) \$25,000,000 or more in annual gross revenues from U.S. federal contracts, subcontracts, loans, grants, subgrants, and/or cooperative agreements? ☐ Yes ☐ No

Does the public have access to information about the compensation of the executives in the organization through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (18 U.S.C. 78m(a), 78o(d) or section 6104 of the Internal Revenue Code of 1986? ☐ Yes ☐ No

NOTE: All bids must bear the handwritten signature of a duly authorized member or employee of the organization making the bid. **This sheet must be signed and returned with the application package.**

Lambert Woods Coop. Housing Project (PL2078-2022): Draft TDM Plan Initial Review Comments

Bruce Hyman <bhyman@portlandmaine.gov>
To: Sean King <sking@portlandmaine.gov>
Cc: James Rather <jrather@portlandmaine.gov>

Thu, Aug 4, 2022 at 1:55 PM

Good afternoon, Sean,

I have done an initial review of the Draft TDM Plan (dated June 15, 2022) for PL2078-2022, Lambert Woods Cooperative Housing Project. I have the following preliminary comments on the draft Plan:

- provides a very comprehensive overview of the transportation context of the proposed project including transportation opportunities and challenges of the site related to TDM
- provides a 25% multimodal/mode share trip target for all resident trips to and from the site for 3 years after occupancy in addition to ongoing monitoring of the 0.45 parking spaces per unit proposed
- includes a strong menu of potential TDM strategies in the areas of Infrastructure, Incentives and Information - many of these need to become more definitive in the TDM Plan final form such as proposed transit pass incentives for residents
- provides for annual surveying of residents and producing an annual TDM monitoring report to the City.

I held a meeting with the TDM consultant on July 19th to discuss my preliminary comments on the draft plan.

Following the workshop, please don't hesitate to let me know of any comments by the Planning Board or additional follow-up that is requested. Once I receive a revised draft I will be able to finalize my comments.

Bruce

--

Bruce Hyman
Transportation Program Manager
City of Portland
Department of Planning and Urban Development
[389 Congress Street, 4th Floor](#)
[Portland, Maine 04101](#)
(207) 874-8717 phone
bhyman@portlandmaine.gov



Design Review

Planning and Urban Development Department



Subject: 165 Lambert Street
 Zone: R-3
 Date of Review: Thursday, September 1, 2022
 Reviewer(s): Sean King (Urban Designer)
 Project ID: PL-002078-2022

I. DESIGN REVIEW COMMENTS

(h) Planned Residential Unit Development (PRUDs) in the R-3 Residential Zones.

(1) STANDARDS. Planned residential unit developments (PRUDs) in the R-3, R-5 or R-5a residential zones and manufactured housing parks in any zone shall meet the following standards. Design standard not met are shown in red.

Standard (1) a. Design relationship to the site

The placement, orientation and arrangement of buildings types (Three-story Community Flats and Three-story Rowhouses) propose a moderately dense neighborhood that concentrate the development area to minimize disturbance to the site's natural features and wetlands. The proposed orientation of buildings prioritizes solar exposure with a majority of dwelling units facing south to optimize access to natural sunlight. The proposed PRUD is bisected by Washington Ave. Ext with streetscape improvements proposed to activate the street by traffic calming infrastructure and arrangement of Community Flats to establish a proximate connection between the north and south sides of the site. New interior roadways are limited for vehicles to access parking and drop-off areas that prioritize pedestrian accessibility with walkways to all residential entryways and open spaces. *The location of parking, trash storage and drainage facilities are concentrated to the edges of the site, applicant shall adequately screen with native plantings of varies heights to reduce abutting properties views. Applicant should prioritize the retention and protection of existing tree canopy over removal and replacement of trees to achieve canopy cover and establish a natural relationship to the site's context.*

Standard (1) b. Internal design character and relationship to the surrounding neighborhood

Context: The surrounding neighborhood is dominated by single family residences that adjoin at the back yard of the proposed Lambert Woods project. While there is no established residential pattern along Washington Ave. Ext., the proposed development and buildings exhibit a cohesive design character and site connectivity to Washington Ave. Ext. to create a new community of residential buildings. *The site context is a wooded forest with existing wetlands, applicant shall provide a native plant palette that adequately transitions the development site with the existing forested edge and along Washington Ave. Extension to be preserved to the greatest extent possible. Incorporate native plant groupings of varies heights that transition the existing vegetation.*

Architectural character: The surrounding neighborhood is dispersed with single family residences that include traditional lap siding with attached garages and simple roof forms. The architectural character of the proposed building types (Courtyard flats and Rowhomes) include a range in siding material – cedar shiplap, reverse board and batten, and traditional lap with reveal variation and color that create a

cohesive community of unified buildings. The proposed building types include shared entrance canopies of various form / color / material, façade articulation and window fenestration patterns oriented towards primary circulation routes. Additional building façade articulation shall be explored at the rear of the Rowhomes buildings that front the common open space through either additional fenestration at the ground floor, façade delineation of floors, expression of base foundation and/or similar elements appropriate to the style of the building.

Height, scale, and massing: The design and layout of buildings exhibit a cohesive design character expressed by a diversity of housing types, roof types and exterior facades to create a unique neighborhood. The building heights are consistent throughout the site at 3-stories, organized to relate to the site's circulation and open space. These variations include façade material changes to differentiate units vertically, variation in roof forms and building massing composition articulated with appropriate material changes. Because the building contains more than 2 units with building lengths greater than forty (40) feet, the Rowhome buildings shall provide additional variation through either roof configuration at midpoint or end and/or projecting or recessed building elements to assist with dividing to a greater degree the horizontal scale.

Standard (1) c. Recreation and open space

1. External buffers: A conceptual planting plan has been included with a formal arrangement of trees, screening, streetscape and lawn areas. The site context is a wooded forest with existing wetlands, applicant shall provide a plant palette that adequately transitions the development site with the existing forested edges to be preserved. The applicant is strongly encouraged to prioritize the retention and protection of existing tree canopy over removal and replacement of trees to achieve canopy cover.
2. Internal buffers: Effective privacy between unit entryways, screening of utilities (e.g. transformer, generator), roadways and waste collection is proposed with sufficient screening shrubs. Applicant to provide additional native plant screening at trash area and surface parking at abutters. The applicant is strongly encouraged to prioritize the retention and protection of existing tree canopy over removal and replacement of trees to achieve canopy cover and enhancing the public realm.
3. Passive recreational open space: Proposed passive recreational open space includes paved walkways, stone bench seating, lawn spaces and paved communal patio spaces. Applicant has highlighted communal entryways with undulating canopies at the ground floor at the Rowhomes and accent materiality to express the communal entryway at the Community Flats. The site is bisected by the Sebago to the Sea Trail and has an opportunity to enhance the trail experience in this location. Applicant to formalize communication with Portland Trails to identify pathways throughout the preserved forested areas of the site.
4. Active recreational open space: The primary recreational open space are the common greenspace located at both north and south development. Applicant to advance design of proposed facilities for the Community Pavilion, and include the intent for use. Applicant to quantify recreational open space requirement to be shown on plans. To the extent possible, the applicant shall consider the inclusion of community garden plots, playground equipment and/or other recreational elements to meet recreational open space requirement.
5. Private open spaces: Proposed private open spaces are included as Juliet balconies and entryway porches at Rowhouses, and balconies proposed at Courtyard Flats.



Sean King <sking@portlandmaine.gov>

Lambert Woods Work Session

Jeff Tarling <jst@portlandmaine.gov>
 To: Sean King <sking@portlandmaine.gov>
 Cc: James Rather <jrather@portlandmaine.gov>

Wed, Sep 28, 2022 at 10:31 AM

Hi Sean -

From a quick glance, the overall landscape plan and plant list is improved.

I will take a closer look at the details today, the Open Space area should consider some type of play element for children knowing that other options are not within walking distance.

Jeff

On Wed, Sep 28, 2022 at 10:13 AM Sean King <sking@portlandmaine.gov> wrote:

Hello Jeff,
 Thank you for your past email and notes during today's DevRev. I've included the landscape plan resubmitted, along with the construction management plan that speaks to invasive species management (see M. Special Measures as Necessary on page 7). Please share any preliminary comments this week as we prepare to bring this project to Planning Board workshop 10/11th.

Regarding previous comments provided as contingent to approval in your review, the applicant's comment response letter notes several outstanding items to be determined. See below for these responses from the applicant...

Open Space & Trails - Comments

Comment – Advocate for trails in passive wooded areas, applicant to clarify how open space requirement is being met. Coordinate with Falmouth Land Trust & Portland Trails for potential

opportunities for trail connections and future recreation use.

Response – We have been in coordination with Portland Trails; there is not a final trail design yet but a note has been added to the plans that states the future trails are to be coordinated with Portland Trails.

Comment – TREE SAVE / Limit of Work - The final plan should include a 'Tree Save' / Limit of Work designation and plan to be used prior to clearing and during construction. This would include a written plan, signage and construction fencing to prevent off site storage or materials and equipment. "Tree Save' trees should be protected with signage and fencing around the drip line. To date the plan does not show either a tree save or limit of work. The proposed project clears an extensive amount of existing forest without any tree saves or forest management suggestions? The site workclearing should include nearby forest thinning improvements for sustainable landscape and safety.

Response – A forester has been contacted for this project and has visited the site to mark out potential tree saves. The proposed tree saves have been included on the latest set of plans. A narrative will be prepared at a later date.

Comment – Invasive plant management - The northern side of the project especially contains extensive Common Buckthorn shrubs, the project should identify, plan and remove all invasive plants as part of their clearing portion of site work. This has been a standard on other project sites where high numbers of invasive plants are located.

Response – Please see the revised document titled "Q. Construction Management Plan" which includes information regarding the management of the Common Buckthorn shrub during clearing.

Comment – Tree & Landscape treatment - We encourage high percentage use of native plants on wood sites like the proposed 165 Lambert Street project. Stevens Commons for example next to Baxter Woods successfully modified their landscape plan to a higher percentage of native species. This should be a condition of approval. The site is surrounded by natural appearing woodlands, the project should appear part of the surrounding landscape vs 'suburban'. The 'Woods at Canco' development is another

successful landscape example. Thus we would ask the project not to use plants like 'Feather Reed Grass' and 'Maiden Grass' for example, and increase the native grasses like 'Little Bluestem', 'Prairie Dropseed' and other plants compatible to the New England region. The proposed tree pallet should also diversify, currently over 100 trees using only four species, recommend reducing numbers on the 'Armstrong' Red Maples from 40 to perhaps half of that and consider other tree types like the 'Beacon' and 'Regal Prince' Oak, though they are cultivars it would be nice to have a greater mix of tree types. Tree types missing: Red Oak, Swamp White Oak (use instead of the hard to establish White Oak), Tupelo, Shagbark Hickory, River Birch, Yellow Birch, White Spruce, Larch, 'Bowall', 'Red Pointe', 'Karpick' Red Maples offer a variety of other maple types depending on the desired planting space size.

Response – A revised planting plan been included indicating a broader variety of trees and mix of native shrubs and grasses. The design team has held a meeting with the city to review trees and plantings.

Comment – Tree planting spacing and sizes - While regular spaced trees all in certain order adds a degree of structure to the landscape, this site might be better served by including groves of trees in a more natural arrangement. This might include a mix of plant heights like 5-6' conifers and 2" caliper trees with the larger sizes proposed. Knowing the more orderly plantings might be closer to the buildings and the natural groves of trees near the edges.

Response – A revised planting plan has been included to incorporate a greater variety of native material, as well as revised layout indicating more naturalistic transitional plantings along site edges.

Comment – Street trees - We would like to work closer with the project team to review the public 'Street tree' portion of the project. This would include species types, spacing. Applicant to include total tree count proposed.

Response – ALA looks forward to working with the City on more detailed design and tree selection for public ROW improvements.

Comment – Buffering - The proposed site contains existing residential boundaries with Auburn Street, and Falmouth properties

on the North side and Auburn Street and Lambert Street residents on the South side, the landscape plan should address adequate buffer planting and treatment.

Response – A revised planting plan will be provided to include considerations for buffering adjacent sites. The planting plan now includes a more robust mix of evergreen plantings to buffer adjacent properties as well as fencing in key locations.

Comment – Wetlands / drainage treatment - the use of restored wetlands, intermittent streams, raingardens was not noticed during my review and wanted to check to see if the project is favoring natural drainage features?

Response – A formal stormwater drainage system has been designed for this project, the stormwater water will be detained, treated, and cooled through the use of underground chambers and utilization of porous pavement. The stormwater will be released back into the surrounding environment at a controlled rate to ensure the post development peak flow rates do not exceed the predevelopment rates. The development has been designed to be tight and compact, consolidating the infrastructure such that the overall development footprint remains minimized. As a result, intermittent rain gardens and natural drainage features are difficult to incorporate into the core site design given the competing list of site elements.

However, as a way to treat the “first flush” of runoff from the road, and to provide an educational component to the project, two rain gardens have been proposed within the public right-of-way between the roadway and the development.

Comment – Recreational / Open Space - It is essential to include a variety of onsite recreational and trail amenities for this project. The geographic location is out of walking distance to existing playgrounds and trails. (The future Haverty Field may in time offer somewhat close trails). Recreation features for youngsters could include playground structure, adventure play items, benches. Walking trails on or around the existing site should be a requirement and could match up with Fire Safety access.

Response – The design team is actively working with the client to solidify program and design of the community spaces. The site design goals include creation of community amenities which provide benefits and may be accessible both for residents of this

project as well as adjacent neighbors insofar as budget, spatial constraints, and project sequence allows.

Thank you, Sean

On Wed, Sep 7, 2022 at 10:32 AM Jeff Tarling <jst@portlandmaine.gov> wrote:

Hi James, Sean -

Sorry I missed the Lambert Woods review last week. I was on Peaks Island viewing recent storm damage and hoped to join remotely.

Wanted to see if the project team has planned adjustments for the topics mentioned. Sean, it was helpful to view the site prior to the meeting with you last week. I know there are many challenges in regards to fitting everything in. Focus priorities included higher percentage of native trees and landscape, any tree saves?, buffering on the existing residents on Lambert Street, invasive plant management, - especially on the Falmouth side of the project, multi use play area for youth, and lastly possible trails.

Also wondering about any feedback from nearby residents, staff review or Planning Board.

Thanks,

Jeff

Jeff Tarling
City Arborist - City of Portland Maine
Parks, Recreation & Facilities
Forestry, Parks & Horticulture
212 Canco Road - Suite A
Portland, ME. 04103
jst@portlandmaine.gov



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Sean King, PLA
Urban Designer
389 Congress Street, 4th Floor
Portland, Maine 04101
(207) 874-8901
sking@portlandmaine.gov
(he/him/his)





Sean King <sking@portlandmaine.gov>

PL-002078-2021: 165 Lambert Street Resubmitted plans and documents

Justin Pellerin <jrp@portlandmaine.gov> Tue, Sep 27, 2022 at 9:37 PM
 To: Jeremiah Bartlett <jbartlett@portlandmaine.gov>, Sean King <sking@portlandmaine.gov>, "Thomas.errico@tylin.com" <thomas.errico@tylin.com>

1 other major item I didn't initially hit on:

Snow removal/snow ban parking. They indicate there is going to be an agreement with the property manager to sign the parking spaces for no parking during storms and that they are working with the lyseth school and other businesses to secure snow ban parking locations near the development.

They also state that a majority of this parking is for guests even though I seem to recall Mr. Lebel stating that the owner wanted the on-street parking to supplement the off street parking being provided. With the limited off street parking being provided it seems obvious to me that residents from the development will park in the on street areas if it's unrestricted.

I still am concerned about winter operations.

Further discussion warranted when I get back.

On Tue, Sep 27, 2022 at 9:20 PM Justin Pellerin <jrp@portlandmaine.gov> wrote:

Hi Jeremiah

Kevin did not get back to me regarding the proposed response to Liz this afternoon.

If he does tomorrow could you send the response back to Liz and Sam Lebel? Traffic Calming in the greater Lambert Summit neighborhood is not part of this package.

I just completed a quick read through of the comment response letter.

- I think they have mainly addressed most of the comments we have been working through. I think that some work/review is still needed on the Auburn Street crosswalk to ensure the Ped landings are located close enough the RRFB push button.
- They are formally requesting a waiver for three driveways (2 on south, 1 on north). I feel like we should work with them on this issue.
- They are proposing two raised crosswalks on Washington Avenue as opposed to the three originally approved, which is what we discussed.
- They are showing 8' multi use paths on both sides of the street, but that appears they they shrink to 5' on the westerly end of Washington Avenue due to the existing ditch lines.
- Radii reduction at Auburn and Lambert has shifted from slopped curb truck aprons to flush concrete, which I think will likely work and captures what we discussed.
- They appear to have provided enhancements to the shared car/bike lane infrastructure as discussed at previous meetings.

There is probably more elements which need review, but I've run out of time!

It may be worth while for you to attend the Dev Rev Meeting tomorrow at 9am so you can discuss this with Sean, James and Tom E and the rest of the group.

Thanks!

Justin Pellerin, P.E.
Senior Engineer
Department of Public Works
jrp@portlandmaine.gov
207-874-8881



On Tue, Sep 27, 2022 at 3:15 PM Jeremiah Bartlett

<jbartlett@portlandmaine.gov> wrote:

Are you feeling all set on this topic? I think we're still waiting on feedback from Kevin K, correct?

Jeremiah J. Bartlett, PE, PTOE
Transportation Systems Engineer
Department of Public Works
[212 Canco Road, Suite B](#)
[Portland, Maine 04103](#)
jbartlett@portlandmaine.gov
(207) 874-8891
He/Him/They

----- Forwarded message -----

From: **Sean King** <sking@portlandmaine.gov>

Date: Tue, Sep 27, 2022 at 3:08 PM

Subject: PL-002078-2021: 165 Lambert Street Resubmitted plans and documents

To: Tom Errico <thomas.errico@tylin.com>, Jeremiah Bartlett
<jbartlett@portlandmaine.gov>

Hello Tom and Jeremiah,

The applicant for 165 Lambert Street has resubmitted plans and documents to respond to preliminary review comments from the first PB workshop focused on transportation and subsequent meetings with DPW. I will be bringing this project to DevRev tomorrow morning at 9am and wanted to share resubmitted materials in preparation for the next PB workshop on 10/11.

Please let me know if you are available to provide comments this week and always reach out with questions.

Thank you, Sean

--

Sean King, PLA
Urban Designer
389 Congress Street, 4th Floor
Portland, Maine 04101
(207) 874-8901
sking@portlandmaine.gov
(he/him/his)



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Justin Pellerin, P.E.
Senior Engineer
Department of Public Works
jrp@portlandmaine.gov
207-874-8881





Sean King <sking@portlandmaine.gov>

Lambert Woods Residential Development -Status Traffic Review Comments

Tom Errico <thomas.errico@tylin.com>

Wed, Oct 5, 2022 at 7:15 PM

To: Sean King <sking@portlandmaine.gov>, Jeremiah Bartlett
<jbartlett@portlandmaine.gov>

Draft for Review – I think we need an internal staff meeting to guide the roadway design elements. This should happen when Justin returns.

Hi Sean – the following is a status update of my previous initial traffic review comments.

- The applicant has conducted a Trip Generation analysis and assuming an Affordable Housing development 83 peak hour trips will be generated by the project during the worst-case peak hour. I find the methods used to estimate trip generation to be reasonable. I would further note that this level of trip generation does not require a Traffic Movement Permit.

Status: No further response.

- As noted in the report acceptable sight distance will be provided from the proposed driveways assuming vehicle speeds of 25MPH. I find conditions to be acceptable.

Status: No further response.

- The Traffic Assessment did not identify any High Crash Locations. Although the Washington Avenue/Lambert Street intersection is not a High Crash Location (Historically it has been

a High Crash Location), I would like to understand the contributing factors for crashes. The applicant shall provide the requested information.

Status: The applicant has provided the requested information. Crash patterns mostly included angle crashes involving movements from the intersecting streets. This crash pattern is surprising given the presence of a four-way STOP condition. I continue to review this issue.

- Given the level of traffic generation by the project, the applicant shall conduct a traffic analysis at the Auburn Street/Washington Avenue Extension and Lambert Street/Washington Avenue Extension intersections. This shall include conducting existing traffic counts. The counts and analysis shall be performed for the weekday AM and PM peak hours. The analysis at the Auburn Street/Washington Avenue Extension intersection should also include changes to intersection capacity as proposed by the applicant.

Status: The applicant has conducted the requested analysis and my comments are noted as follows.

- **Movements from Washington Avenue Extension onto Auburn Street will have a failing level of service condition. Current movements operate at level of service F, but delay will increase from 159.8 seconds per vehicle to 231 seconds per vehicle after project completion. A traffic signal warrant analysis was performed to determine if traffic signalization was a possible alternative to mitigating the long delays. The preliminary analysis indicates a traffic signal is warranted. It should be noted that the applicant is conducting a vehicle speed survey on Auburn Street and this information will help to inform the signal warrant conclusion. Further review is required.**
- **Washington Avenue Extension currently has two approach lanes to Auburn Street. The applicant is suggesting that the approach be reduced to a single lane. Based on the traffic analysis performed**

and low right-turn volumes, the City supports elimination of one approach lane.

- The analysis indicates the Lambert Street/Washington Avenue Extension intersection will operate at an acceptable level of service.
 - The analysis indicates the project driveways on Washington Avenue Extension will operate at an acceptable level of service.
- Three driveways are proposed for the development. The applicant shall provide information in support of a waiver from the City's Technical Standards. I would note that Washington Avenue Extension is classified as a Major Collector and thus minimizing access points is preferred.

Status: City staff continues to review the waiver request.

- The plans depict a shared use path from the site to Auburn Street. The minimum width for a shared use path without constraints is 10 feet. Please refer to comments from DPW.

Status: City staff continues to review the cross-section elements of Washington Avenue Extension.

- The use of on-street parking spaces to meet parking demand requirements for a project historically has not been permitted during site plan approval. Please refer to comments from DPW.

Status: City staff continues to review the cross-section elements of Washington Avenue Extension.

- The number of crosswalks on Washington Street Extension does not meet City standards and reducing the number of crosswalks is suggested. Please refer to comments from DPW.

Status: The applicant has reduced the number of crosswalks from three to two. I would suggest that the crosswalk locations

be reviewed for origin/destination pedestrian routings, like to and from the bus stop.

Additional Comments

- **The applicant has prepared a concept plan for a pedestrian crossing on Auburn Street south of Washington Avenue Extension. I find the concept to be meet the purpose for improved pedestrian safety, but additional review of design details is required.**
- **City staff continues to review the radii changes at the two Washington Avenue Extension intersections. Review comments will be provided when a roadway cross-section is determined for Washington Avenue Extension.**

Please contact me if you have any questions.

Best regards,

Tom Errico, PE

NE TRAFFIC ENGINEERING DIRECTOR

T +1 207.347.4354

M +1 207.400.0719

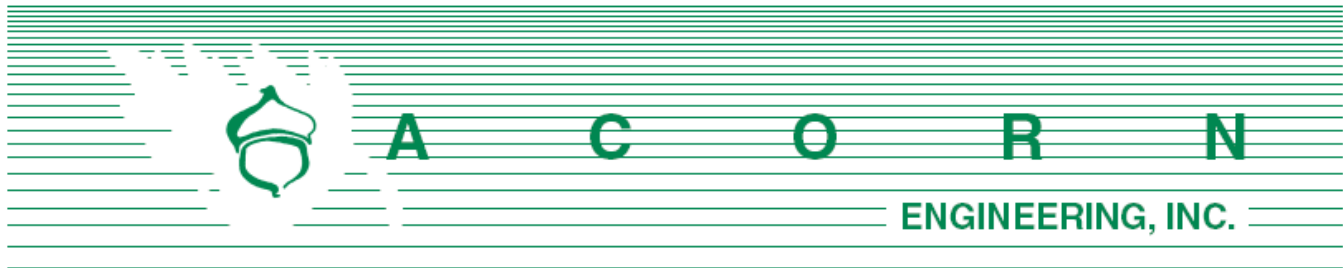
E thomas.errico@tylin.com

TYLin

12 Northbrook Drive Building A, Suite One
Falmouth, ME 04105, United States

TYLin.com





Planning Division
 Attn: James Rather, Development Review Manager
 City of Portland, Maine
 389 Congress Street, 4th Floor
 Portland, ME 04101

July 15, 2022

Subject: Major Site Plan Application – 165 Lambert St

James:

On behalf of Maine Cooperative Development Partners, we are pleased to submit this application for the proposed development of two lots located at 165 Lambert Street and 622 Auburn Street in the North Deering neighborhood. The combination of the parcels yields 17.95 acres and was recently put under a Purchase & Sale agreement between the City and the Applicant after a competitive public RFP process. As part of the RFP, the owner was also awarded the property located at 0 Gray Road in Falmouth, although this parcel is not currently proposed to be developed at this time and will result in conservation of approximately 13 acres of forest, wetlands, and streams. The design team has held numerous neighborhood meetings and informational sessions, as well as achieved a map amendment which converted the R-2 zoning district to R-3 for the purposes of increasing the allowable residential density and therefore contributing a larger number of units to Portland's affordable housing supply.

The existing traffic condition along the project's frontage on Washington Ave, as well as the intersections at Auburn and Lambert Streets will be improved through a combination of transportation strategies including narrowing the lane widths along Washington Ave, reducing the paved turning radius at both intersections, and providing a concrete apron to facilitate larger truck traffic. Additionally, a link to the Portland Trails network by way of a multi-use path is proposed. Two new bus shelters at the center of the development will be designed and constructed in tandem with METRO. Currently, the #9 Route travels by this location in both directions with an anticipated increased frequency in coming years.

The project proposes a total of 165 affordable residential units, all of which will be income restricted with 75% of the total units falling at 100% AMI and 25% at 80% AMI. After utilizing the PRUD standards and capitalizing on affordable housing incentives, the project will create a clustered village campus on both sides of Washington Avenue that maximizes housing, allows for pleasant outdoor space for residents, and conserves much of the mature canopy and wetland/stream habitat. We are pleased to present this project as it falls directly in line with the comprehensive plan by creating quality affordable housing and transforming the suburban feel of this corridor into a sense of place.

Sincerely,

Samuel J. Lebel, P.E.
 Project Manager
 Acorn Engineering, Inc.

The following documents and drawings will be uploaded onto the City's electronic submission site per the procedure outlined in the application:

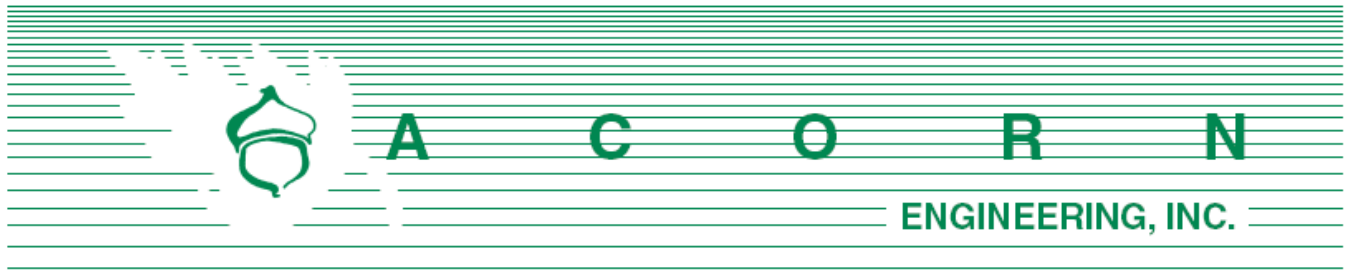
Documents:

- Section A: Cover Letter
- Section B: Major Site Plan Application & Checklist
- Section C: Right, Title, Interest
- Section D: Zoning Assessment
- Section E: Easements
- Section F: Waiver Table
- Section G: Financial Capacity
- Section H Technical Capacity
- Section I: Conformity with Land Use Ordinance
- Section J: Stormwater Management Report
- Section K: Erosion & Sedimentation Control Report
- Section L: Fire Department Letter
- Section M: Wastewater Capacity Letter
- Section N: Lighting
- Section O: Architectural Design Narrative
- Section P: Utility Cover
- Section Q: Construction Management Plan
- Section R: Solid Waste
- Section S: Traffic Report
- Section T: Turning Templates
- Section U: Transportation Demand Management Report
- Section V: Stormwater Management Law – Delegated Review Application

Drawings:

- Civil Site Plan Set
- Architectural Plan Set





Planning Division
City of Portland, Maine
Attn: Sean King
389 Congress Street, 4th Floor
Portland, ME 04101

September 29, 2022

Subject: 165 Lambert Street Co-Op – Notice of Public Meeting Certification

I, Sam Lebel, hereby certify that (3) notice of neighborhood meeting signs were posted on September 29, 2022, prior to the October 11, 2022 Planning Board Meeting for the proposed project PL-002078-2022 located in the vicinity of 165 Lambert Street and 622 Auburn Street. Photo documentation of sign in-situ:



Sign Location Along Washington Avenue



Sign Location Near Auburn Street



Sign Location Near Lambert Street

Note that it is the applicant's responsibility to remove the notice of public meeting sign within three days following the date of the meeting.

Sincerely,

A handwritten signature in cursive script that reads "Sam Lebel".

Samuel J. Lebel, P.E.
Project Manager
Acorn Engineering, Inc.



CITY OF PORTLAND
Planning & Urban Development Department

MAJOR SITE PLAN GENERAL DOCUMENT AND DRAWINGS CHECKLIST Please submit each document as a separate PDF file. Please confirm by electronically checking the boxes in the left-hand column. ** PLEASE FILL OUT AND UPLOAD THE ZONING ASSESSMENT TABLE AND WAIVER TABLE SEPARATELY AS NOTED BELOW ** At the time of application submission, please contact the Department of Public Works regarding E-911 addressing for your project.		
GENERAL APPLICATION DOCUMENTS		
☒	NA	Project Description Cover letter with detailed project description
☒	NA	Completed Checklist (this document)
☒	NA	Evidence of Right, Title, and Interest Deeds, leases, or purchase and sales agreements
☒	NA	Evidence of State or Federal Approvals Permits or letters of non-jurisdiction, if applicable
☒	NA	Zoning Assessment (see Zoning Assessment Table) Summary of compliance with use and dimensional standards of the land use code
☒	NA	Site Plan Standards Assessment (see Section 14.6 of the land use code) Summary of project compliance with site plan standards of the land use code
☒	NA	Summary of Existing and/or Proposed Easements or Covenants, applicable. Evidence of existing easements and any proposed easements, covenants, public or private rights-of-way
☒	NA	Waiver Requests (see Waiver Table) Written request for waiver describing request and compliance with applicable waiver standards
☒	NA	Financial Capability Letter or evidence from a financial institution or third party verifying financial capacity to undertake project
☒	NA	Technical Capability Evidence of technical capability of applicant and consultants – resumes and/or examples of past projects

MAJOR SITE PLAN STANDARDS AND SUBMISSION CHECKLIST

Provide assessment of compliance with standards and include supplemental documentation, as applicable.
Please submit each document as a separate PDF file.

TRANSPORTATION

Yes NA	Impact on Surrounding Street Systems (14-14.6.1(A)) Describe incremental volume of traffic impacts and mitigation measures. If needed
Yes NA	Access and Circulation (14-14.6.1(B)) Identify and describe the following: - Site access and internal circulation, including ADA access - Drive-up features, if applicable - Loading and servicing needs, routes, and geometry, providing turning templates for delivery vehicles, if applicable - Sidewalks and condition along street frontages and internal walkways - Engineered details for ADA ramps and public sidewalks, meeting sidewalk material policy and construction requirements (Technical Manual, Section 1)
Yes NA	Public Transit (14-14.6.1(C)), if applicable Identify and describe the following: Existing available transit service and proposed transit improvements, including design details, such as easement, pad base, and shelter
Yes NA	Off-Street Parking (14-14.6.1(D)), if applicable Identify and describe the following: - Proposed vehicular and bicycle parking supply (including ADA-compliant parking) in relation to applicable parking requirements in Article 19 of the land use code - Curb cut separation and parking layout (Technical Manual, Section 1) - Construction details for bicycle racks - Management plan for snow storage and removal
Yes NA	Transportation Demand Management (TDM) (14-14.6.1(E)), if applicable Provide TDM plan drafted in accordance with Technical Manual Section 1 requirements

ENVIRONMENTAL		
Yes	NA	Preservation of Significant Natural Features (14-14.6.2(A)), if applicable Identify and describe the following: • High and moderate value waterfowl and wading habitat • Aquifers (for Casco Bay Islands) • Waterbodies (including wetlands, watercourses, significant vernal pools and floodplains) • Proposed preservation areas and protection measures • Documentation from environmental compliance consultants and determinations from applicable state and federal agencies
Yes	NA	Landscape Preservation (14-14.6.2(B)) Identify and describe the following: • Measures to preserve trees, including within required zoning setbacks (Technical Manual, Section 4) • Measures to protect existing vegetation during construction
Yes	NA	Site Landscaping and Buffers (14-14.6.2(C)) Identify and describe the following: • Overall landscaping approach and consistency with standards • The use of screening and buffering of service areas and between non-residential and residential uses • Existing Heritage or Feature Trees on site and measures to preserve • Compliance with street tree requirements
Yes	NA	Water Quality, Stormwater Management, and Erosion Control (14-14.6.2(D)) Identify and describe the following: • Erosion and sedimentation control plan and measures • Evidence of compliance with Urban Impaired Stream Standards pursuant to DEP Chapter 500 stormwater law, as applicable • Subsurface sanitary sewage disposal and groundwater protection measures

PUBLIC INFRASTRUCTURE AND COMMUNITY SAFETY		
Yes	NA	Consistency with City Master Plans (14-14.6.3(A)) Describe proposed easements, rights and improvements to connect or continue off-premises public infrastructure, as applicable
Yes	NA	Public Safety and Fire Prevention (14-14.6.3(B)) Identify and describe the following: - Compliance with Crime Prevention through Environmental Design (CPTED) requirements (Technical Manual, Section 3) - Emergency vehicle access - Consistency with public safety standards (Technical Manual, Section 3)
Yes	NA	Availability and Adequacy of Public Utilities (14-14.6.3(C)) (Technical Manual, Sections 2 & 9) Identify and describe the following: - Electrical services, including providing underground services - Existing and proposed connections for public utilities and required public utility upgrades - Sewer line connections
SITE DESIGN		
Yes	NA	Massing, Ventilations and Wind Impact (14-14.6.4(A)) Identify and describe the following: - Wind and ventilation impacts on adjoining structures and/or adjacent public spaces, including wind study, if applicable - Bulk, location, or height impacts on adjoining structures
Yes	NA	Shadows (14-14.6.4(B)), if applicable Provide shadow analysis of impacts on publicly accessible open space (Technical Manual, Section 11)
Yes	NA	Snow and Ice Loading (14-14.6.4(C)) Describe building design measures to prevent snow and ice from loading or falling onto adjacent properties or public ways
Yes	NA	View Corridors (14-14.6.4(D)), if applicable Describe any protection of designated view corridors (Portland Design Manual, Appendix. 1)
Yes	NA	Historic Resources (14-14.6.4(E)), if applicable Identify and describe the following: - The site's status as a designated landmark, within a historic district or historic landscape district, or within 100 feet of any designated landmark, historic district, or historic landscape district - Compliance with standards for preservation and documentation of archaeological resources

Yes	NA	Exterior Lighting (14-14.6.4(F)) Describe how the proposed site lighting will adhere to photometrics requirements as it relates to light trespass and full cutoff fixture design, pursuant to Technical Manual Section 12
Yes	NA	Noise and Vibration (14-14.6.4(G)) Provide data on noise levels for HVAC and other mechanical equipment, such as design specifications, to demonstrate consistency with state and federal noise emissions requirements as well as City code
Yes	NA	Signage and Wayfinding (14-14.6.4(H)), if applicable - Provide signage plan showing the location, dimensions, height and setback of all existing and proposed signs - Provide drawings of all commercial and directional signage on site
Yes	NA	Zone-Related Design Standards (14-14.6.4(I)) Address any applicable design review standards by zone, including compliance with Design Manual

MAJOR SITE PLAN DRAWINGS CHECKLIST

Please upload the following DRAWINGS with the listed details into e-Plan as separate pdfs.

All drawings must be submitted in a 24 x 36 sheet size.

BOUNDARY SURVEY (stamped by a Maine Licensed Surveyor and drawn as per Technical Manual Sec. 13)

SITE PLAN(S) (stamped by a Maine Licensed Professional Engineer) including:

All sheets – Include a title block with project title and the following information:

- Project street address
- Name and address of property owner & applicant
- Licensed design professional, incl firm that produced plans
- North arrow
- Date of preparation and revision history block
- Tax parcel (chart, block, and lot) number

Existing Conditions Plan with the following:

- Existing structures, with distance from primary building façade(s) to the property line
- Approximate location of structures on abutting properties
- All streets and intersections adjacent to the site
- Existing driveways, pedestrian ways, and bicycle infrastructure, including dimensions and materials
- Existing public transit infrastructure
- Existing vehicle & bicycle parking areas
- Existing utilities on site and within adjacent rights-of-way
- Existing grades (two-foot contours preferred)
- Location of water courses, wetlands, and vegetation, or other significant natural features
- Existing soil conditions and location of test pits and borings
- Zoning boundary lines, including overlays
- Location of all existing easements and rights-of-way

Proposed Site Plan with the following:

- Proposed structures, including distance from primary building façade(s) to property lines
- Ground floor area, and finished floor elevations for all buildings
- Any proposed geometric modifications to streets and intersections adjacent to site
- Location, dimensions and materials of all proposed driveways, vehicle, bicycle, & pedestrian access ways with corresponding curb lines
- Engineered specifications/ cross-sections for proposed driveways, sidewalks & paved areas
- Location and dimensions of proposed loading areas, including turning templates
- Proposed transit infrastructure with dimensions/ engineering specifications
- Location of vehicle and bicycle parking with dimensions and engineering specifications
- Location of all snow storage areas
- Exterior lighting (please see Technical Manual Sec. 12 for photometrics requirements)
- Location of fire hydrants

• Location of solid waste management receptacles • Location of all proposed HVAC and mechanical equipment, including proposed screening, where applicable • Location of proposed easements and rights-of-way, including dimensions • Please utilize color-coding and/or hatches and shading to delineate changes between the pre and post development condition as needed
UTILITY PLAN including:
• Proposed electrical infrastructure • Location, sizing and directional flows of all proposed sewer and stormwater infrastructure • Location and dimensions of off-premises public or publicly accessible infrastructure adjacent to site • Electric utility infrastructure
GRADING AND DRAINAGE PLAN including:
• Proposed grades • Proposed stormwater management measures meeting Technical Manual (Section 5) standards • Any proposed alteration of a watercourse or wetlands • Any groundwater protection measures • Proposed buffers and preservation measures for wetlands or significant natural features
LANDSCAPE PLAN including:
• Existing vegetation to be preserved and preservation measures • Proposed landscaping, screening, and street trees, including caliper widths for trees • Planting schedule, including street trees
ARCHITECTURAL PLANS AND RENDERINGS including:
• Exterior building elevations, color renderings, illustrations of all sides • Axonometric and street-level views for structures greater than three stories in height • Provide context drawings, if applicable (Design Manual, page 1) • Floor plans
CONSTRUCTION MANAGEMENT PLAN including:
• Specifics on traffic control, sidewalk sheds, and pedestrian rerouting • Include a drawing and written narrative
OTHER
• Details and cross-sections, as necessary

PURCHASE AND SALE AGREEMENT

THIS PURCHASE AND SALE AGREEMENT IS made this 10th day of May, 2022 by and between the City OF PORTLAND, a body politic and corporate located in Cumberland County, Maine, (hereinafter referred to as “Seller” or “City”), and MAINE COOPERATIVE DEVELOPMENT PARTNERS LLC, a Maine limited liability company, having a mailing address of 6 City Center, Fl. 3, Portland, Maine 04101 (hereinafter referred to as “Buyer”).

RECITALS

WHEREAS, the City is the owner of approximately 4.85 acres of land at or near 622 Auburn Street, Portland, Maine (the “Portland Premises”) and 13.3 acres of land at or near 0 Gray Road, Falmouth, Maine (the “Falmouth Premises”) (the Portland Premises and the Falmouth Premises are referred to herein collectively as the “Premises”) and did advertise RFP #21042 dated February 24, 2021, entitled Request for Proposals for Disposition and Development of City-Owned Property Located at 622 Auburn Street, Portland and 0 Gray Road, Falmouth, a copy of which is attached hereto as Exhibit A and made a part of this Agreement (the “Request for Proposals”) (the Portland Premises is identified in the City of Portland’s tax records as CBL 385 D008001, including 386-B-12 and 386-B-15, and the Falmouth Premises is identified in the Town of Falmouth’s tax records as Lot U48-027 and is generally depicted on Attachments B,C, D and E to the Request for Proposals); and

WHEREAS, Buyer submitted a proposal dated May 2, 2021 in response to the Request for Proposals, a copy of which is attached hereto as Exhibit B and incorporated herein (the “Proposal”); and

WHEREAS, Buyer desires to purchase and develop the Premises, and the City desires to convey the Premises to Buyer, subject to the terms and conditions set forth herein.

NOW THEREFORE, in consideration of the foregoing and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties, intending to be legally bound, hereby agree as follows:

1. **SALE.** City agrees to sell the Premises to Buyer, and Buyer agrees to purchase the Premises in accordance with the terms and conditions set forth in this Agreement. This Agreement is for the sale of land only.
2. **CONSIDERATION.** The purchase price for the Premises shall be One Dollar (\$1.00) (the “Purchase Price”).
3. **TITLE AND DUE DILIGENCE.**
 - a. **Due Diligence Period.** Buyer will have from the date of this Agreement until 4:00 PM Eastern Daylight Savings Time on the day that is twenty-five (25) months after the date of this Agreement (the “Due Diligence Period”) to complete any surveys, environmental review, inspections, and title examinations, and to obtain any zone change, site plan approval, and any other permits and regulatory approvals required for the Project.

- b. Property Description. The legal description of the Premises contained in the deed to the Premises will be a survey description based upon a survey plan that will more specifically describe the Premises. The survey and description of the Premises will be prepared by the Buyer at its sole expense and provided to the City for review two months prior to the expiration of the Due Diligence Period. City shall notify Buyer of any objections to the survey and description prior to the expiration of the Due Diligence Period.
- c. Rezoning Contingency. Buyer proposes to obtain the Portland City Council's approval to rezone the Premises (the "Rezoning Approval") to maximize residential density for its development of the Premises as described in the Proposal (the "Project"). The Buyer will be responsible for obtaining, at its sole expense, the Rezoning Approval and any other regulatory approvals required for the Project prior to Closing.
- d. Financing Contingency. The Buyer's obligation to close is contingent on obtaining construction and permanent financing for the Project that the Buyer, in its discretion, determines is sufficient to put the Project on a sound financial footing. That financing is anticipated to include, but not be limited to, the following: (i) permanent financing for the Coop in the form of a HUD Section 213 loan; and (ii) affordable housing tax increment financing from the City.
- e. Title and Survey Objections. Buyer will have until the end of the Due Diligence Period to deliver to City any written objections to title, environmental, or survey matters (other than the permitted exceptions identified herein) that materially affect insurability or use. Objections not made prior to the end of the Due Diligence Period will be deemed waived; provided, however, that objections pertaining to matters of record first appearing after the end of the Due Diligence Period may be made at any time prior to the closing.
- f. Option to Cure. In the event of a title or survey objection, City will have the option, but not the obligation, to cure the objection and will notify Buyer of its election within ten (10) business days after receipt of the objection. In the event that the City elects to cure the objection, it will have sixty (60) days from the date of the notice of election, or such other reasonable time as the parties may agree, to cure the objection. In the event that the City does not elect to cure the objection, or, having elected to cure the objection fails to timely do so to Buyer's reasonable satisfaction, Buyer will have the option to (1) terminate this Agreement (after which neither party will have any further obligation or liability to the other under this Agreement), (2) waive the objection and close, or (3) undertake the cure of such objection at its own expense (in which case it shall have 60 days to do so).

- g. Deed. City shall convey the Premises to Buyer at the closing in fee simple by a municipal quitclaim deed without covenant. Title shall be good and insurable title, free and clear of all encumbrances except (i) easements of record and the Development Restrictions described in this Agreement and its attachments;; (ii) easements for utilities servicing or located on the property, (iii) zoning ordinances, and (iv) real estate taxes not yet due and payable. Further, Buyer acknowledges that the deed shall contain a restriction stating that in the event that the Portland Premises or any portion thereof shall be exempt from real and personal property taxes, by transfer, conversion, or otherwise, then the then-owner of the exempt portion shall make annual payments to the City in lieu of taxes in the amount equal to the amount of property taxes that would have been assessed on the exempt portion of the real and personal property situated on the Premises had such property remained taxable. Such restriction shall also confirm that Buyer and its successors and assigns shall possess and be vested with all rights and privileges as to abatement and appeal of valuations, rates, and the like as are accorded owners of real and personal property in Maine.
- h. Development Restrictions on the Portland Premises. The Portland Premises shall be conveyed subject to an easement in form and substance reasonably satisfactory to the City preventing the development for purposes other than passive recreation within the wetland areas located on the Portland Premises; provided however, that the City shall release its easement rights to permit minor wetland alterations affecting less than 10,000 square feet of the wetland areas if the Buyer determines such alterations to be reasonably necessary for the development of the Portland Premises as required by this Agreement.
- i. Development Restrictions on the Falmouth Premises. The Falmouth Premises shall be conveyed subject to an easement in form and substance reasonably satisfactory to the City preventing the development of the Falmouth Premises for any purposes other than passive recreation thereon. The easement shall be held by the City or another entity reasonably acceptable to the City and Buyer; provided, however, that the City shall release such easement rights to the extent necessary to permit the development of affordable housing on the Falmouth Premises, subject to the rent and income restrictions set forth in sections 11(b) and (c) below.
- j. Buyer's Right to Assign. The Buyer may assign its rights under this Agreement to an affiliated limited partnership or other affiliated entity for purposes of securing financing and/or tax credits for the project with the City's prior written consent, which shall not be unreasonably withheld, delayed or conditioned, provided any such assignee agrees to be bound to the terms of this Agreement.
- k. Buyer's Right to Terminate. The Buyer may terminate this Agreement at any time during the due diligence period if, in the exercise of its sole discretion, it decides to not proceed with the Project by giving written

notice of termination to the City in which case neither party shall have any further obligations to the other.

- l. Zoning. The parties agree that the Falmouth Premises shall not be included in any lot coverage or other calculations with respect to the development of the Portland Premises.

4. INSPECTIONS.

- a. During the Due Diligence Period, Buyer and its employees, consultants, contractors and agents shall have the right, at Buyer's expense, to enter on the Premises at reasonable times in order to (i) inspect the same, (ii) conduct engineering studies, percolation tests, geotechnical exams, environmental assessments, and other such studies, tests, exams, and assessments, and (iii) do such other things as Buyer determines, it is sole discretion, to be required to determine the suitability of the Premises for Buyer's intended use (collectively, the "Inspections"). The City acknowledges that such Inspections may include the digging of test pits, which the City hereby approves.
- b. Buyer agrees to defend, indemnify and hold harmless the City against any mechanics liens that may arise from the activities of Buyer and its employees, consultants, contractors and agents on the Premises.
- c. Buyer shall exercise the access and inspection rights granted hereunder at its sole risk and expense, and Buyer hereby releases the City from, and agrees to indemnify, defend, and hold the City harmless against, any and all losses, costs, claims, expenses and liabilities (including without limitation reasonable attorney fees and costs) (collectively, "Damages") suffered by the City on account of any injury to person or damage to property arising out of the exercise by Buyer of its rights hereunder, except to the extent that such Damages result from the act or omission of the City.
- d. Buyer shall cause any contractors, consultants or any other party conducting the Inspections to procure automobile insurance, if applicable, and commercial general liability insurance coverage in amounts of not less than Four Hundred Thousand Dollars (\$400,000.00) per occurrence for bodily injury, death and property damage, listing the City as an additional insured thereon, and also Workers' Compensation Insurance coverage to the extent required by law; the forms of all such insurance to be subject to City's Corporation Counsel's reasonable satisfaction.
- e. In the event that Buyer does not purchase the Premises, Buyer agrees to either return the Premises as nearly as possible to its original condition after conducting the Inspections; provided, however, the City hereby acknowledges and agrees Buyer shall have no obligation to clean-up, remove or take any other action with respect to any disturbance of any pre-existing environmental contamination on the Premises caused by such

inspections, studies, tests, exams, and assessments, and that Buyer shall have no obligation to clean-up, remove or take any other action with respect to any pre-existing environmental contamination disturbed thereby.

- f. The parties hereto acknowledge and agree that it is a condition to Buyer's obligations under this Agreement that the results of the Inspections be acceptable to Buyer in its sole discretion. If the results of such due diligence are not acceptable to Buyer in its sole discretion, and if Buyer exercises its right to terminate this Agreement, and neither party shall have any further obligations or liabilities under this Agreement except as expressly set forth in this Agreement.

5. **REAL ESTATE TAXES, PRORATIONS AND TRANSFER TAX.** Buyer shall be liable for all real estate taxes beginning as of the start of fiscal year following the closing and continuing thereafter. Because the Property is currently owned by the City of Portland, which is exempt from real estate taxes, no taxes were assessed or will be due for any portion of the current fiscal year, and no taxes will be prorated at the closing. Any utilities for the Property shall be prorated as of the closing. The Maine real estate transfer tax shall be paid for by Buyer in accordance with 36 M.R.S.A. § 4641-A. City is exempt from paying the transfer tax pursuant to 36 M.R.S.A. § 4641-C. The recording fee for the deed of conveyance and any expenses relating to Buyer's financing or closing shall be paid for by Buyer.
6. **DEFAULT AND REMEDIES.** In the event that Buyer defaults hereunder for a reason other than the default of the City, City may terminate this Agreement, and neither party shall have any further obligation to the other. In the event City defaults under this Agreement, and if Buyer is not then in default hereunder, Buyer shall have the right to pursue specific performance or terminate this Agreement, in which case neither party shall have any further obligation to the other.
7. **RISK OF LOSS.** The risk of loss or damage to the Premises by fire, eminent domain, condemnation, or otherwise, until transfer of title hereunder, is assumed by the City. The Premises is to be delivered in substantially the same condition as of the date of this Agreement unless otherwise stated. In the event City is not able to deliver the Premises as stated, Buyer may terminate this Agreement, and neither party shall have any further obligations or liabilities under this Agreement except as expressly set forth in this Agreement.
8. **PROPERTY SOLD "AS IS, WHERE IS."** Buyer acknowledges that Buyer has had an opportunity to inspect the Premises, and to hire professionals to do so, and that Premises will be sold "as is, where is" and "with all faults." City, and its agents, make no representations or warranties with respect to the accuracy of any statement as to boundaries or acreage, or as to any other matters contained in any description of the Premises, or as to the fitness of the Premises for a particular purpose, or as to development rights, merchantability, habitability, or as to any other matter, including without limitation, land use, zoning and subdivision issues or the environmental, mechanical, or structural condition of the Premises. Acceptance by Buyer of the Deed at closing and payment of the purchase price shall be deemed to be full

performance and discharge by the City of every agreement and obligation contained herein.

9. ENVIRONMENTAL INDEMNIFICATION. Buyer covenants and agrees to indemnify, defend, and hold the City harmless from and against any and all claims, damages, losses, liabilities, obligations, settlement payments, penalties, assessments, citations, directives, claims, litigation, demands, defenses, judgments, costs, or expenses of any kind, including, without limitation, reasonable attorneys', consultants', and experts' fees incurred in investigating, defending, settling, or prosecuting any claim, litigation or proceeding, that may at any time be imposed upon, incurred by or asserted or awarded against Buyer or the City and relating directly or indirectly to the violation of or compliance with any federal, state, or local environmental laws, rules, or regulations governing the release, handling or storage of hazardous wastes or hazardous materials and affecting all or any portion of the Premises, except to the extent that such a claim results directly from the City's release, handling or storage of hazardous wastes or hazardous materials on the Premises. This duty to indemnify, defend, and hold harmless shall be included in a covenant in the deed and shall run with the land conveyed and be binding upon Buyer's successors, assigns, and transferees.

10. CLOSING. Time is of the essence in the performance of this agreement. The closing shall be held at the offices of Buyer's counsel at a time agreeable to the parties on or before the day that is twenty-seven (27) months after the date of this Agreement (the "Closing Date"). At the Closing:

- a. the City shall execute, acknowledge and deliver to Buyer a municipal quitclaim deed conveying to Buyer good and insurable title to the Premises, free and clear of all encumbrances except as otherwise set forth herein.
- b. Buyer shall deliver the Purchase Price to the City.
- c. Each party shall deliver to the other such other documents, certificates and the like as may be required herein or as may be necessary to carry out the obligations under this Agreement.
- d. Buyer shall deliver evidence, reasonably satisfactory to City's Corporation Counsel, that the entity receiving title to the Premises is in good standing under Maine law, and that the individuals acting at Closing and executing documents on behalf of Buyer are authorized to do so.

11. BUYER'S POST CLOSING OBLIGATIONS; RIGHTS OF CITY TO REPURCHASE PROPERTY.

- a. Within twelve (12) months after the Closing Date, Buyer shall commence construction of the Project, as the Project is generally described in the Proposal. The Project shall include no less than forty-four (44) dwelling units, no less than 25% of which shall be three-bedroom units or larger.
- b. Upon the issuance of a certificate of occupancy for all or a portion of the first phase of the Project or at such earlier time as the Buyer, in its

discretion, may determine, the Buyer shall convey the Project or provide a master lease of the Project with a right to purchase to a Cooperative Affordable Housing Corporation (the "Coop") organized in accordance with the Maine Cooperative Affordable Housing Ownership Act, 13 M.R.S.A. §1741-1762, as may be amended (the "Act").

- c. Rent Restrictions. For a period of 99 years after the Project has been transferred to the Coop, all units and cooperative interests in the Project shall be affordable to low- and moderate-income households earning less than or equal to 100% of the area median income (AMI), adjusted for family size, in accordance with federal standards generally accepted at the time of incorporation under the Act. For purposes of this Agreement, "affordable" means that the percentage of income a household is charged in connection with its cooperative interest and other housing expenses, including utilities, shall not exceed 30% of the household's gross monthly income. Minimum household size allowed per unit and the formula for calculating maximum allowable monthly rent is detailed on Exhibit C, which is attached hereto and made a part hereof.
- d. Income Restrictions. In order to purchase a cooperative membership interest in, and reside in a unit owned by the limited equity cooperative, a household must not earn more than 100% of the AMI, adjusted for family size, as published by the U.S. Department of Housing and Urban Development ("HUD"). Household income is defined as adjusted gross income used by the IRS. This income test will be used only at the time of the household's purchase, and excludes transfers to family members or an estate beneficiary. At the time of initial sale of cooperative membership interests in the Coop, up to 20% of the cooperative membership interests may be sold to households earning up to 120% of AMI. All other sales and all subsequent sales of cooperative membership interests must be to households earning no more than 100% of AMI.
- e. Option to Repurchase. Unless the Project has been transferred to the Coop as set forth above, if Buyer, its successors, assigns, or transferees fails to commence construction of the Project on the Premises within 12 months after the closing, and construct the buildings which are part of the first phase of the Project within thirty (30) months after closing, the City shall have the right, but not the obligation, to repurchase the Premises and the Project at the Purchase Price plus all documented, design, development, construction, and approval expenses incurred by Buyer, or successors, to that juncture. If the City exercises this right to repurchase, Buyer shall convey the Premises to the City and assign to the City all contracts, plans, and other documents related to the design, construction, and regulatory approvals for the Project. This right to repurchase shall be assignable by the City.
- f. The articles of organization for the Coop shall provide that in the event the Coop shall be dissolved, its assets will be distributed in accordance with § 1754(6) of the Act to the City or, at the City's option, to another organization permitted under § 1754(6) of the Act reasonably acceptable to the City.

- g. The provisions of this Section 11 will survive closing and will be included in greater detail in the City's deed to Buyer or in a Declaration of Covenants, Conditions and Restrictions executed before or at the time of Closing, which shall be recorded in the Cumberland County Registry of Deeds.

- 12. **ENTIRE AGREEMENT.** This Agreement represents the entire and complete Agreement and understanding between the parties and supersedes any prior agreement or understanding, written or oral, between the parties with respect to the acquisition or exchange of the Property hereunder. This Agreement cannot be amended except by written instrument executed by City and Buyer.
- 13. **NON-WAIVER.** No waiver of any breach of any one or more of the conditions of this Agreement by either party shall be deemed to imply or constitute a waiver of any succeeding or other breach hereunder.
- 14. **HEADINGS AND CAPTIONS.** The headings and captions appearing herein are for the convenience of reference only and shall not in any way affect the substantive provisions hereof.
- 15. **BINDING EFFECT.** This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, administrators, successors and assigns.
- 16. **TIME.** The City and Buyer each confirm and agree that each of the time periods set forth herein are essential provisions of the terms of this Agreement.
- 17. **GOVERNING LAW.** This Agreement shall be construed in all respects in accordance with, and governed by, the laws of the State of Maine. All parties hereto hereby consent to the exclusive jurisdiction of the Superior Court for the County of Cumberland in the State of Maine, for all actions, proceedings and litigation arising from or relating directly or indirectly to this Agreement or any of the obligations hereunder, and any dispute not otherwise resolved as provided herein shall be litigated solely in said Court. If any provision of this Agreement is determined to be invalid or unenforceable, it shall not affect the validity or enforcement of the remaining provisions hereof.
- 18. **NOTICE.** All notices, demands and other communications hereunder shall be in writing and shall be deemed to have been duly given on the date of service if served personally on the party to whom notice is to be given, or on the first business day after the notice is delivered to an overnight delivery service with delivery confirmation, addressed to the recipients at the addresses set forth below. Either party may change addresses for purposes of this paragraph by giving the other party notice of the new address in the manner described herein.

FOR THE City:

City of Portland
ATTN: City MANAGER
389 Congress Street
Portland, ME 04101

With a copy to: The Office of the Corporation Counsel at the same address.

FOR Buyer: Maine Cooperative Development Partners,
6 City Center, Fl. 3
Portland, ME 04101

With a copy to: David C. Pierson, Esq.
Eaton Peabody
P.O. Box 15235
Portland, ME 04112-5235

19. SIGNATURES; MULTIPLE COUNTERPARTS. This Agreement may be executed in any number of counterparts and by different parties in separate counterparts. Each counterpart when so executed shall be deemed to be an original and all of which together shall constitute one and the same agreement.

20. BROKERS. The CITY and Buyer each represent and warrant that they have not dealt with a real estate broker in connection with this transaction. Buyer agrees to indemnify and hold harmless City from any claims made by any broker should Buyer's representation in this paragraph be false. Subject to the limitations of liability set forth in the Maine Tort Claims Act, City agrees to indemnify and hold harmless Buyer from any claims made by any broker should City's representation in this paragraph be false. The foregoing indemnities shall include all legal fees and costs incurred in defense against any such claim, and shall survive closing.

21. RECITALS INCORPORATED BY REFERENCE. The recitals set forth above are incorporated herein by reference and made a part of this Agreement.

Signature page follows.

IN WITNESS WHEREOF, the parties have caused this instrument to be executed on their behalf by their duly authorized offices or representatives, on the day and year first written above.

WITNESS

City OF PORTLAND

DocuSigned by:

Danielle P. West

Danielle West

Its Interim City Manager

**BUYER: MAINE COOPERATIVE
DEVELOPMENT PARTNERS, LLC**

DocuSigned by:

Brian Eng

Printed Name: Brian Eng

Its Principal

WITNESS

Approved as to Form:

Michael Goldman

Corporation Counsel's Office

PURCHASE AND SALE AGREEMENT

THIS PURCHASE AND SALE AGREEMENT IS made this 4th day of January 2021 by and between the City OF PORTLAND, a body politic and corporate located in Cumberland County, Maine, (hereinafter referred to as “Seller” or “City”), and Maine Cooperative Development Partners, a Maine corporation, having a mailing address of 6 City Center, Fl. 3., Portland, Maine 04101 (hereinafter referred to as “Buyer”).

RECITALS

WHEREAS, the CITY is the owner of approximately 13.3874 acres of land at or near 165 Lambert Street, Portland, Maine (the “Premises”) and did advertise RFP #20068 dated April 10, 2020, entitled Request for Proposals for Disposition of City-Owned Property Located at 165 Lambert Street, a copy of which is attached hereto as Exhibit A and incorporated herein (the “Request for Proposals”) (the Premises is identified in the City’s tax records as CBL 385 A001 and 386 C001 and is generally depicted on Attachment C to the Request for Proposals); and

WHEREAS, Buyer submitted a proposal dated June 16, 2020 in response to the Request for Proposals, a copy of which is attached hereto as Exhibit B and incorporated herein (the “Proposal”); and

WHEREAS, Buyer desires to purchase and develop the Premises, and the City desires to convey the Premises to Buyer, subject to the terms and conditions set forth herein.

NOW THEREFORE, in consideration of the foregoing and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties, intending to be legally bound, hereby agree as follows:

1. **SALE.** City agrees to sell the Premises to Buyer, and Buyer agrees to purchase the Premises in accordance with the terms and conditions set forth in this Agreement. This Agreement is for the sale of land only.
2. **CONSIDERATION.** The purchase price for the Premises shall be One Dollar (\$1.00) (the “Purchase Price”).
3. **TITLE AND DUE DILIGENCE.**
 - a. **Due Diligence Period.** Buyer will have from the date of this Agreement until 4:00 PM Eastern Daylight Savings Time on the day that is thirteen (13) months after the date of this Agreement (the “Due Diligence Period”) to complete any surveys, environmental review, inspections, and title examinations, and to obtain any zone change, site plan approval, and any other permits and regulatory approvals required for the Project.
 - b. **Property Description.** The legal description of the Premises contained in the deed will be a survey description based upon a survey plan that will more specifically describe the Premises. The survey and description of the

Premises will be prepared by the Buyer at its sole expense and provided to the City for review two months prior to the expiration of the Due Diligence Period. City shall notify Buyer of any objections to the survey and description prior to the expiration of the Due Diligence Period.

- c. **Rezoning Contingency.** Buyer proposes to obtain the Portland City Council's approval to rezone the Premises (the "Rezoning Approval") to maximize residential density for its development of the Premises as described in the Proposal (the "Project"). The Buyer will be responsible for obtaining, at its sole expense, the Rezoning Approval and any other regulatory approvals required for the Project prior to Closing.
- d. **Financing Contingency.** The Buyer's obligation to close is contingent on obtaining construction and permanent financing for the Project that the Buyer, in its discretion, determines is sufficient to put the Project on a sound financial footing. That financing is anticipated to include, but not be limited to, the following: (i) permanent financing for the Coop in the form of a HUD Section 213 loan; and (ii) affordable housing tax increment financing from the City.
- e. **Title and Survey Objections.** Buyer will have until the end of the Due Diligence Period to deliver to City any written objections to title, environmental, or survey matters (other than the permitted exceptions identified herein) that materially affect insurability or use. Objections not made prior to the end of the Due Diligence Period will be deemed waived; provided, however, that objections pertaining to matters of record first appearing after the end of the Due Diligence Period may be made at any time prior to the closing.
- f. **Option to Cure.** In the event of a title or survey objection, City will have the option, but not the obligation, to cure the objection and will notify Buyer of its election within ten (10) business days after receipt of the objection. In the event that the City elects to cure the objection, it will have sixty (60) days from the date of the notice of election, or such other reasonable time as the parties may agree, to cure the objection. In the event that the City does not elect to cure the objection, or, having elected to cure the objection fails to timely do so to Buyer's reasonable satisfaction, Buyer will have the option to (1) terminate this Agreement (after which neither party will have any further obligation or liability to the other under this Agreement), (2) waive the objection and close, or (3) undertake the cure of such objection at its own expense (in which case it shall have 60 days to do so).
- g. **Deed.** City shall convey the Premises to Buyer at the closing in fee simple by a municipal quitclaim deed without covenant. Title shall be good and insurable title, free and clear of all encumbrances except (i) easements of record and easements described herein; (ii) easements for utilities servicing the property, (iii) zoning ordinances, and (iv) real estate taxes not yet due

and payable. Further, Buyer acknowledges that the deed shall contain a restriction stating that in the event that the Premises or any portion thereof shall be exempt from real and personal property taxes, by transfer, conversion, or otherwise, then the then-owner of the exempt portion shall make annual payments to the City in lieu of taxes in the amount equal to the amount of property taxes that would have been assessed on the exempt portion of the real and personal property situated on the Premises had such property remained taxable. Such restriction shall also confirm that Buyer and its successors and assigns shall possess and be vested with all rights and privileges as to abatement and appeal of valuations, rates, and the like as are accorded owners of real and personal property in Maine.

- h. Buyer's Right to Terminate. The Buyer may terminate this Agreement at any time during the due diligence period if, in the exercise of its sole discretion, it decides to not proceed with the Project by giving written notice of termination to the City in which case neither party shall have any further obligations to the other.

4. INSPECTIONS.

- a. During the Due Diligence Period, Buyer and its employees, consultants, contractors and agents shall have the right, at Buyer's expense, to enter on the Premises at reasonable times in order to (i) inspect the same, (ii) conduct engineering studies, percolation tests, geotechnical exams, environmental assessments, and other such studies, tests, exams, and assessments, and (iii) do such other things as Buyer determines, it is sole discretion, to be required to determine the suitability of the Premises for Buyer's intended use (collectively, the "Inspections"). The City acknowledges that such Inspections may include the digging of test pits, which the City hereby approves.
- b. Buyer agrees to defend, indemnify and hold harmless the City against any mechanics liens that may arise from the activities of Buyer and its employees, consultants, contractors and agents on the Premises.
- c. Buyer shall exercise the access and inspection rights granted hereunder at its sole risk and expense, and Buyer hereby releases the City from, and agrees to indemnify, defend, and hold the City harmless against, any and all losses, costs, claims, expenses and liabilities (including without limitation reasonable attorney fees and costs) (collectively, "Damages") suffered by the City on account of any injury to person or damage to property arising out of the exercise by Buyer of its rights hereunder, except to the extent that such Damages result from the act or omission of the City.
- d. Buyer shall cause any contractors, consultants or any other party conducting the Inspections to procure automobile insurance, if applicable, and commercial general liability insurance coverage in amounts of not less than Four Hundred Thousand Dollars (\$400,000.00) per occurrence for

bodily injury, death and property damage, listing the City as an additional insured thereon, and also Workers' Compensation Insurance coverage to the extent required by law; the forms of all such insurance to be subject to City's Corporation Counsel's reasonable satisfaction.

- e. In the event that Buyer does not purchase the Premises, Buyer agrees to either return the Premises as nearly as possible to its original condition after conducting the Inspections; provided, however, the City hereby acknowledges and agrees Buyer shall have no obligation to clean-up, remove or take any other action with respect to any disturbance of any pre-existing environmental contamination on the Premises caused by such inspections, studies, tests, exams, and assessments, and that Buyer shall have no obligation to clean-up, remove or take any other action with respect to any pre-existing environmental contamination disturbed thereby.
- f. The parties hereto acknowledge and agree that it is a condition to Buyer's obligations under this Agreement that the results of the Inspections be acceptable to Buyer in its sole discretion. If the results of such due diligence are not acceptable to Buyer in its sole discretion, and if Buyer exercises its right to terminate this Agreement, and neither party shall have any further obligations or liabilities under this Agreement except as expressly set forth in this Agreement.

5. **REAL ESTATE TAXES, PRORATIONS AND TRANSFER TAX.** Buyer shall be liable for all real estate taxes beginning as of the start of fiscal year following the closing and continuing thereafter. Because the Property is currently owned by the City of Portland, which is exempt from real estate taxes, no taxes were assessed or will be due for any portion of the current fiscal year, and no taxes will be prorated at the closing. Any utilities for the Property shall be prorated as of the closing. The Maine real estate transfer tax shall be paid for by Buyer in accordance with 36 M.R.S.A. § 4641-A. City is exempt from paying the transfer tax pursuant to 36 M.R.S.A. § 4641-C. The recording fee for the deed of conveyance and any expenses relating to Buyer's financing or closing shall be paid for by Buyer.

6. **DEFAULT AND REMEDIES.** In the event that Buyer defaults hereunder for a reason other than the default of the City, City may terminate this Agreement, and neither party shall have any further obligation to the other. In the event City defaults under this Agreement, and if Buyer is not then in default hereunder, Buyer shall have the right to pursue specific performance or terminate this Agreement, in which case neither party shall have any further obligation to the other.

7. **RISK OF LOSS.** The risk of loss or damage to the Premises by fire, eminent domain, condemnation, or otherwise, until transfer of title hereunder, is assumed by the City. The Premises is to be delivered in substantially the same condition as of the date of this Agreement unless otherwise stated. In the event City is not able to deliver the Premises as stated, Buyer may terminate this Agreement, and neither party shall have any further obligations or liabilities under this Agreement except as expressly set forth in this Agreement.

- 8. PROPERTY SOLD “AS IS, WHERE IS.”** Buyer acknowledges that Buyer has had an opportunity to inspect the Premises, and to hire professionals to do so, and that Premises will be sold “as is, where is” and “with all faults.” City, and its agents, make no representations or warranties with respect to the accuracy of any statement as to boundaries or acreage, or as to any other matters contained in any description of the Premises, or as to the fitness of the Premises for a particular purpose, or as to development rights, merchantability, habitability, or as to any other matter, including without limitation, land use, zoning and subdivision issues or the environmental, mechanical, or structural condition of the Premises. Acceptance by Buyer of the Deed at closing and payment of the purchase price shall be deemed to be full performance and discharge by the City of every agreement and obligation contained herein.
- 9. ENVIRONMENTAL INDEMNIFICATION.** Buyer covenants and agrees to indemnify, defend, and hold the City harmless from and against any and all claims, damages, losses, liabilities, obligations, settlement payments, penalties, assessments, citations, directives, claims, litigation, demands, defenses, judgments, costs, or expenses of any kind, including, without limitation, reasonable attorneys’, consultants’, and experts’ fees incurred in investigating, defending, settling, or prosecuting any claim, litigation or proceeding, that may at any time be imposed upon, incurred by or asserted or awarded against Buyer or the City and relating directly or indirectly to the violation of or compliance with any federal, state, or local environmental laws, rules, or regulations governing the release, handling or storage of hazardous wastes or hazardous materials and affecting all or any portion of the Premises, except to the extent that such a claim results directly from the City’s release, handling or storage of hazardous wastes or hazardous materials on the Premises. This duty to indemnify, defend, and hold harmless shall be included in a covenant in the deed and shall run with the land conveyed and be binding upon Buyer’s successors, assigns, and transferees.
- 10. CLOSING.** Time is of the essence in the performance of this agreement. The closing shall be held at the offices of Buyer’s counsel at a time agreeable to the parties on or before the day that is fifteen (15) months after the date of this Agreement (the “Closing Date”). At the Closing:
- a. the City shall execute, acknowledge and deliver to Buyer a municipal quitclaim deed conveying to Buyer good and insurable title to the Premises, free and clear of all encumbrances except as otherwise set forth herein.
 - b. Buyer shall deliver the Purchase Price to the City.
 - c. Each party shall deliver to the other such other documents, certificates and the like as may be required herein or as may be necessary to carry out the obligations under this Agreement.
 - d. Buyer shall deliver evidence, reasonably satisfactory to City’s Corporation Counsel, that the entity receiving title to the Premises is in good standing

under Maine law, and that the individuals acting at Closing and executing documents on behalf of Buyer are authorized to do so.

11. BUYER'S POST CLOSING OBLIGATIONS; RIGHTS OF CITY TO REPURCHASE PROPERTY.

- a. Within twelve (12) months after the Closing Date, Buyer shall commence construction of the Project, as the Project is generally described in the Proposal. The Buyer, in its discretion, may develop the Project in two phases. The first phase of the Project shall include the greater of 20 three-bedroom dwelling units or the maximum number of dwelling units feasible under the current zoning.
- b. Upon the issuance of a certificate of occupancy for all or a portion of the first phase of the Project or at such earlier time as the Buyer, in its discretion, may determine, the Buyer shall convey the Project to a Cooperative Affordable Housing Corporation (the "Coop") organized in accordance with the Maine Cooperative Affordable Housing Ownership Act, 13 M.R.S.A. §1741-1762, as may be amended (the "Act"). Notwithstanding anything to the contrary in the foregoing, the Buyer may retain the right to develop additional units on the Premises as a second phase of the Project which shall be conveyed to the Coop.
- c. Rent Restrictions. For a period of 99 years after the Project has been transferred to the Coop, all units and cooperative interests in the Project shall be affordable to low- and moderate-income households earning less than or equal to 100% of the area median income (AMI), adjusted for family size, in accordance with federal standards generally accepted at the time of incorporation under the Act. For purposes of this Agreement, "affordable" means that the percentage of income a household is charged in connection with its cooperative interest and other housing expenses, including utilities, shall not exceed 30% of the household's gross monthly income. Minimum household size allowed per unit and the formula for calculating maximum allowable monthly rent is detailed on Exhibit C, which is attached hereto and made a part hereof.
- d. Income Restrictions. In order to purchase a cooperative membership interest in, and reside in a unit owned by the limited equity cooperative, a household must not earn more than 100% of the AMI, adjusted for family size, as published by the U.S. Department of Housing and Urban Development ("HUD"). Household income is defined as adjusted gross income used by the IRS. This income test will be used only at the time of the household's purchase, and excludes transfers to family members or an estate beneficiary. At the time of initial sale of cooperative membership interests in the Coop, up to 20% of the cooperative membership interests may be sold to households earning up to 120% of AMI. All other sales and all subsequent sales of cooperative membership interests must be to households earning no more than 100% of AMI.
- e. Option to Repurchase. Unless the Project has been transferred to the Coop as set forth above, if Buyer, its successors, assigns, or transferees fails to commence construction of the Project on the Premises within 12 months after the closing, and construct the buildings which are part of the first

phase of the Project within thirty (30) months after closing, the City shall have the right, but not the obligation, to repurchase the Premises and the Project at the Purchase Price plus all documented, design, development, construction, and approval expenses incurred by Buyer, or successors, to that juncture. If the City exercises this right to repurchase, Buyer shall convey the Premises to the City and assign to the City all contracts, plans, and other documents related to the design, construction, and regulatory approvals for the Project. This right to repurchase shall be assignable by the City.

- f. The articles of organization for the Coop shall provide that in the event the Coop shall be dissolved, its assets will be distributed in accordance with § 1754(6) of the Act to the City or, at the City's option, to another organization permitted under § 1754(6) of the Act reasonably acceptable to the City.
- g. The provisions of this Section 11 will survive closing and will be included in greater detail in the City's deed to Buyer or in a Declaration of Covenants, Conditions and Restrictions executed before or at the time of Closing, which shall be recorded in the Cumberland County Registry of Deeds.

- 12. **ENTIRE AGREEMENT.** This Agreement represents the entire and complete Agreement and understanding between the parties and supersedes any prior agreement or understanding, written or oral, between the parties with respect to the acquisition or exchange of the Property hereunder. This Agreement cannot be amended except by written instrument executed by City and Buyer.
- 13. **NON-WAIVER.** No waiver of any breach of any one or more of the conditions of this Agreement by either party shall be deemed to imply or constitute a waiver of any succeeding or other breach hereunder.
- 14. **HEADINGS AND CAPTIONS.** The headings and captions appearing herein are for the convenience of reference only and shall not in any way affect the substantive provisions hereof.
- 15. **BINDING EFFECT.** This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, administrators, successors and assigns.
- 16. **TIME.** The City and Buyer each confirm and agree that each of the time periods set forth herein are essential provisions of the terms of this Agreement.
- 17. **GOVERNING LAW.** This Agreement shall be construed in all respects in accordance with, and governed by, the laws of the State of Maine. All parties hereto hereby consent to the exclusive jurisdiction of the Superior Court for the County of Cumberland in the State of Maine, for all actions, proceedings and litigation arising from or relating directly or indirectly to this Agreement or any of the obligations hereunder, and any dispute not otherwise resolved as provided herein shall be litigated solely in said Court. If any provision of this Agreement is determined to be

invalid or unenforceable, it shall not affect the validity or enforcement of the remaining provisions hereof.

- 18. NOTICE.** All notices, demands and other communications hereunder shall be in writing and shall be deemed to have been duly given on the date of service if served personally on the party to whom notice is to be given, or on the first business day after the notice is delivered to an overnight delivery service with delivery confirmation, addressed to the recipients at the addresses set forth below. Either party may change addresses for purposes of this paragraph by giving the other party notice of the new address in the manner described herein.

FOR THE City: City of Portland
ATTN: City MANAGER
389 Congress Street
Portland, ME 04101

With a copy to: The Office of the Corporation Counsel at the same address.

FOR Buyer: Maine Cooperative Development Partners, 6
City Center, Fl. 3, Portland, ME 04101

With a copy to: David C. Pierson, Esq.
Eaton Peabody
P.O. Box 15235
Portland, ME 04112-5235

- 19. SIGNATURES; MULTIPLE COUNTERPARTS.** This Agreement may be executed in any number of counterparts and by different parties in separate counterparts. Each counterpart when so executed shall be deemed to be an original and all of which together shall constitute one and the same agreement.

- 20. BROKERS.** The CITY and Buyer each represent and warrant that they have not dealt with a real estate broker in connection with this transaction. Buyer agrees to indemnify and hold harmless City from any claims made by any broker should Buyer's representation in this paragraph be false. Subject to the limitations of liability set forth in the Maine Tort Claims Act, City agrees to indemnify and hold harmless Buyer from any claims made by any broker should City's representation in this paragraph be false. The foregoing indemnities shall include all legal fees and costs incurred in defense against any such claim, and shall survive closing.

- 21. RECITALS INCORPORATED BY REFERENCE.** The recitals set forth above are incorporated herein by reference and made a part of this Agreement.

IN WITNESS WHEREOF, the parties have caused this instrument to be executed on their behalf by their duly authorized offices or representatives, on the day and year first written above.

Approved as to Form:

DocuSigned by:
Michael Goldman
58DA6A4D85584F1
Corporation Counsel's Office

City OF PORTLAND

DocuSigned by:
Jon P. Jennings
7321A75603411
Jon P. Jennings Its City Manager

**MAINE COOPERATIVE
DEVELOPMENT PARTNERS**

DocuSigned by:
Brian Eng
14F9ED9E0884B5...
Brian Eng
Its Principal

Portland, Maine



Yes. Life's good here.

Planning & Urban Development Department

ZONING ANALYSIS Relevant Zone(s) R3 - PRUD

All Projects:

	Required	Proposed
Lot Size	3 acres	17.94 acres
Area Per Dwelling Unit	3,250 SF	3,256 SF
Minimum Street Frontage	N/A	
Front Yard Minimum	N/A	
Front Yard Maximum	N/A	
Rear Yard	10'	>10'
Yard Right	10'	>10'
Yard Left	10'	>10'
Side Street Setback	N/A	
Step Back	N/A	
Maximum Lot Coverage	N/A	
Minimum Lot Coverage	N/A	
Maximum Height	35'	<35'
Open Space	300 S.F / D.U.	303 S.F/D.U.
Maximum Impervious Area	N/A	
Pavement Setback	N/A	
Floor Area Ratio	N/A	
Off Street Parking Spaces	N/A	67
Loading Bays	N/A	
Other 1		
Other 2		
Other 3		

E. Summary of Written Easements

Existing easements on site as identified by Owen Haskell, Inc. include:

- A drainage easement benefitting Maine DOT as recorded in the Cumberland County Registry of Deeds Book 3901/31.

Proposed Easements:

- There are several proposed drainage easements currently being coordinated on which will benefit the City of Portland.



Standard to be Waived: Cite Ordinance or Technical Manual Standard	Cite Standard Language: Cite specific language of applicable Ordinance or Technical Manual Standard	Waiver Being Sought: Describe waiver being sought. Ex. – We are requesting a two-way parking lot drive aisle width of 20' feet.	Justification for Waiver: Address specific waiver criteria, if applicable, and document reasons for the waiver request.
Technical Manual 1.7.2.3	24' Drive Aisle Width	We are requesting to reduce the drive aisle width from 24' to 22'.	Based on the proposed land use, the residents' familiarity with the site, and a low rate of turnover, a width of 24' is not necessary to accommodate a functional parking lot. 22' allows for a reduction in impervious area.

Standard to be Waived: Cite Ordinance or Technical Manual Standard	Cite Standard Language: Cite specific language of applicable Ordinance or Technical Manual Standard	Waiver Being Sought: Describe waiver being sought. Ex. – We are requesting a two-way parking lot drive aisle width of 20' feet.	Justification for Waiver: Address specific waiver criteria, if applicable, and document reasons for the waiver request.
Land Use Code Ch 14.6.1.B.3.a	All development shall provide curb and sidewalks along all frontages	We are requesting to provide a curbed sidewalk along the project's frontage on Washington Ave.	The waiver is being sought to focus funds to enhance pedestrian safety along Washington Ave, at the Auburn and Lambert intersections, and the link to the existing sidewalk network where there is the greatest density of existing pedestrian infrastructure. There is not a sidewalk along Lambert Street within 1,000 ft of the project.
Technical Manual 8.2. Standards	Design the development to minimize wetland impacts by either avoiding direct wetland impacts or minimizing them when they are unavoidable. Activities in or adjacent wetlands should be carried out in accordance with the standards set forth in the Maine Wetlands Protection Rules.	We are requesting to fill 4,700 square feet of wetland area located on north site and 2,500 square feet of wetland area located on south site.	The waiver is being sought to fill a small portion of the wetlands on site. The site has been designed to minimize wetland impacts to the greatest extent feasible with a compact site design. The current design fills a small portion of wetlands (adjacent to the road and an isolated pocket) but in turn allows for the preservation of the high value wetlands located adjacent to the stream. We believe this approach to be desirable to increase residential density on site while also prioritizing the preservation of natural resources.
Technical Manual 1.7.2.8	No more than two (2) driveways shall be permitted for ingress and egress purposes to any commercial, industrial or residential (with 10 or more parking spaces) site. A joint access driveway shall be considered as adequate access for any adjacent sites and shall be encouraged. An easement for joint access shall be required.	We are requesting to provide two (2) driveways for the southern site and one (1) driveway for the northern site.	The waiver is being sought to provide access through the site for several parties including the Portland Fire Department, residents, the solid waste contractor, and mail services. Given the project contains nearly 3,000 feet of legal street frontage, three curb cuts represents a modest approach to provide the necessary access while complying with the various other site plan and NFPA standards.

G. Financial Capacity

Please find attached the status of good standing from the Secretary of State for the Maine Cooperative Development Partners and a letter of financial capacity from the Applicant's bank.





MAINE

Department of the Secretary of State
Bureau of Corporations, Elections and Commissions

Corporate Name Search

Information Summary

[Subscriber activity report](#)

This record contains information from the CEC database and is accurate as of: Wed May 11 2022 10:31:06. Please print or save for your records.

Legal Name	Charter Number	Filing Type	Status
MAINE COOPERATIVE DEVELOPMENT PARTNERS LLC	20212626DC	LIMITED LIABILITY COMPANY (DOMESTIC)	GOOD STANDING

Filing Date	Expiration Date	Jurisdiction
10/01/2020	N/A	MAINE

Other Names (A=Assumed ; F=Former)

NONE

Clerk/Registered Agent

DAVID C. PIERSON
PO BOX 15235

PORTLAND, ME 04112 5235

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amendments
\(\\$30.00\)](#)

You will need Adobe Acrobat version 3.0 or higher in order to view PDF files.
If you encounter problems, visit the [troubleshooting page](#).





June 2, 2022

Mr. Matthew Peters
Maine Cooperative Development Partners, LLC
c/o Elysian Enterprises LLC
P.O. Box 4341
Portland, ME 04101

RE: Letter of Interest – Lambert Woods North, Portland, Maine

Dear Matthew:

Thank you for the opportunity to review the Lambert Woods North project, the new construction of affordable family housing in Portland, Maine.

Evernorth is pleased to provide this letter of interest. As you know, Evernorth invests in community-based projects receiving the federal Low-Income Housing Tax Credit (LIHTC). The below pricing and investment estimates are based upon preliminary information provided by you.

The information provided describes an approximate \$29.3 million construction of a 74-unit project located at 622 Auburn Street.

The project proposes 4% federal LIHTC equity.

We understand the project may qualify for up to \$1,103,161 in annual federal LIHTCs. Upon satisfactory resolution of any identified funding needs, we would be interested in investing approximately \$9,596,538 in LIHTCs (approximately \$0.87 equity pricing) in exchange for a 99.99% limited partnership interest in the Partnership to be formed.

Changes in project timing or assumptions relied upon by Evernorth may result in changes to equity pricing. A more detailed equity letter of intent will be provided once all capital sources have been secured.

As this is not a commitment letter, Evernorth's investment is conditioned upon successful completion of underwriting, due diligence review, tax credit award, and pro-forma approved by Maine State Housing Authority.

We wish you success as you further define the project and look forward to working with you.

Sincerely,

Beth Boutin

100 Bank Street, Suite 400, Burlington, VT 05401
Phone: 802.863.8424 Fax: 802.660.9034

120 Exchange Street, Suite 600, Portland, ME 04101
Phone: 207.772.8255 Fax: 207.772.8241

evernorthus.org



Vice President, Community Investments

100 Bank Street, Suite 400, Burlington, VT 05401
Phone: 802.863.8424 **Fax:** 802.660.9034

120 Exchange Street, Suite 600, Portland, ME 04101
Phone: 207.772.8255 **Fax:** 207.772.8241

evernorthus.org



April 1, 2021

Matthew Peters
Principal
Maine Co-op Development Partners
6 City Ctr, Fl 3
Portland, ME 04101

RE: Lambert Woods Cooperative

To whom it may concern:

Centennial Mortgage has been engaged by Maine Co-op Development Partners to secure mortgage insurance through the FHA 213 program for cooperative housing and fund a construction/permanent mortgage for Lambert Woods Cooperative, a new cooperative housing project in Portland, ME. We have reviewed a financing request, including initial plans, pro forma operating budget, the construction budget and initial market information for Lambert Woods Cooperative in Portland, ME. In addition, we have reviewed the experience of the overall development team. Based on this review, we feel that this project is an excellent candidate for financing and will conform to all the requirements to qualify for construction and permanent financing through the FHA 213 program. We feel that this is the right time and place to create a new affordable cooperative given the advantages this particular form of housing provides to its members, primarily sustainable, affordable housing, democratic control and a greater sense of community.

Having now completed this structuring phase, we have now entered the formal application stage for the FHA 213 mortgage insurance and believe that Lambert Woods Cooperative has a high likelihood of success over the coming year in obtaining a 40-year, low interest loan for the project of approximately \$25,210,000. Additional subordinated financing would serve to further increase that likelihood. We also believe that success at Lambert Woods Cooperative will open an entirely new avenue for affordable housing finance in the state of Maine by making the FHA 213 program finance accepted in the market.

Centennial Mortgage has substantial expertise and experience completing FHA financing transactions. We are very active in lending to cooperative housing projects throughout the country. Cooperative housing provides a unique form of democratically controlled housing and we are actively working with several groups to create new communities at affordable prices. Personally, I have been involved in cooperative housing for over 20 years, through financing and serving on the board of the National Association of Housing Cooperatives.



We encourage other funding sources to join us in supporting this innovative project and creating up to 98% leverage for future projects through this program. Please let me know should you have any questions or require any additional information.

Sincerely,

A handwritten signature in blue ink, appearing to read "H. Jeffers", is positioned above the printed name.

Hugh Jeffers
Vice President of Originations



COOPERATIVE DEVELOPMENT INSTITUTE

P.O. Box 1051, Northampton, Massachusetts 01061-1051
PH 413-665-1271 • FX 413-541-8300 • www.cdi.coop • info@cdi.coop

April 29, 2020

To whom it may concern:

The Cooperative Development Institute (CDI) is excited to support the Maine Cooperative Developers' proposal for Lambert Woods II (at 622 Auburn Street, Portland and at 0 Gray Road, Falmouth). CDI believes this will be a beneficial addition to the adopted plan at the 165 Lambert St. parcel, which we also enthusiastically support.

CDI is a 501(c)3 nonprofit founded in 1994 by co-op leaders to work with people in the Northeast to create cooperative businesses and networks that grow a prosperous, equitable economy.

CDI provides expert assistance, organizational development, and support to groups undertaking cooperative development. In the past decade, CDI has helped create 49 new Resident Owned Communities (ROCs) in New England, representing 4,479 households. 10 of the ROCs are conversions of manufactured home parks in Maine. CDI's role is to help form new cooperatives, train residents, and ensure that the cooperative has the support it needs to remain permanently affordable.

Our intention is that at Lambert Woods II, CDI will:

- Lead the creation of the new Co-op entity.
- Lead resident training and resident participation in the construction phase.
- Create and administer a long-term management plan that would meet the city's TIF requirements to ensure that the property meets the city's affordability metrics for at least 30 years.
- Be the long term training & support organization for the Co-op.

We are pleased with the proposal and the development team, and hope to be part of this exciting project!

Sincerely,

Noémi Giszpenc
Executive Director

THE SOURCE FOR COOPERATIVE BUSINESS DEVELOPMENT IN NEW ENGLAND & NEW YORK

In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discrimination on the base of race, color, national origin, sex, age, or disability. (Not all prohibited bases apply to all programs.) To file a complaint of discrimination write USDA, Director, Office of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (voice and TDD).



ANDREW REICHER EXECUTIVE DIRECTOR

April 29, 2021

To whom it may concern:

UHAB is pleased to support the Lambert II Project to create a Limited Equity Cooperative providing affordable home ownership on Lambert Street in Portland.

The Urban Homesteading Assistance Board was created to assist neighborhood residents in NYC to create, own and operate their own housing. Our original projects were Homesteading Projects where residents would take over abandoned buildings in NYC's low-income neighborhoods and rehab them using their own sweat equity and owning and operating them as affordable housing cooperatives. Since that time UHAB has assisted with the creation of about 1,200 limited equity cooperatives providing affordable homeownership to almost 30,000 households. We continue to support these co-ops with stewardship services, ongoing training and technical assistance as well as group insurance, fuel buying, green energy services, bookkeeping and election services.

Throughout our nearly 50-year history, UHAB has occasionally provided, training, capacity building and services to organizations and developers creating affordable co-ops in cities around the country. Six years ago, we began a census and survey of all limited equity housing co-ops in the nation. The results and a map of the 320,000 units can be found at www.sixthprinciple.coop. But also, as a result we have received requests for our capacity building, technical assistance, and services from organizations, local governments, and housing developers around the country. It has become part of our mission and our work to serve and grow the cooperative housing community not only in NYC but nationwide.

UHAB has also agreed to provide pre-development financing for the Lambert Woods I at 165 Lambert Street and would be open to considering additional support as Lambert Woods II moves forward.

Our work on the Lambert II project in support of CDI and MCDP is part of this national effort and we couldn't be more excited to be part of this effort. Lambert II is a great proposal with a strong development team.

Sincerely,



Andrew Reicher
Executive Director

EXHIBIT C

Minimum Household Size and Maximum Allowable Monthly Rent Calculation

The Minimum household size for a unit in the Coop is based on the number of bedrooms in the unit, as set forth in the table below. The maximum allowable monthly rent for a unit is 1/12 of 30% of the Area Median Income, based on the minimum household size for a unit, less the Coop member's costs for utilities.

	Studio/One-Bedroom Unit	Two-Bedroom Unit	Three-Bedroom Unit	Four-Bedroom Unit
Minimum Household Size	1	2	3	4

For Example, utilizing 2021 AMI levels, and assuming no out of pocket utility costs for the Co-op member, the maximum allowable monthly rent at 100% AMI would be as follows:

Studio/One Bedroom Unit: $1/12(0.30 \times \$69,950) = \$1,748.75$

Two Bedroom Unit: $1/12(0.30 \times \$79,950) = \$1,998.75$

Three Bedroom Unit: $1/12(0.30 \times \$89,950) = \$2,248.75$

In the event that the Co-op member has out of pocket utility expenses, the maximum allowable monthly rent would be decreased by the amount of those utility expenses. For example, for a two bedroom unit with \$300 in monthly utility expenses, the maximum allowable monthly rent would be $\$1,998.75 - \$300 = \$1,698.75$.

Utility allowance will be calculated in one of two ways: (1) using the utility allowance established by the Portland Housing Authority or (2) based on actual documented utility usage at the property.

H. Technical Capacity

Please find attached descriptions and examples of technical capacity for the Maine Cooperative Development Partners, Aceto Landscape Architects, and Acorn Engineering.





Maine Cooperative Development Partners

MAINE COOPERATIVE DEVELOPMENT PARTNERS

build neighborhoods where the elements that constitute quality of life—access to green space, healthy lifestyles, community, privacy, and affordability—are not at odds with each other. Grounding principles for this work are creating equitable communities; complementing walkable neighborhoods; building healthy buildings; and celebrating beauty, art, and the natural environment. We use Limited Equity Cooperatives as a form of ownership to create options for people of all ages, backgrounds, and incomes to live in harmony with nature and their neighbors.

WE ENVISION small towns, urban neighborhoods, and suburban neighborhood centers that are walkable to daily needs and adjacent to recreational facilities, trails, and transit corridors; homes that use energy efficient construction, and shared gardens, patios, and play spaces for people to get to know and enjoy their neighbors.

WE GIVE BACK by partnering with organizations that support trails and green space, transit, local businesses, social equity, and efforts to mainstream energy efficient building and land use.



PRINCIPALS



MATTHEW PETERS has been involved in the completion of over 20 new construction, major rehab, and acquisition deals. Matt worked for eight years at Avesta Housing, one of Northern New England's largest non-profit housing developers and owners, project managing affordable housing developments, building out and overseeing the Asset Management department, and ending in an executive role overseeing the entire development and acquisitions pipeline as Vice President of Real Estate Services. In 2018 he began to consult for Housing Authorities, housing non-profits, and Community Development Finance Institutions in Maine supporting these organizations in acquisition, ground-up development, and underwriting of affordable housing properties. Matt also is the Executive Director of Freeport Housing Trust based in Freeport, Maine. He has strong working relationships with MaineHousing, Rural Development, lenders, tax credit syndicators, and other professionals in the design and construction field, holds a Masters in Urban Planning from the University of Washington, and certifications such as Spectrum's C3P and Rural Development STAR trainings and LEED Accredited Professional.



BRIAN ENG is a real estate investor who has worked on commercial projects in Florida, Connecticut, New Jersey, and Maine. He has worked as a principal on developments of over 200 units, is a principal on redeveloping the MERC site in Biddeford, and has redeveloped several smaller properties in Portland. He brings strong expertise in financials, fundraising, advocacy, and public speaking. He grew up in a co-op in New York City, and is on the board of UHAB, the entity that manages 20,000 units of cooperative housing in New York.



LIZ TRICE is a policy professional who builds multidisciplinary partnerships across real estate, economic development, entrepreneurship, and public health. Liz holds a masters degree in Public Policy & Management with a certificate in Community Planning & Development from the Muskie School at the University of Southern Maine. She has worked on multi-unit projects in Portland to obtain zone changes, lead the public engagement process with neighboring residents and businesses, apply for TIFs and grants, and direct the design of shared spaces. Her work includes award-winning research on the regulatory barriers to people living alone achieving home ownership, leading the process to redesign Bramhall Square, and working with medical and economic development institutions to develop strategic plans. Her projects to re-envision urban spaces for livability and natural ecosystems won two of three awards given by the 2019 Portland Society of Architecture's Complete City Competition. Liz trained as a cohousing developer and Passive House Design Consultant and has visited over 20 cohousing developments in the United States. She is currently the owner of PelotonLabs, a coworking space in Portland.



PROJECTS



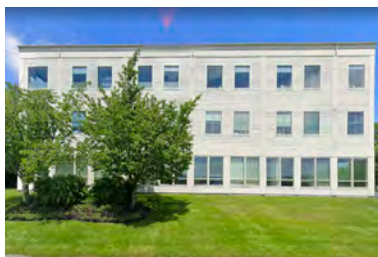
M NORTH ORLANDO—As a principal of Clay Cove Capital, Brian was the control capital partner in the ground-up development of M North in Orlando, a \$37.1M, 288-unit multifamily development in Orlando, Florida. www.mnorthorlando.com



BIDDEFORD MERC REDEVELOPMENT Brian worked with Jim Brady of Fathom Companies, to serve as master developer of city-owned land on the former Maine Energy Recovery Corp. incinerator through a public-private partnership with the City of Biddeford.



6 CITY CENTER IN PORTLAND—Brian redeveloped and retented a largely vacant Old Port mixed use building including executive office suites. www.sixcitycenter.com, and bringing in a law firm condo, law firm tenant, Lio Restaurant, and HE Paintbar nail salon.



1685 CONGRESS IN PORTLAND—Brian redeveloped a 50% vacant office/medical building and retented it including Maine Plastic Surgery Center and Maxim Healthcare. www.maineplasticsurgery.com

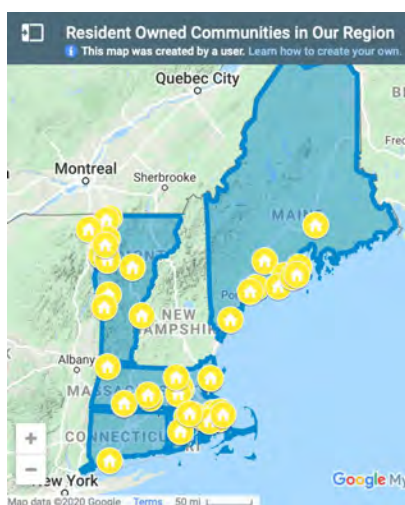


645 CONGRESS STREET—This former downtown college dormitory was converted to 55 one-bedroom and studio apartments with retail on the first floor. Liz worked for developers Shinberg and Alford on the initial concept, conducted a market analysis, developed relationships and communication with neighbors and businesses, creating a bike storage and parking plan, created a community management plan, and assisted with lease-up.



The Cooperative Development Institute (CDI) is a regional 501(c)3 non-profit founded in 1994 by co-op leaders in the Northeast. CDI's mission is to build a cooperative economy through the creation and development of successful cooperative enterprises. We are transforming ownership of our economy, so all people can meet their basic needs. CDI has 30 staff across the Northeast including six staff members in Southern Maine.

New England Resident Owned Community Projects (NEROC)



One of our primary activities is creating cooperative housing in Maine and the Northeast. When a park is for sale we help residents form a cooperative, get financing to buy the park, and learn how to run it with democratic resident control. This program gives residents control of the land beneath their homes and protects the affordability of their housing.

The Resident Owned Community (ROC) model began in NH with the NH Community Loan Fund and became a national model with the formation of ROC USA in 2008. The program has helped people in over 50 parks – comprising more than 4,800 homes — convert to resident ownership. Those communities are part of the ROC USA Network, which has helped secure over 15,000 units of affordable housing

nation-wide. CDI provides ongoing support as trainers and advisers for the ROCs and other cooperatives in the region. We assist in governance, management, financial oversight, communications, conflict resolution, compliance, and securing financing.

Charter Oaks Village Cooperative



With the support and technical assistance of the Cooperative Development Institute (CDI), the residents of Charter Oaks Village acquired the land on the 40 unit Arundel manufactured housing park on June 11, 2019 for \$1,170,000, helping to preserve the affordable housing community within it.

Charter Oaks Village joins nine other Maine manufactured housing communities supported by CDI and financed by Genesis Community Loan Fund, representing 440 homes now under resident control. The newly formed housing cooperative was a recipient of a GrowSmart Maine's honorary 2019 Smart Growth Award.

Mountainside Community Cooperative



CDI's newest Maine Cooperative is the 52-unit Mountainside Community Cooperative in Camden, Maine. Securing affordable housing in a community like Camden is increasingly challenging as housing costs escalate and its population ages. The residents of Mountainside Community purchased the community on December 11, 2019 for \$1,900,000 with financing provided by Camden National Bank, Genesis Community Loan Fund and the Local Enterprise

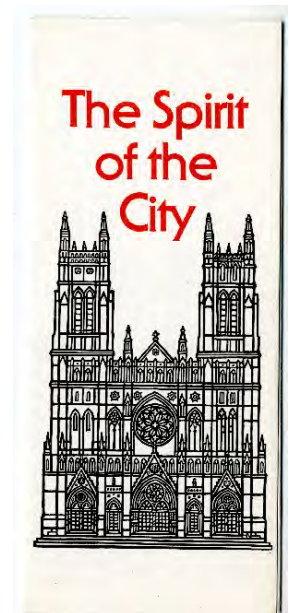
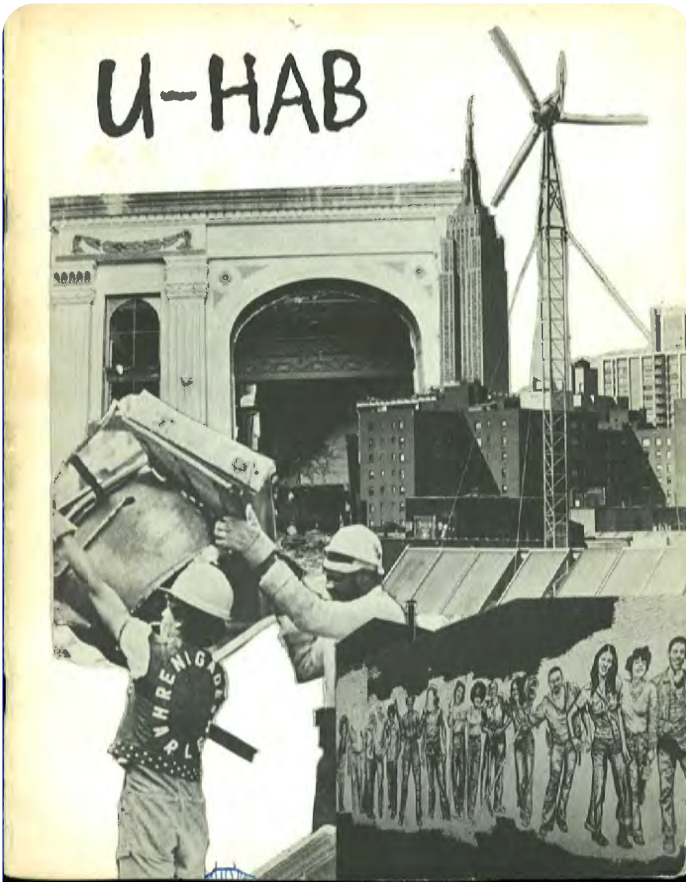
Assistance Fund. "We are so pleased to be able to help the residents of the Mountainside Community Cooperative become property owners today," said Bill Floyd, Executive Director of the Genesis Fund.

Wardtown Mobile Home Cooperative



The residents of the 60-unit Wardtown Mobile Home Cooperative voted to form the cooperative and purchase the community in May 2015, with assistance from CDI, and combined financing from Maine State Housing and The Genesis Community Loan Fund. As with all of the CDI's Resident Owned Communities (ROCs), Wardtown members continue to engage in extensive training and organizational development. As Bill Hodgkins, Cooperative Treasurer explains, "We all gained valuable new skill sets as we went through the process of establishing and financing our

cooperative...Now we have a very strong board of directors and feel very organized, to the point we are able to assist other ROC mobile home parks with advice about the process."



2019 UHAB ANNUAL REPORT

Building for Us

This year, UHAB made a considerable effort to build an archive. In doing so, the lesson we learned from decades of growth is very simple: what has always mattered most for affordable housing is community. It is the strength and support that comes from the community inside a co-op that is just as essential as the affordable housing itself.

With this in mind, UHAB is proud to offer new and expanded programs to low-income homeowners with a refined lens on our work. We have more data and research than ever on the long-term impacts of redlining policies and how communities of color have been resilient in their efforts to remain in their homes, whether in the 1970s or today. By building new affordable co-ops, strengthening tenants' rights statewide, making share loans through our HomeOwnership Lending program, and working in cooperation with our Interboro Community Land Trust partners to create the first Citywide CLT in New York City, we are actively working to dismantle the detrimental legacies of redlining and community disinvestment.

As we look toward the future, our work is expanding in several ways. We are offering more services like Co-ops Go Solar and our energy programs that are tackling the most pressing issue of our lifetime: the climate crisis. Without renewable energy and carbon reduction, low-income residents more than anyone will be affected. Most importantly, we need to recognize that it is not just low-income communities, but people of color in particular who are disproportionately affected by this crisis, just as they have been marginalized from fair and stable housing. UHAB's CDFI, HomeOwnership Lending, helps ensure that a family is not denied the opportunity to purchase because they don't have the money to be an all cash buyer. This program makes small loans where other lenders are reluctant and in this way supporting our HDFC and Mitchell Lama co-op communities in continuing to provide affordable housing.

The interest in co-ops and our work is expanding not just in New York City, but in upstate New York where residents can securely remain in their mobile homes; to New Haven, CT where the nearly 50-year old Seabury Co-op struggles to keep up with its aging infrastructure; and to Seattle, WA where a new permanently affordable co-op is being created. UHAB is excited to be assisting a new City financed co-op development program in Oakland, CA and we continue to meet with organizations and officials in other cities who are seriously considering the limited-equity model.

We have come a long way and welcome our next chapter of growth.

Sincerely,

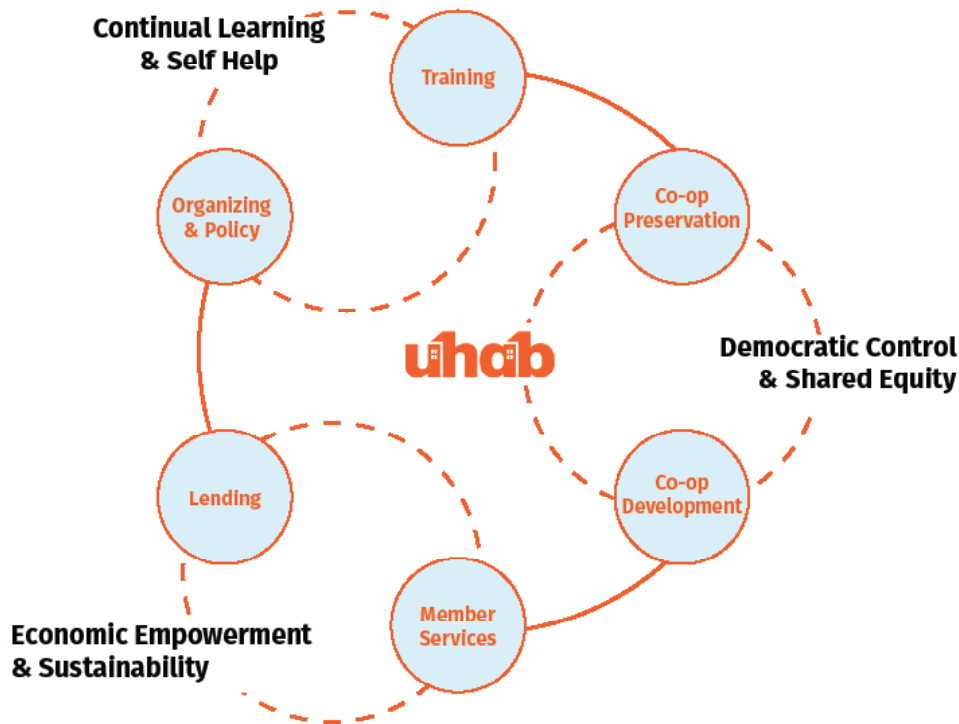
A handwritten signature in blue ink, appearing to read 'A. Reicher', with a stylized flourish at the end.

Andrew Reicher, Executive Director

Community through Cooperation

UHAB empowers low- to moderate-income residents to take control of their housing and enhance communities by creating strong tenant associations and lasting affordable co-ops.

Our Principles



I. Continual Learning & Self Help

When residents take the lead on everything from creating, managing, and preserving their own co-ops to advocating for affordable housing policy reform, this not only improves buildings and neighborhoods, but it transforms lives as well. Ongoing education and training is the key to preserving affordable housing cooperatives and strong tenant associations.

II. Democratic Residential Control & Shared Equity

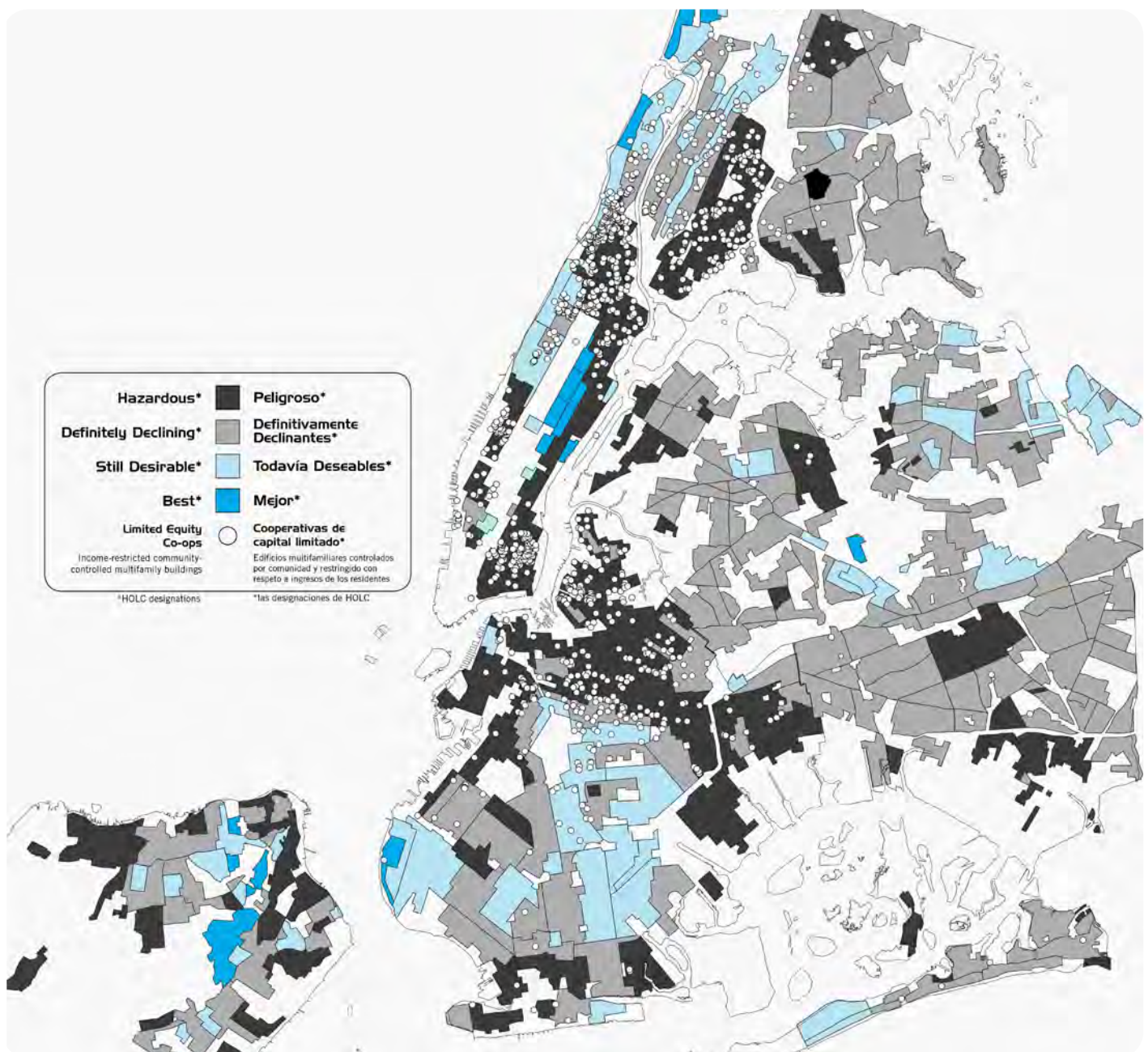
Transparent leadership and the participation of a majority of residents—each contributing unique skills and perspectives—make democratic governing and organizing possible. This collective control of housing helps prioritize a shared equity that keeps affordability manageable for future incoming residents.

III. Economic Empowerment & Sustainability

UHAB provides access to affordable, high-quality resources covering areas of energy, finance, democratic participation and education. These tools help residents maintain lower costs of living while helping to demystify financial technicalities. With support and guidance, all residents should be able to read and manage their finances, in order to make informed decisions about their operating costs.

Housing Justice is Racial Justice

This map overlays the location of modern-day HDFC co-ops with redlined neighborhoods from the 1930s. Redlining was a discriminatory housing practice that devalued neighborhoods where people of color lived and made it difficult for people of color to secure safe, affordable housing. In this map, the deepest shade of grey represents the least economically desirable neighborhoods. In the 1970s and 1980s, landlord abandonment and arson led to City foreclosure on thousands of occupied buildings in these same neighborhoods, creating the conditions for the self-help housing movement and the creation of thousands of HDFCs.



Through organizing and self-help initiatives, community-controlled housing arose as a way for low-income people and people of color to take control of their housing solutions when the government and private sector would not. Today, neighborhoods like Harlem, the South Bronx, and Central Brooklyn still struggle with the legacy of redlining; high air pollution, increased heat waves, higher poverty rates, and gentrification all threaten to displace longtime residents from neighborhoods that were once widely abandoned.

Through it all, community control remains a tool to provide New Yorkers with decent, affordable housing. HDFC co-ops are anchors in their neighborhoods, providing a safe haven to raise families and age in place. Tenant unions build power among renters and win victories like stronger rent laws.

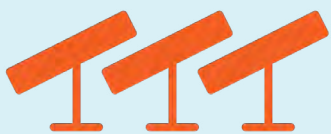


Through our work, UHAB helps people of color control, manage, and improve their homes. We know from experience that most of the low- to moderate- income residents in the buildings we serve are Black or Latinx. Our goal is to have as many people from the communities we serve reflected in our organization's leadership and programs.

Currently, around 60% of our Board and program staff are people of color, and more than half of our organization is bilingual in English and Spanish, fulfilling an essential need for our Spanish-speaking HDFC board members and residents. We provide our technical assistance, homeownership advisement, energy advisement, bookkeeping services, quarterly newsletter, and entire training curriculum in both English and Spanish.

UHAB BY THE NUMBERS: 2019

125 fair elections monitored
in practice of democratic
community control



9 HDFCs
adopted solar,
bringing the total
number to
28

3,500,000 tenants protected
under stronger rent laws



115 budgets planned to
preserve HDFCs' financial
stability & affordability



5
affordable
homeowner-
ship loans
totaling
\$242,011

203
trainings for
affordable
co-op
residents



\$9,197,000
secured in loans to
help HDFCs make
capital
improvements



Our Co-op
Preservation
team helped

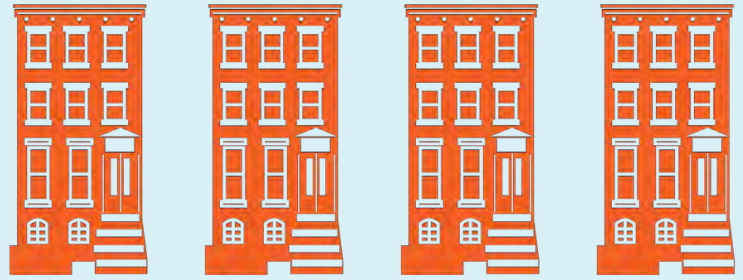
15 co-ops

secure necessary
loans to avoid City
foreclosure last year.

This represents over

350 families

that were able to
retain their equity
and control of their
homes through
technical assistance
and guidance
from
UHAB staff.



To date, UHAB is the
foremost developer of
limited-equity housing
co-ops in NYC. we have

developed **over**

1,300 units of

affordable housing
with the support of a
variety of City and State
programs.



FIRM BIO



ACETO LANDSCAPE ARCHITECTS

ALA is a process-driven, landscape architecture and urban design firm committed to thoughtful, creative intervention at the intersection of environment, economics, art, and culture. ALA was founded on the notion that great design is a product of careful listening, inclusive decision-making, and unrelenting passion for enduring built spaces. We believe landscape architecture lies at the nexus of the built form and the ephemeral qualities of an ever-changing environment. ALA's team offers a unique set of skills and perspective, well-equipped to harmonize and reconcile the roles and value systems of varied design disciplines. We integrate expertise and intuition to craft powerful places, built upon a commitment to resiliency and sustainability. Our studio's passion for craft and technical savvy affords us the opportunity to collaborate across a broad geographic range and myriad project scales from intimate private spaces to large-tract master plans.

ALA was founded in 2014 by Principal, Nick Aceto. ALA has 5 employees, all of which are landscape architects, licensed in the states of Maine, Massachusetts, New York and Colorado.

PROJECT TEAM KEY PERSONNEL



NICK ACETO, PLA, ASLA

ACETO LANDSCAPE ARCHITECTS

FOUNDING PARTNER, LANDSCAPE ARCHITECT | NA@ACETOLA.COM

Nick is a licensed landscape architect and urban designer with a deep passion for the creative process. Nick believes in landscape as a framework for organizing the patterns and behaviors through which we live. From the private garden to the region, Nick has the ability to recognize and translate patterns into visual narratives which tell the unique story of a place through built form. Nick grew up in Portland, Maine where he developed a deep appreciation for the rich and varied New England landscape, from rocky shorelines of the Atlantic to the forested peaks of the Appalachians. As both a consummate urbanist and adventure-seeking outdoorsman, Nick is intrigued by the interplay between urban form, economics, wild nature, and ecology.



CAITLIN ACETO, PLA, ASLA

ACETO LANDSCAPE ARCHITECTS

FOUNDING PARTNER, LANDSCAPE ARCHITECT | CA@ACETOLA.COM

Caitlin is a licensed landscape architect in the states of Maine, New Hampshire, and Colorado, who's passion for art and design began in the Chicagoland area where she was exposed to the architectural works of Frank Lloyd Wright and Olmsted's historic planned community of Riverside. Caitlin's project experience ranges in scale from circulation and wayfinding design at Grand Canyon National Park, to security barrier conceptualization for the Thomas Jefferson Memorial, to signage programming and design. Caitlin brings a distilled clarity to design that strives to embody the contextual heritage, textural richness and cultural integrity of place.



SETH KIMBALL, PLA, ASLA

ACETO LANDSCAPE ARCHITECTS

PRINCIPAL, LANDSCAPE ARCHITECT | SK@ACETOLA.COM

Seth has been practicing Landscape Architecture for over 15 years. He has a Bachelor's degree in Landscape Architecture from the University of Massachusetts Amherst. Seth's project experience includes serving as project manager/lead designer for a master plan for the new Al Guhair University in Dubai, the Al Ain Oasis Cultural Quarter Master Plan in Abu Dhabi, institutional experience including Phillips Andover Academy, Bates College, George Stevens Academy, and Southern New Hampshire University, and a range of residential projects including homes in Texas, Idaho, Montana, New York, Arizona, and several throughout the northeast. Seth joined ALA in 2018, bringing to the practice his experience in civic, institutional, and residential projects. further ALA's commitment to achieve sustainable and resilient project outcomes.



LIST OF SELECT CURRENT & ONGOING OR COMPLETED ALA PROJECTS

ALA has been fortunate to have made meaningful contributions to a vast array of projects across a wide gamut of scales over the last 5-6 years. Below is an abbreviated list of select project examples intended to provide a sense of our professional skill set, experience, and range as a design studio. We would be happy to provide more information about any of the below projects upon request.

RESIDENTIAL

DBX 11 RESIDENCE	ASPEN, CO
WHITE HORSE SPRINGS RESIDENCE	ASPEN, CO
TELLURIDE AGUIRRE ROAD RESIDENCE	TELLURIDE, CO
PRIVATE RESIDENCE	SOUTH FREEPORT, ME
SHADOW MOUNTAIN CONDOMINIUMS	ASPEN, CO
SMYTH RESIDENCE	SNOWMASS, CO

COMMERCIAL/CAMPUS

100 FORE STREET OFFICE BUILDING	PORTLAND, ME
66 STATE STREET	PORTLAND, ME
LAAM 525 LIVE-WORK	BASALT, CO
HOTEL ASPEN	ASPEN, CO
MEMORIAL PLAZA	QUANTICO, VA
CUMBERLAND CLUB SITE PLAN	PORTLAND, ME
RIVERSIDE LIVE-WORK	PORTLAND, ME
WILLITS BEND LIVE-WORK	BASALT, CO
RED HAWK ELEMENTARY SCHOOL	ERIE, CO
CSU UNDERPASS STUDY	FORT COLLINS, CO
ANDERSON RANCH ARTS CAMPUS	SNOWMASS VILLAGE, CO

HOUSING & DEVELOPMENT

SCARBOROUGH DOWNS MASTER PLAN	SCARBOROUGH, ME
THE TREE FARM	BASALT CO
66 STATE STREET	PORTLAND, ME
BLOCK 11 MASTER PLAN	BRECKENRIDGE, CO
BROKEN COMPASS BREWERY	BRECKENRIDGE, CO
RIVERBEND COMMERCIAL CENTER	TIMNATH, CO
CUMBERLAND MULTI-GEN	CUMBERLAND, ME

PUBLIC

COMMERCIAL STREET TRANS. STUDY	PORTLAND, ME
LIBBYTOWN PLAYSCAPE	PORTLAND, ME
PORTLAND DOWNTOWN SQUARE	PORTLAND, ME
BASALT POST SIGNAGE	BASALT, CO
TOWN WAYFINDING SIGNAGE	BASALT, CO
BAYSIDE ADAPTS MASTER PLAN	PORTLAND, ME
ARBANEY PARK MASTER PLAN	BASALT, CO
BASALT OUR TOWN	BASALT, CO
TIMNATH COMMUNITY PARK	TIMNATH, CO
PACTS SMART CORRIDOR STUDY	PORTLAND, ME
LIBBYTOWN VISIONING	PORTLAND, ME
BERTHOUD PARKS & OPEN SPACE PLAN	BERTHOUD, CO

REFERENCES

CAITLIN CAMERON

CITY OF PORTLAND, URBAN DESIGNER
207-874-8901
CCAMERON@PORTLANDMAINE.GOV

"In my capacity as Urban Designer for the City of Portland, I interacted with Aceto Landscape Architects (ALA) on the 100 Fore Street project where they demonstrated thoughtful and creative design strategies for a challenging urban site. Speaking from my experience working with a diversity of landscape and urban design professionals in Southern Maine, I found ALA to have an innovative approach that demonstrates a value for and understanding of the role of public space and urban landscape for the livability and resiliency of cities and towns." - Caitlin Cameron

BRUCE HYMAN

CITY OF PORTLAND, TRANSPORTATION PROGRAM MANAGER
207-874-8717
BHYMAN@PORTLANDMAINE.GOV

"Aceto Landscape Architecture's compelling graphics as part of the Portland-South Portland Smart Corridor Plan effort in 2017 enabled the public to readily visualize the benefits and trade-offs of various transportation alternatives being considered and highlighted the opportunities those alternatives could also have for placemaking, a key goal of the Plan." - Bruce Hyman

RICH CIECIUCH

PROJECT WORKSHOP
970-729-0126
RICH@PROJECT-WORKSHOP.COM

"ALA is a key design collaborator in our design build approach, helping to navigate complex approval issues, participating seamlessly in the iterative design process that succeeds best when site attribute identification and organization melds with building design concepts. They are excellent listeners and always come back with creative and unexpected solutions. Community and Neighbor impacts of any development must be carefully contemplated and negotiated to a successful outcome, and ALA has all the skills and experience to shape and illustrate how new projects relate to the existing fabric of community and neighborhoods." - Rich Ciecuch

DAN BACON

DEVELOPMENT DIRECTOR MR.HOLDINGS
207.232.5154
DBACON@MR.HOLDINGS

MARK RUDOLF

PRINCIPAL / OWNER VELLUM ARCHITECTS
970 618 1889
MARK@VELLUMAD.COM

JAY CHACE

PLANNING DIRECTOR, TOWN OF SCARBOROUGH
207-730-4042
JCHACE@SCARBOROUGHMAINE.ORG

TROY MOON

CITY OF PORTLAND SUSTAINABILITY COORDINATOR
THM@PORTLANDMAINE.GOV
207.756.8362



THE DOWNS | 510-ACRE MASTER PLAN & TOWN CENTER SCARBOROUGH ME

ALA has worked collaboratively with Gorrell Palmer Consulting Engineers along with a large team of consultants and stakeholders in developing a master plan for this 500+ acre former harness racing facility. The project was recently granted a TIF agreement based in large part on the attributes ALA visualized in their plans for the proposed Town Center which included a 4 acre community park with music venue, playground, and sport courts.

KEY STAFF SERVICES STATUS REFERENCE

Nick Aceto, Seth Kimball
Master Planning, Urban Design, Landscape Architecture, Visualization
Planned
Jay Chace, Planning Director, Town of Scarborough | Jchace@Scarboroughmaine.org

ALA worked closely with an experienced Southern Maine builder to develop a neighborhood plan which begins to challenge conventional subdivision development rules with a compact pattern and highly walkable streetscape organized around a central woodland preserve which serves as a neighborhood playscape.

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FRONTRUNNER PARK SCARBOROUGH ME

This third phase of The Downs master plan includes over 200 homes across a broad range of affordability including compact, lane-loaded single family and pocket homes as well as more than 75 apartment units and ground floor office space. The plan is organized around a series of small parks and a highly-walkable street grid.

KEY STAFF

Nick Aceto, Seth Kimball

SERVICES

Master Planning, Urban Design, Landscape Architecture, Visualization

STATUS

Permitted, Expected Construction Fall 2020

REFERENCE

Jay Chace, Planning Director, Town of Scarborough | Jchace@Scarboroughmaine.org



LAAM 525

BASALT CO

Aceto Landscape Architects worked closely with architect, owner and contractor on this urban infill development, providing creative streetscape and urban plaza design interventions. The project included 8 affordable residential units, 5,000 SF of commercial / light industrial space, parking, and integration with the town's transit system.

KEY STAFF

Caitlin Aceto, Nick Aceto

SERVICES

Landscape Architecture, Urban Design

STATUS

Under Way Summer 2020

REFERENCE

Glenn Rappaport | grappa@blackshack.net



FREEPORT LIVE-WORK

FREEPORT ME

Freeport Live-Work is a community master plan envisioned as a series of mixed-density neighborhoods including more compact, single-family pocket homes as well as mixed-use townhomes and commercial-office buildings

KEY STAFF	Nick Aceto, Caitlin Aceto
SERVICES	Landscape Architecture, Urban Design, Planning
STATUS	Planned
REFERENCE	Undisclosed



BASALT ON-CALL PLANNING

BASALT CO

ALA was tasked with the study of two parcels within the Town of Basalt Growth Management Area for feasibility of alternative 'affordable' housing development options. ALA explored options for pocket neighborhoods, compact lot scenarios, and consolidation of infrastructure as a means to offset development cost and in turn reduce home pricing.

KEY STAFF

Lisa Cowan, Caitlin Aceto

SERVICES

Landscape Architecture, Visualization

STATUS

Planning Document Complete 2016

REFERENCE

Undisclosed | Undisclosed



Acorn Engineering, Inc. is a Portland-based civil and environmental engineering firm of nine full-time employees and four construction inspectors. Acorn's team has a diverse portfolio providing Maine with quality engineering and environmental services as well as state-wide construction administration on behalf of the Maine Department of Transportation.

A cornerstone of Acorn Engineering is the attention to quality and exceptional level of service on every project, regardless of size. Our engineers and scientists pride themselves on their extensive experience, which is backed by a broad knowledge of civil and environmental engineering practices from smaller residential projects to larger commercial projects that integrate environmental assessment and site redevelopment.

Acorn Engineering has demonstrated the ability to breakdown and synthesize widely disseminated regulations into accepted engineering practices and practical site assessment and development. As a result of Acorn's efforts, the Cumberland County Soil & Water Conservation District recently recognized Acorn as the Contractor of the Year. This was the first award associated with the nationally recognized Long Creek Restoration Project and the first time the Cumberland County Soil & Water Conservation District ever recognized an engineering firm as their Contractor of the Year.

Acorn's expertise covers the areas of: civil/site design, evaluation, development, and permitting; and construction phase services such as construction administration, construction documents, project bidding, and site inspection including erosion and sedimentation control. Acorn's experience also includes the field of environmental engineering and compliance such as: Phase I and Phase II environmental site assessments, soil and groundwater remediation planning and design; Maine's Voluntary Response Action Program (VRAP); and stormwater treatment system design and permitting.

Acorn's engineers have designed, permitted, and overseen construction on numerous single-family and multifamily residential projects including traditional subdivision designs featuring on-site sewage/septic disposal and drilled wells. Furthermore, Acorn has demonstrated extensive experience and capabilities with municipalities, the Maine Department of Transportation (MDOT), Maine Department of Environmental Protection (MDEP), soil & water conservation districts, conservation commissions, municipalities, and the private sector on environmental and site development projects as demonstrated by the following:

- Listed on Maine DEP's Pre-Qualified Vendor List for Environmental Consulting Services
- Listed on Maine DOT's Pre-Qualified Consultants for eight service areas (listed under Section I.D)
- Cumberland County Soil & Water Conservation District Contractor of the Year for work on the Long Creek Restoration Project

- **Public Works Redevelopment – Meeting House Hill**

Over the past two years, Acorn Engineering has worked in close association with the City of South Portland, neighbors, and private clients on the redevelopment of the former Public Works facility. The 6-acre site is nestled in the middle of the Meeting House Hill residential neighborhood and is currently



a mix of storage buildings, fuel fill stations, miscellaneous stockpiles, and pavement. The site will be redeveloped into a mix of multifamily townhomes and single-family dwellings comprising 38 units along with a public park and community gardens.

In addition to the environmental remediation, Voluntary Response Action Program (VRAP), and other environmental considerations given the previous land use, the project is subject to a Maine DEP stormwater management law. The redevelopment design results in a reduction in impervious area of over 50% and reduces land use intensity across the site. Though not required, several stormwater BMP's have been implemented into the site as a best practice, further attenuating and treating stormwater runoff. In addition to the significant redevelopment plan, Acorn has designed an infrastructure plan to separate the storm and sewer mains. This will include installing 400 feet of new storm drain along the existing O'Neil Street right-of-way and 700 feet of new storm drain along the proposed O'Neil Street right-of-way extension. Overall, this effort will reduce the effects of combined sewer overflows (CSO) into Casco Bay which occur due to wet-weather events and the wastewater treatment plant's inability to provide capacity for both storm and sanitary sewer flows.

As part of this project, Acorn held a multitude of meetings with the City including the assistant City manager, the former Mayor, the entire planning division, and the chief engineer of Public Works. Furthermore, Acorn has collaborated with department heads of the Fire, Parks, Public Works, and Water Resource departments to ensure a feasible and ideal project for all parties. As a result, the process was truly a collaborative effort with a number of stakeholders weighing in on the design.

- **Munjoy Heights**

Acorn provided civil/site engineering and permitting for the design of Munjoy Heights – a six townhome, 29-unit development on the steep slopes of Munjoy Hill in the City of Portland. Acorn designed and developed construction drawings for the sanitary sewers, storm drains, water mains, driveways and pedestrian circulation, retaining wall locations, building locations, and drainage infrastructure to be built in compliance with City standards.



A key component to the project was coordinating with the City on the future combined sewer separation project and the site's overall stormwater management. Additionally, discussions with neighbors and stakeholders were paramount in the project's success.

The innovative urban infill project compliments the Munjoy Hill neighborhood with a communal design and plentiful native landscaping that replaced invasive species which previously dominated the eroding banks prior to the development. The \$22 million project features a courtyard, terraced landscaping, a Portland Trails-maintained path that connects the redevelopment to the existing trail system, and low impact development (LID) techniques that meet MDEP Chapter 500 regulations. The stormwater management includes an underdrained sand filter and chambers that detain and treat stormwater on site in tandem with strategically placed rain gardens.

The project required extensive coordination and collaboration between the client, City of Portland, Portland Trails, the structural engineer, the architect, and the contractor to successfully complete the project with the first “woonerf” in the state and maintaining the existing public walking path through the property.

- **200 Valley St**

Working with Avesta Housing, Acorn Engineering provided civil engineering and permitting for Avesta's 60-unit project in the St. John Valley neighborhood. This urban infill project replaces the existing single-family house and abutting vacant lots into new affordable housing opportunities with two levels of covered parking, amenities, and a rebuilt project frontage with new sidewalks, street trees, and bicycle hitches.



As part of the project, Acorn developed a transportation and parking analysis to ensure that the provided parking will adequately serve the redevelopment. Furthermore, the design team identified and implemented multiple strategies to encourage residents to efficiently utilize the many modes of transportation available on the Portland peninsula.

- **Little Dolphin Drive & Jocelyn Place**

In collaboration with the South Portland Housing Authority and Risbara Holdings, Acorn provided civil engineering design and permitting of a multi-use subdivision at the end of Little Dolphin Drive in Scarborough. Proposed uses include a two-story office building and a three-story 60-unit senior housing facility with associated parking and landscaped areas.



In addition to a voluntary neighborhood meeting, the project went through a 3-step master plan phase with the Town of Scarborough in which the project was collaborated on with Planning Staff, the Planning Board, and neighbors.

The project is subject to Maine DEP and US Army Corps permits. To adequately treat stormwater on the site, Acorn has designed multiple stormwater BMPs meeting Maine DEP Chapter 500 regulations resulting in a low impact design.

- **89 Anderson Street**

In collaboration with Redfern properties and the East Bayside neighborhood, Acorn developed the civil/site engineering design of a mixed use 53-unit redevelopment of an existing under-utilized, urban infill lot in the East Bayside neighborhood. Acorn's scope of services included in the initial phase applying for and obtaining a zone change and



conducting Phase I and Phase II Environmental Site Assessments to evaluate potential environmental contamination at the site.

After conducting the environmental remediation efforts, Acorn developed the site layout and design of sanitary sewers, storm drains, water mains, site driveway, retaining wall locations, building locations, parking lot design, building drainage structures, utility connections and landscaping plan (with a landscape architecture subconsultant) to meet the City of Portland Technical Standards. Acorn also integrated sidewalk and improvements associated with the project into the City's Anderson Street ByWay project. Furthermore, the project team worked with a non-profit organization, the Telling Room, to provide public art along the Fox Street streetcape in lieu of traditional fencing.

Overall, the project established an important mixed use building on a prominent corner lot adjacent to Kennedy Park which contains popular recreation space. The building houses a restaurant and the Gear Hub bicycle school on the first floor with residential apartments above which encourages an active street presence with housing, goods, and services that help tie the neighborhood together and keep eyes on the street.

- **667 Congress Street – The Hiawatha**

The \$28 million project included the civil/site engineering design for the 8-story, first floor retail and 139-unit apartment building on Congress Street in Portland. Vehicle parking is served by two levels with separate access from Vernon and Avon St. The project featured building and site design in an historic district adjacent to Longfellow Square.

Services included, but is not limited to, permitting with the City of Portland, layout and design of sanitary sewers, storm drains, water mains, pedestrian and vehicle entrances, building locations, parking lot design, and parking garage grading and drainage. Acorn provided significant coordination between the Architect, Structural Engineer, Geotechnical Engineer, Construction Management Company, Owner, and the City.



I. Conformity with Land Use Ordinance

The following outline is made in accordance with the City of Portland Code of Ordinances, Chapter 14 Land Use, Article V Section 14.6.1-4

OVERVIEW

The proposed mixed-use residential buildings have been designed to conform to City standards where possible, as well as improve upon existing non-conformities. This project conforms with the majority of the applicable standards of Portland's Land Use Ordinance Section 14-526 as demonstrated in the following narrative.

14.6.1 Transportation Standards

A. Impact on Surrounding Street Systems:

- a. The project will not create any significant hazard to safety on the surrounding street network. The site is located along Washington Avenue Extension. It is classified as a Major Urban Collector according to the City of Portland Federal Street Classification map.
- b. A moderate traffic increase is expected for this project due to the change in use of the property. Intersection improvements are proposed at the Auburn and Lambert intersections to help mitigate any impacts from increased trip generation.

B. Access and Circulation:

1) In general

- a. The development will provide safe access and internal circulation for both pedestrians, vehicles and emergency vehicles as seen on the Site Plan.
- b. Continuous internal walkways will be provided and will connect to the proposed transit stops along Washington Avenue.
- c. The proposed parking areas can be accessed from Washington Avenue. Points of access have been located to avoid conflicts with turning movements and traffic flows on the site.
- d. The site does not feature drive up services as mentioned in this requirement.

2) Loading and Servicing:

A designated space has been signed along the northern and southern portion of Washington Ave near the proposed bus stops. It is proposed that delivery vehicles use this space for delivery purposes in lieu of



circulating through the site. Ample space has been provided both for short-term unloading and bus loading/unloading to exist in one location.

3) Curbs and Sidewalks:

- a. Bituminous pavement sidewalks are proposed throughout the site, as seen on the Site Plan, and will connect to the proposed bus-stops on Washington Avenue. Curb and sidewalks will be provided along the property frontage and continuing to the Portland Trails connection on Garsoe Drive.
- b. There are no existing sidewalks along Washington Avenue. Utility connections within the road will be required and will be rebuilt in conformance with City standards.
- c. Not applicable
- d. We will be requesting a waiver from curb installation requirements as it is proposed to install slipform concrete curb in lieu of granite.

C. Public Transit Access:

- 1) As part of the development, two bus stop/shelters are proposed along the properties Washington Avenue frontage.
- 2) The bus stop/shelters will be connected to the internal sidewalks within the site.
- 3) Not applicable.

D. Parking:

- 1) Vehicular Parking
 - a. The proposed project will provide 122 parking spaces which is anticipated to meet the requirements of the proposed uses within the new buildings.
 - b. Although not specifically required within this zone or land use, Transportation Demand Management (TDM) strategies will be implemented as identified in Section U.
 - c. Not applicable.
 - d. The parking space and aisle dimensions are in conformance with the Technical Standards with the exception of a waiver request to reduce the drive aisle width from 24' to 22' given the residential use and low turnover rate. Please refer to the Site Plan for more information.



2) Location and Required Number of Bicycle Parking Spaces:

- a. A minimum of 66 bicycle spaces are proposed for the 165 residential units. Please refer to the Landscape Plan for more information.
- b. Not applicable

3) Snow Storage:

- a. Snow storage area is provided throughout the site. The Owner will be responsible for managing snow at their discretion and/or coordinating snow removal from the site when necessary.
- b. Snow storage areas will not encroach on parking, walkways, or stormwater management systems.

4) Electric Vehicle (EV) charging

- a. The development will adhere to applicable EV standards, as it will provide 20% of parking spaces with charging.

E. Transportation Demand Management (TDM):

- 1) A Transportation Demand Management (TDM) plan will be provided as part of the site plan application.
- 2) The plan will comply with the transportation systems and street design standards of the technical manual.

14.6.2 Environmental Quality Standards

A. Preservation of Significant Natural Features:

- 1. The site is completely wooded and undeveloped. Wetlands traverse the site and are considered a significant natural feature due to the life they have the potential to house. There are no known endangered species or plants existing on the site.
- 2. The contiguity of the wetlands will be preserved to the greatest extent feasible.
- 3. Not applicable



B. Landscape Preservation:

- 1) There are many existing trees on site, a portion of the existing trees will need to be removed to accommodate the building. Given the compact development scheme, a significant portion of the existing trees and vegetation will be preserved. This effort will be further acted upon by hiring a forester to help select tree saves in tandem with the proposed
- 2) Measures will be taken in accordance with Section 4 of the Technical Manual.
- 3) It's anticipated a minimum of 30% of existing trees ten inches DBH or greater within the setback area will be preserved as a result of the efficient development scheme.
- 4) A waiver is not requested.
- 5) Not applicable.

C. Site Landscaping and Buffers

- 1) The development will include a minimum of one shade tree or six plantings per 30 linear feet of all frontages as measured along the property line. Where applicable it is proposed to utilize the existing vegetation to remain in order to satisfy this requirement.
- 2) Buffers
 - a. The solid waste locations will be located adjacent to the parking lots on the east sides of the development on both sides of the street. The proposed solid waste containers are anticipated to be screened by a decorative fencing, screening, and landscape plantings.
 - b. Not applicable
 - c. The existing buffers are to remain or be replanted along all residential abutters.
- 3) Parking Landscaping
 - a. The proposed development will include one (1) tree and three (3) shrubs for every five (5) parking spaces within landscaped islands to screen shade and break up parking.
 - b. Uninterrupted parking spaces do not exceed forty (40) parking spaces.



- a. Not applicable.

4) Street Trees

- a. Street trees along the property frontage will be provided per the standards of the technical manual.
- b. Not applicable.

D. Water Quality, Stormwater Management and Erosion Control:

- a. The site drainage will not be directed to flow or pond onto adjacent lots. The runoff created from the site will be collected, attenuated, and released at a rate that does not exceed the existing condition.
- b. Provisions are in place to ensure stormwater from the development will not exceed the pre-development flows.
- c. Not applicable
- ii. A site-specific Stormwater Management Plan has been developed for the project to show compliance with Section 5 of the Technical Manual, including the basic standards of MEDEP Chapter 500. Please refer to sections J and K, the Erosion & Sedimentation Control and Stormwater Management Plans, respectively, for more information.
- iii. The development is not anticipated to pose a contamination risk to groundwater during or after construction. The project will be serviced by a public wastewater system.

The development will provide for adequate and sanitary disposal of sewage in accordance with Section 2 of the Technical Manual.

14.6.3 Public Infrastructure and Community Safety Standards

- 1. Consistency with City Master Plans:
 - a. The project has been designed to be consistent with the City's Zoning Ordinance and off-site infrastructure.
 - b. Not applicable.



2. Public Safety and Fire Prevention:

- a. The site has been designed to allow for long viewing aisles and minimal spaces obscured from view. An open space area has been provided at the center of both site's to reinforce a sense of community. Lighting will be provided to create a safe environment at nighttime.
- b. Emergency access has been provided. Fire trucks and ambulance will be able to access all of the site and buildings, the grass paver access aisle has been included in the site design to promote efficient emergency access circulation.

3. Public Utilities

- a. Ability to Serve letters have been sent to the respective companies. Responses are forthcoming.
- b. The electrical service will be wired underground via a new pad-mounted transformer as shown on the Utility Plan.
- c. The new sewer and stormwater infrastructure will meet the provisions of the Technical Manual.
- d. The project will be served by connection to the public sewer system within Washington Avenue. The stormwater management system is designed to meet the standards of Chapter 500.
- e. A space allocated for solid waste storage can be seen on the Site Plan (C-09, C-10, and C-11). The solid waste containers will be fully enclosed and screened from the public view.

16.4.4 Site Design Standards

A. Massing, Ventilation and Wind Impact:

- a. Please refer to Section O, Architectural Design Narrative.

B. Shadows:

- a. Not applicable.

C. Snow and Ice Loading:

- a. The structure will not distribute snow and ice onto adjacent properties.

D. View Corridors:

Please refer to Section O. Architectural Design Narrative.

E. Historic Resources:

- a. The development is not located in a historic district, historic landscape district or City designated landmark.



- b. The development is not located adjacent to designated landmarks, historic district, or historic landscape district.
- c. There are no known archaeological resources on the site.

F. Exterior Lighting:

- a. Exterior lighting will be designed to meet the requirements of Section 12 of the Technical Manual.
- b. Any lighting that may adversely impact the abutting residential properties will feature house-side shielding.
- c. Architectural and Specialty Lighting.
- d. No architectural or specialty lighting is proposed.
- e. No up-lighting is proposed.
- f. No new street-lights are proposed.

G. Noise and Vibration:

- a. The HVAC system will meet the applicable state and federal emissions requirements and will also be screened and directed away from abutters.

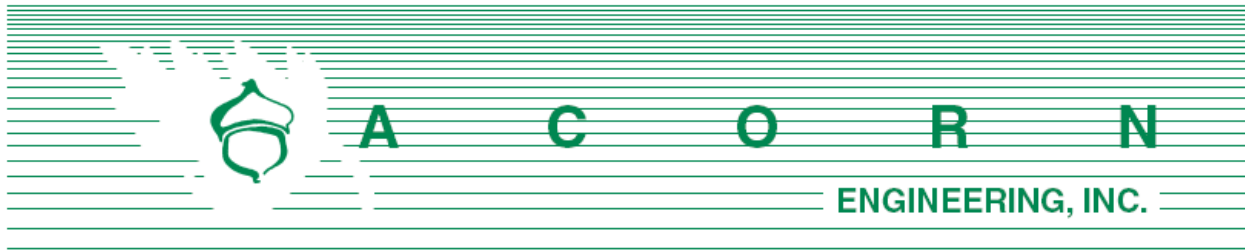
H. Signage and Wayfinding:

- a. All street and wayfinding signage shall meet the requirements of the Manual on Uniform Traffic Devices (MUTCD) and Division 22 of the City Code.
- b. The project is not located in a historic district or subject to Article IX.
- c. Signage will only be related to vehicular access.
- d. All street and wayfinding signage shall meet the requirements of the Manual on Uniform Traffic Devices (MUTCD) and Division 22 of the City Code.

I. Design Standards.

- a. The project has been designed to meet the standards set forth in the R-3 zone. Please refer to the Site Plan for more information on the Space & Bulk Standards.





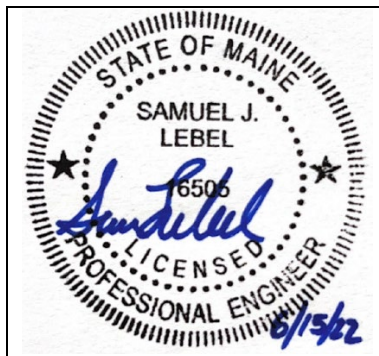
STORMWATER MANAGEMENT **REPORT**

Prepared For:

**Maine Cooperative Development Partners
Portland, Maine 04103**

Prepared By:

**Acorn Engineering, Inc.
PO Box 3372
Portland, Maine 04104**



**June 2022
Rev. September 2022**

INTRODUCTION

Acorn Engineering, Inc. has been retained by The Maine Cooperative Development Partners to provide civil engineering services for the proposed development at 165 Lambert Street and 622 Auburn Street. The property consists of approximately 17.95 acres of land and contains the following parcels (Chart, Book, Lot, 385-A-1, 386-C-1, 386-B-12, and 386-B-15).

A stormwater analysis was prepared to demonstrate that the project will meet the requirements set forth by Maine DEP Chapter 500 Basic and General Standards and the following requirements from the City of Portland (the City):

- City of Portland Land Use Ordinance Article 14.6.2.D.
- City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards and Maine DEP Chapter 500 Stormwater Management.

EXISTING CONDITIONS

The project site is bordered by Lambert Street, Auburn Street, and Washington Ave. A boundary plan has been prepared by Owen Haskell Inc., dated June 14th, 2021 and revised December 21st, 2021. Two wetland investigations were performed (separate investigations for both parcels) by Jones Associates Inc., dated June 2021 and October, 2021. As shown in the reports there are two wetlands on the south parcel, one of the identified wetlands is within 25 feet of a stream and therefore is classified as a Wetland of Special Significance (WOSS). There are also two wetlands within the northern parcel where one is considered a WOSS due to its proximity to an identified stream. Jones Associates identified multiple streams in both parcels. The southern parcel consists of four streams, with two converging at the eastern portion of the parcel creating one larger stream flowing from the east to west. These streams are a result of culverts flowing onto the property. Two feeder streams also contribute to the large stream and drain from the south to the north. One stream is located on the northern parcel and flows from east to northwest, this stream is formed from a culvert draining onto the property. The site is not in the watershed of an urban impaired stream.

The site primarily consists of wooded, undeveloped area with six subcatchments.

- SC 1N – This subcatchment consists of wooded land and a vegetated ditch alongside Washington Ave. This subcatchment drains to an existing catch basin at the end of the ditch which outlets runoff to another existing catch basin located at the end of the southern Washington Ave ditch.
- SC 1S – This subcatchment consists of wooded land, a vegetated ditch, and an isolated wetland pocket. This subcatchment drains to the south roadside ditch which is collected by an existing catch basin at the end of the ditch. The catch basin outlets to an existing cross culvert beneath Lambert Street.
- SC 2N – This subcatchment consists of undeveloped land, a portion of the single family lots along Auburn Street, and existing wetlands. This subcatchment includes area from the northeastern portion of Washington Ave as well as the Washington Ave / Auburn Street



intersection. The subcatchment crosses Washington Ave via a 12" culvert that outlets into the south parcel and flows to the existing 18" culvert.

- SC 2S - This subcatchment consists of the southern portion of the south parcel and is primarily wooded and undeveloped land. Multiple stream exist in this subcatchment and serve as the primary drainage conveyance system. The confluence of the stream occurs near the western portion of the parcel upstream of an 18" culvert off Lambert Street.
- SC 3N – This subcatchment consists of wooded area along the northern parcel. The area drains to an existing wetland within the Falmouth parcel as identified by Jones Associated.
- SC 4N – This subcatchment consists of wooded area along the northern parcel as well as a portion of the single family lots located along Auburn Street. This area drains to the stream flowing east to west and bisects the parcel.

It should be noted that the USGS soil survey has soil types HSG A and HSG D in SC 1S. The delineated wetland located in this subcatchment falls in the HSG A area. We believe that the wetland pocket should be replaced with HSG D soils in lieu of HSG A to better represent the existing site conditions. As such the stormwater model has been updated to reflect the above.

PROPOSED DEVELOPMENT

The project features the development of a planned unit residential development (PRUD) which a development program outlined within the land use ordinance and generally follows the principles of cluster subdivision planning where infrastructure is denser and more efficient in lieu and as a result, grater open space opportunities are available. The site will consist of fourteen separate residential buildings with a total of 162 dwelling units, each building will be served with associated parking and utilities. Overall, the project proposes to develop 4.57 acres of the lots with 2.59 acres consisting of impervious area.

The site has been graded to slope with the existing topography while providing for appropriate slopes in the parking areas. The slopes on the outside of the parking areas that are not part of a stormwater system will be appropriately stabilized per the specifications in the plans and are anticipated to be heavily landscaped for further slope protection and buffering. The majority of the site's runoff, including 97.5% of the new impervious area, will be either piped to the two proposed Underdrain Subsurface Sand Filters (USSF), or graded to flow to the three proposed porous pavement sections. The USSFs consist of a pretreatment isolator row which provides initial settlement and filtration of contaminants. Water will then flow vertically through the sand filter providing water quality improvements and outlet via an underdrain. At each outlet to the downstream drain manhole, orifices through the use of drilled holes in pipe caps will be utilized to help reduce the flow rate leaving the USSFs.

A portion of the parking areas and mews will consist of porous pavement with filter media and stone beneath the pavement profile. Traditional pavement will be used in the parking lot areas in the higher portions of the site and will runoff onto the porous pavement. In the mews, it is proposed for pavers or traditional pavement to be located upgradient of the porous pavement. Underdrains will be provided to collect and convey water with catch basins being



located at the low points to serve as overflows for extreme storm events as well as an access point for inspection and maintenance purposes.

The discharge from these systems will ultimately flow to a level lip spreader or riprap apron before entering the roadside ditch or surrounding woods. Two 15" storm drains are proposed to outlet into the existing ditch line with a proposed riprap apron to help reduce velocity, based on the peak 10-year flow rates the maximum water velocity discharging into the City's ditch system will be below 5 ft/sec. Maine DOT recommends grassed ditches be designed to ensure flow velocities are below 5 ft/sec for the 10-year storm, as such the stormwater outlet aligns with industry standard hydraulic design.

The development will be served by the Portland Water District, CMP, Spectrum, Consolidated Communications, and municipal sewer and storm systems. Utility mains and services have been coordinated with each respective utility company.

GENERAL STANDARDS – WATER QUALITY

All treatment BMPs proposed as part of this development were designed in accordance with The Maine Stormwater Management Design Manual Chapter 7.3 and 7.7.

Treatment Area

In accordance with Chapter 500, General Standard rules, treatment must be provided for no less than 95% of the impervious area and 80% of the developed area. As such, it is proposed that treatment is required via the Underdrained Subsurface Sand Filter (USSF) and Porous Pavement BMPs. The USSF provides initial treatment of the larger sized pollutants. The stormwater will flow vertically through the sand filter layer. The treated stormwater will then be collected within perforated pipes and released slowly into the downstream system. The Porous Pavement will collect runoff through the top bituminous paved surface where it will then filter through several layers of media before being collected by an underdrain and transported to the downstream system.

The treatment of the impervious and developed surfaces by the BMPs are as follows:

Table 1 – New Impervious Area Treatment Area Table				
Existing Imp. Area (SF)	Proposed Total Imp. Area (SF)	Net Change in Imp. Area (SF)	Proposed Imp. Area with Treatment (SF)	% Overall New Imp. Area Treated
0	112,810	112,810	110,000	97.5%



Table 2 – New Developed Area Treatment				
Existing Dev. Area (SF)	Proposed Total Dev. Area (SF)	Net Change in Dev. Area (SF)	Proposed Dev. Area with Treatment (SF)	% Overall New Dev. Area Treated
0	199,100	199,100	167,600	84%

Underdrain Subsurface Sand Filter

The underdrained subsurface sand filters were sized to meet or exceed the requirements set forth within the MDEP Volume III BMPs Technical Design Manual, Chapter 7.3. Filter BMP systems have shown to be effective at filtering out and removing a wide range of pollutants from stormwater runoff.

As shown above, the project anticipates meeting the required treatment for new impervious and developed surfaces with the filter BMPs.

Filter Area Sizing

A calculation for sand filter area is necessary to meet the requirements below the surface of the USSF. As defined in the Volume III: BMPs Technical Design Manual, Chapter 7, the surface area of the filter shall be no less than the sum of 5% of the tributary impervious area and 2% of the tributary vegetated area. The filter area is calculated by the following formula:

$$[(\text{Imp. SF} \times 0.05) + (\text{Veg. SF} \times 0.02)] = \text{Filter Area (SF)}$$

Please refer to Table 2 below.

Table 2 – Total Filter Surface Area, displays the proposed USSF sizing requirements, actual size and the percentage of required area.

Table 3 – Total Filter Surface Area				
	Landscaped Area (SF)	Impervious Area (SF)	Required Filter Area (SF)	Actual Filter Area (SF)
USSF 1	16,429	26,776	1,667	1,765
USSF 2	20,682	29,778	1,903	2,294

As shown, the size of the soil filter area will meet and exceed the surface area requirements.

Isolator Row Sizing



The isolator row was sized based upon a letter from Mark Bergeron, Director of the MDEP Bureau of Land Resources, to StormTech dated July 29, 2016. The calculation that Mr. Bergeron references to determine the minimum number of stormwater chambers needed for the isolator row is defined as the one-year peak flow rate divided by the specific flow rate of the chamber (0.3 cfs for MC-3500 chambers).

Table 4 – Isolator Row Sizing			
	1-Year Peak Flow (cfs)	Required Chambers	Provided Chambers
USSF 1	1.20	4	5
USSF 2	1.60	5.3	7

Water Quality Volume

In accordance with the Volume III: BMPs Technical Design Manual, a water quality volume of 1.0 inches times the tributary impervious area plus 0.4 inches times the tributary vegetated area is required to be treated by the USSF. The water quality volume is calculated by the following formula:

$$\left(\frac{\text{Imp. SF} \times 1.0''}{12''/1'} \right) + \left(\frac{\text{Veg. SF} \times 0.4''}{12''/1'} \right) = \text{Treatment Volume (CF)}$$

The proposed water quality volume is as follows:

Table 5 – Water Quality Volume Table				
	Landscaped Area (SF)	Impervious Area (SF)	Treatment Volume Required (CF)	Treatment Volume Provided (CF)
USSF 1	16,429	26,776	2,779	3,293
USSF 2	20,682	29,778	3,171	3,755

As shown, the size of the combined water quality volume will meet and exceed the treatment volume requirements. Values from the HydroCAD calculations are attached to this report.

The treatment volume was calculated by using the HydroCAD model and the rainfall that produces 18" of ponding within the chambers. The storage volume within the crushed stone and chambers – the two layers above the filter sand – is then added together to calculate the water quality volume.



A vertical orifice is modeled in HydroCAD at the end of the underdrain outlet to detain the stormwater for an approximate 24-hour time frame. The orifice is intended to be a PVC cap placed on the outfall pipe (no glue) with the orifice drilled into the cap eccentrically. The PVC cap can be easily inspected, removed, or replaced if necessary.

Porous Pavement

The porous pavement subsurface media was sized to meet or exceed the requirement set forth within the MDEP Volume III BMPs Technical Design Manual, Chapter 7.7. The system has proven to be effective at filtering and removing a wide range of pollutants contained in stormwater runoff.

Filter Area Depth

Per the requirement for porous pavement in Chapter 7.7 of the MDEP Stormwater BMP manual, the filter depth shall be a minimum of 4 inches. The proposed design incorporates a filter depth of 10 inches with an assumed void ratio of 5%.

FLOODING STANDARD – WATER QUANTITY

The proposed project was modeled using HydroCAD to verify that the post-development conditions do not exceed the pre-development conditions. A 24-hour SCS Type III storm distribution for the 2, 10, and 25-year storm events were used. The corresponding rainfall amounts for these storms are 3.10", 4.60", and 5.80" respectively. Due to the numerous variables, and inherent inaccuracies with the modeling program used to calculate stormwater runoff it is custom at Acorn Engineering, Inc. to round to the nearest whole number. However due to the small size of the project and the minimal existing flows, the stormwater runoff shall be rounded to the nearest tenth of a cubic feet per second (cfs).

Time of Concentration (Tc)

The times of concentration for subcatchments in both the pre and post conditions were calculated by entering the flow path with the associated ground cover and slopes. HydroCAD then calculated the Tc's and incorporated the total Tc for each subcatchment into the model. When the calculated Tc was less than six minutes (0.1 hours), a direct entry of six minutes was used as advised by the TR-55 model. Consistent with previous submissions and best practices, the sheet flow length for any Tc path was capped at 100 feet.

Curve Number (CN)

Within the pre-development model, the wooded and vegetated ditches were conservatively considered good condition with appropriate underlying soil hydrologic group. In particular, the woods were given a "good" condition throughout the entire development. Based upon the understory, the CN value contained either light underbrush or dense underbrush, depending



on the location as verified by multiple site visits. The site generally features denser underbrush towards the back of the parcels and less dense underbrush closer to Washington Avenue. Lastly, the wetlands were modeled as Woods in the D condition in both the pre and post.

The post development landscaped areas were given a good rating within the appropriate underlying hydrologic soil group. This assumption is reinforced given the aggressive landscape plan which will feature more porous conditions that are appropriately mulched along with future extensive root systems and canopy cover that will exist once the landscaping has matured.

Pre-development Calculations

The site consists of wooded area and wetlands in the predevelopment condition, for the purpose of this analysis the land has been divided into six separate sub catchments.

The existing cross culvert underneath Washington Ave, as well as the catch basin outlet for the northern Washington Ave ditch have been included in the model as reaches. The intent of this is to measure the capacity of the existing infrastructure down stream of any proposed peak flow alterations.

Peak flow rates for the pre-development storm events are as follows:

Table 6 – Pre-Development Peak Stormwater Flows			
Drainage Area	2-Year Storm Event (cfs)	10-Year Storm Event (cfs)	25-Year Storm Event (cfs)
POI #1	1	3	6
POI #2	8	19	27
POI #3	0	0	0
POI #4	0	0	1

Post-development Calculations

The post condition features the same four point of interests that exist in the pre-development condition, but with multiple BMPs throughout the north and south parcel dedicated for the treatment of runoff generated primarily by roof and pavement via porous pavement and the two (2) USSFs. The subcatchments are as follows:

- Subcatchment 1.1N – This subcatchment consists of primarily undeveloped land that flows to the roadside ditch along the northern side of Washington Ave.
- Subcatchment 1.1S, 1.4S, 1.7S – This subcatchment consists of the roof area contained within the southern parcel, the open space in the center of the southern parcel consisting of landscaping and lawn area, and a small portion of area behind building A.9 and A.19. The roofs will be equipped with downspouts to underground storm drains that are routed to USSF 2. SC 1.4S and 1.7S will be collected via a series of field inlets and piped to USSF 2.



- Subcatchment 1.2N – This subcatchment consists of a portion of Washington Ave and a small portion of the northern parcel. These subcatchments flow to a proposed rain garden located near Sta 4+25 along Washington Ave. The rain garden will help cool, detail, and filter out any pollutants before slowly discharging to the roadside ditch along the northern side of Washington Ave.
- Subcatchment 1.3S, 1.5S – This subcatchment of the western parking lot in the south parcel, as well as the mews section and grass paver emergency access aisle. The porous pavement segments are split up into two different low points and will collect and filter the runoff. The runoff will be conveyed via underdrains to the existing ditch along the south side of Washington Ave.
- Subcatchment 1.3N, 1.2S, 1.4N – These subcatchments consists of a portion of Washington Ave, and a small portion of the northern parcel. These subcatchments flow to a proposed rain garden near Sta 6+00 and is used to cool, detain, and filter out any pollutants before slowly discharging to the roadside ditch along the northern side of Washington Ave.
- Subcatchment 1.6S – This subcatchment consists of undeveloped land, single family lots off Lambert Street, and the western portion of the south parcel's frontage along Washington Ave. This area drains to the existing roadside ditch along the southern side of Washington Ave.
- Subcatchment 2.1N – This subcatchment consists of the eastern portion of Washington Ave, the wetland within the north parcel, a portion of the single family lots off Auburn Street, and the intersection of Washington and Auburn. The low point of this subcatchment consists of an existing 12" cross culvert that outlets into the southern parcel. It is proposed for this culvert to remain, with the peak flow rate for the 2, 10, and 25 year storms being reduced or maintained in the post development condition.
- Subcatchment 2.1S – This subcatchment consists of the eastern parking lot with porous pavement located at the low spot. The runoff will be collected via underdrains and outlet into a wooded area before draining towards POI #2.
- Subcatchment 2.2S – This subcatchment consists primarily of undeveloped wooded land. This area drains to POI #2.
- Subcatchment 3.1N – This subcatchment consists primarily of undeveloped land and drains to POI #3.
- Subcatchments 1.1N, 1.7N, 1.8N, 1.9N – These subcatchments consist of the roof area within the north parcel, the common space in the center of the site, and small areas to the rear of Buildings A.4 and C.1 consisting of landscaping, lawn area, and impervious patios. The roofs will be conveyed to USSF 1 via a series of downspouts and underground storm drains. The open space areas will be collected via a series of field inlets and storm drains and routed to USSF 1.
- Subcatchments 4.1N and 4.2N – These subcatchments make up the parking lot and mews section. The porous pavement is located at the low point of this subcatchment and is collected via underdrains and piped to POI #4.
- Subcatchment 4.3N – This subcatchment consists primarily of undeveloped land that flows to POI #4.



The post-development calculations include changes to the land use, and the compensation provided by the USSF's and associated engineered orifices.

The ideology HydroCad uses to model porous pavement assumes the pavement has no surface runoff under ideal conditions and accepts several inches of precipitation. An extended Tc is used to simulate the travel time through the base and the pavement is modelled as a pond which represents storage in the base material. Our analysis of porous pavement uses a time of concentration based on the UNHSC's (University of New Hampshire Stormwater Center) research in which the time of concentration for porous pavement is equal to following ratio:

$$T_c = 790 \text{ minutes} / 41'' \text{ of base above the underdrain}$$

Taking a conservative approach, the Tc was calculated using only the depth of the filter course while excluding the stone layers. The equivalent ratio yielded a Tc of 328 minutes based upon the 17" filter course.

Source: Ballestero, Thomas, UNHSC. *"Real Time Hydrology of Permeable Pavements"* Philadelphia Low Impact Development Symposium, 2011.

Peak flow rates for the storm events are as follows:

Table 7 – Post-Development Peak Stormwater Flows			
Drainage Area	2-Year Storm Event (cfs)	10-Year Storm Event (cfs)	25-Year Storm Event (cfs)
POI #1	1	3	5
POI #2	8	18	26
POI #3	0	0	0
POI #4	0	0	1

The post-development calculations include changes to the land use and the compensation provided by the stormwater BMPs. The following table represents comparison of pre-development and post-development condition peak runoff rates for the proposed development and tributary area.

Table 8 – Comparison of Peak Flows						
POI	2-Year Storm Event (cfs)		10-Year Storm Event (cfs)		25-Year Storm Event (cfs)	
	Pre	Post	Pre	Post	Pre	Post
POI #1	1	1	3	3	6	5
POI #2	8	8	19	18	27	26
POI #3	0	0	0	0	0	0
POI #4	0	0	0	0	1	1

As shown in Table 7 and 8, the net impact of the post development peak flows will remain at or below the predevelopment levels. This is due to the attenuating effect of the USSD's and



the proposed underdrained storage and filter layers beneath the porous pavement. Peak water elevations for a 100-year storm remain below pavement elevations. A maintenance agreement in accordance with Chapter 7.7 and UNHSC specifications will be established. Maintenance activities may include inspections, sweeping, vacuuming, and the limiting of salt and sediment transport to the porous pavement.

A post-development watershed map developed for this project can be viewed in Attachment B, and a copy of the HydroCAD calculations is included within Attachment C of this report.

SOILS

Onsite soil information includes the following:

- Soil Conservation Service Medium Intensity Soil Survey for Cumberland County
- United States Department of Agriculture Web Soil Survey

Given the soils information, listed above, no onsite wastewater is proposed; the applicant does not intend to perform a more intense hydric soil boundary delineation because the waiver requirements set forth in the City of Portland Technical Manual – Section 7 – Soil Survey, Rev. 6/17/11 are met.

The area within and surrounding the project includes soil types listed in the table below. The susceptibility of soils to erosion is indicated on a relative “K” scale of values over a range of 0.02 to 0.69. Higher “K” values indicate more erodible soils.

Table 1 - “K” Value		
Soils Type	Subsurface	Substratum
Elmwood fine sandy loam (EmB)	.32	.49
Hinkley Loamy Sand (HIC)	.17	.17
Suffield Silt Loam (SuE2)	.49	.49
Scantic silt loam (SN)	.49	.49
Swanton Fine Sandy Loam (SZ)	.32	.49

The soil “K” value for the soil, listed above, shows a low to medium susceptibility to erosion. The site’s susceptibility to erosion is sourced from the Soil Conservation Service Medium Intensity Soil Survey for Cumberland County. Although the soil “K” value shows a low to medium susceptibility to erosion, implementation of the proposed Erosion & Sedimentation Measures by the contractor will be of the utmost importance given the sustained slope throughout the site.

CONCLUSION

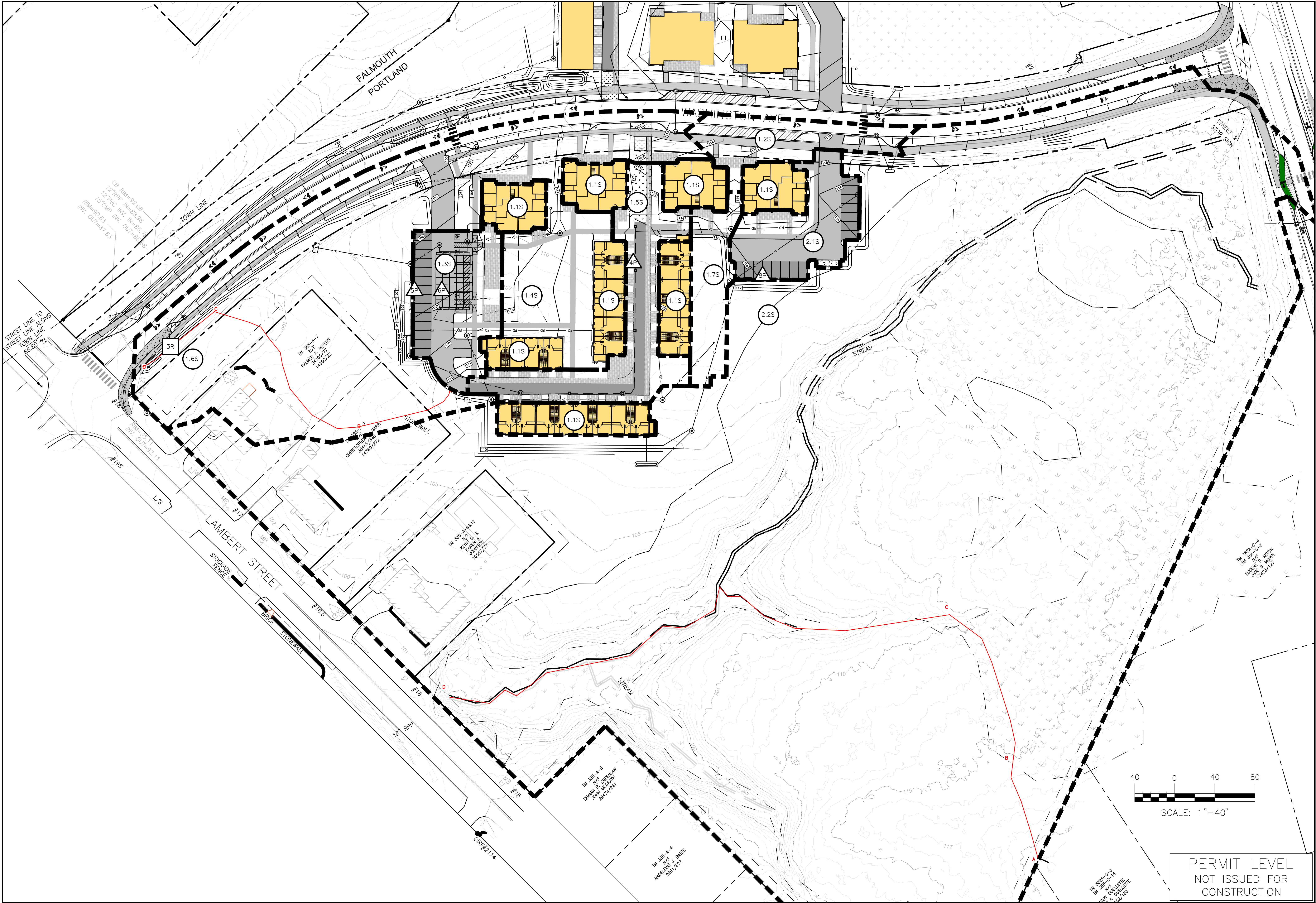


The proposed development was designed to meet the requirements implemented by the MDEP under the Stormwater Management Statute (38 M.R.S.A. § 420-D) as well as the City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards. The proposed project as designed is not anticipated to cause flooding or erosion problems within the subject site, abutters' sites, nor within the right-of-way. Overall, the project will provide an improvement to stormwater runoff and overall management from several perspective as outlined above.

ATTACHMENTS

Attachment A: Pre-Development Watershed Map
Attachment B: Post-Development Watershed Map
Attachment C: HydroCAD Calculations
Attachment D: Soil Survey





ISSUED FOR	BY
SITE/SUB	DATE
COMMENT RESPONSE	SJL
	7/26/22

DRAWING NAME: POST-DEVELOPMENT MAP - NORTH PARCEL	
PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP	
PORTLAND, MAINE 04103	
CLIENT/OWNER OF RECORD:	MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE	

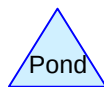
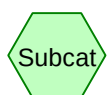
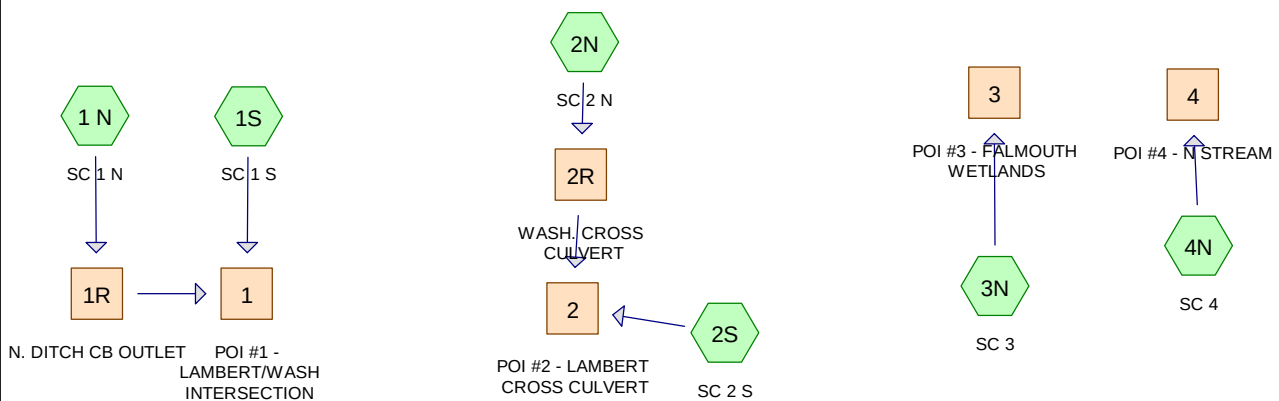
	ACOORN ENGINEERING, INC.
	ENGINEERING, INC.

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM ACOORN ENGINEERING, INC. ANY ALTERATIONS, AUTHORIZED BY THE ENGINEER, SHALL BE INDICATED BY A RED LINE AND WITHOUT LIABILITY TO ACOORN ENGINEERING, INC.

ACOORN ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101
(207) 775-2655

FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS

DRAWING NO.
POST



Routing Diagram for 1145 PRE
 Prepared by HP Inc., Printed 6/17/2022
 HydroCAD® 10.00-26 s/n 00620 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.708	39	>75% Grass cover, Good, HSG A (2S)
0.249	80	>75% Grass cover, Good, HSG D (2S)
0.041	98	Auburn, paved ROW (2S)
0.529	80	Lawns HSG D (2N)
1.277	98	Paved ROW and gravel shoulder (1 N, 1S, 2N)
0.131	80	Road sideslope HSG D (2N)
0.321	39	Roadside ditch and shrubs, HSG A (1 N)
0.065	80	Roadside ditch and shrubs, HSG D (1 N)
0.197	39	Roadside ditch, HSG A (1S)
0.282	80	Roadside ditch, HSG D (1S, 2S)
0.032	98	Roofs, HSG A (1S)
0.089	98	Roofs/driveways/patios (HSG A) (2S)
0.080	98	Roofs/driveways/patios (HSG D) (2S)
0.165	98	Rooftops and driveways (2N)
0.177	98	Wash. paved ROW and gravel shoulder (2S)
0.057	77	Wetland pocket, assumed HSG D (1S)
4.493	30	Woods, Good, HSG A (1 N, 1S, 2N, 2S, 3N, 4N)
0.555	55	Woods, Good, HSG B (2S)
3.516	70	Woods, Good, HSG C (2S)
8.889	77	Woods, Good, HSG D (1 N, 1S, 2N, 2S, 3N, 4N)
21.854	65	TOTAL AREA

Summary for Subcatchment 1 N: SC 1 N

Runoff = 0.13 cfs @ 12.55 hrs, Volume= 0.034 af, Depth= 0.22"

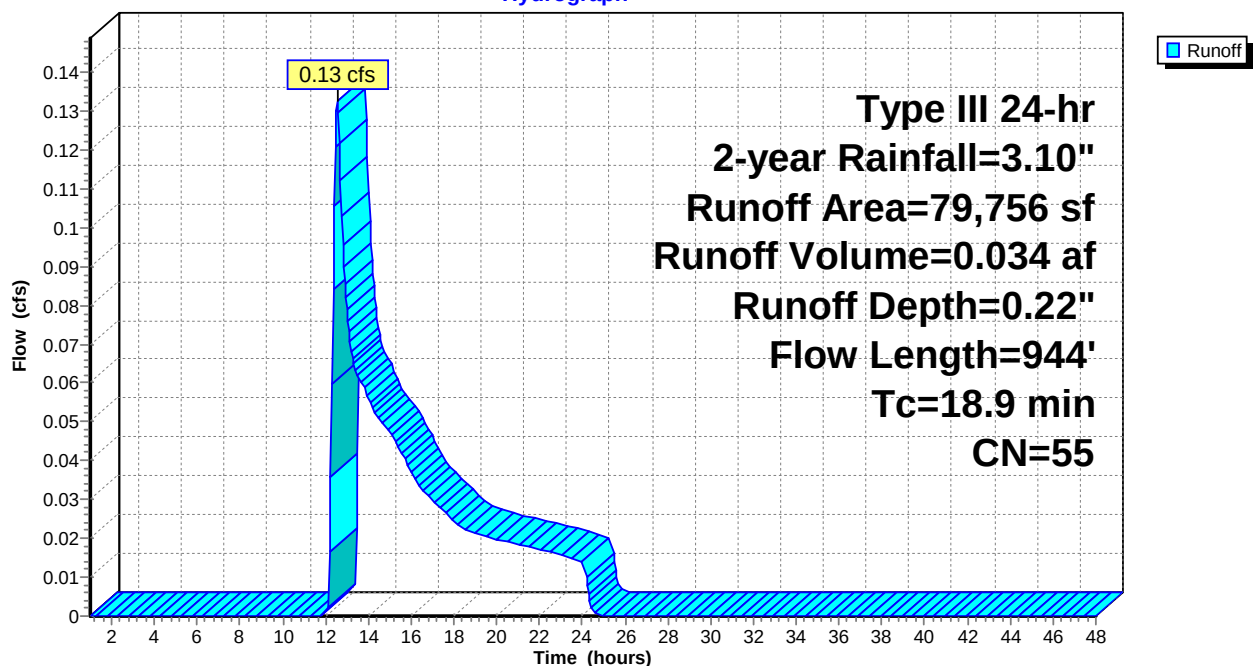
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	13,977	39	Roadside ditch and shrubs, HSG A
*	21,422	98	Paved ROW and gravel shoulder
	35,717	30	Woods, Good, HSG A
	5,802	77	Woods, Good, HSG D
*	2,838	80	Roadside ditch and shrubs, HSG D
	79,756	55	Weighted Average
	58,334		73.14% Pervious Area
	21,422		26.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0500	0.11		Sheet Flow, Sheet Flow (A to B) Woods: Light underbrush n= 0.400 P2= 3.27"
1.6	106	0.0500	1.12		Shallow Concentrated Flow, SCF (B TO C) Woodland Kv= 5.0 fps
2.6	738	0.0310	4.64	17.83	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 & 4.5 ' Top.W=7.60' n= 0.035 Earth, dense weeds
18.9	944	Total			

Subcatchment 1 N: SC 1 N

Hydrograph



Summary for Subcatchment 1S: SC 1 S

Runoff = 0.46 cfs @ 12.59 hrs, Volume= 0.101 af, Depth= 0.31"

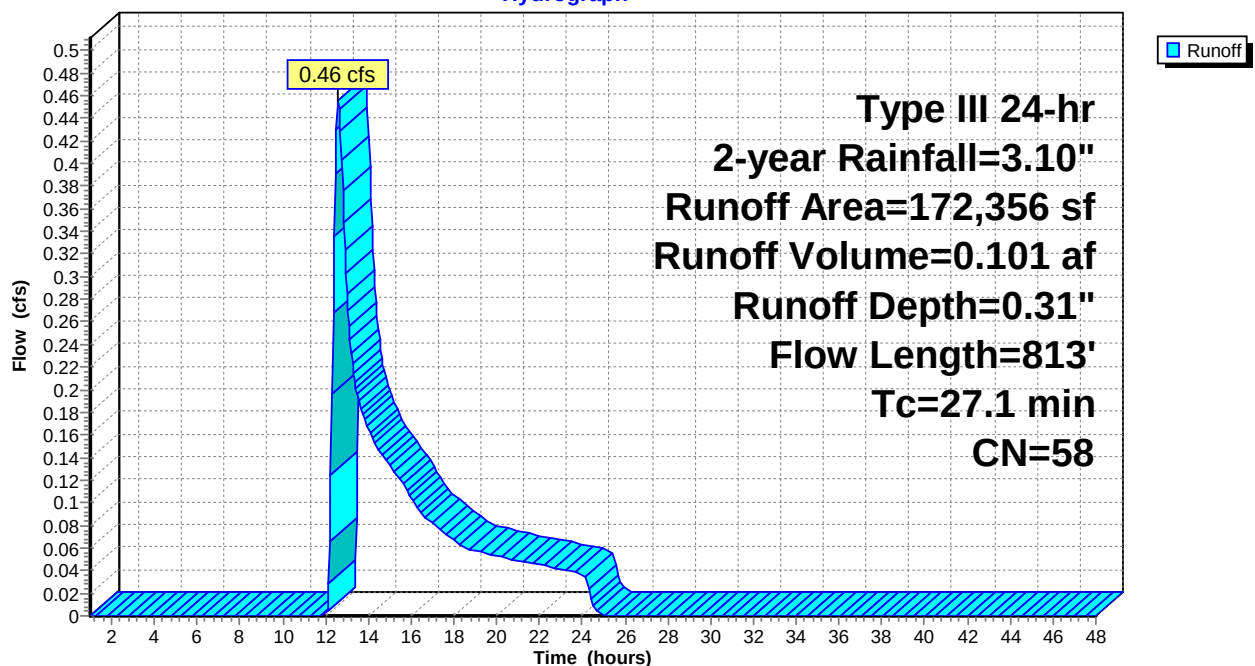
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
72,886	30	Woods, Good, HSG A
* 61,363	77	Woods, Good, HSG D
* 1,387	98	Roofs, HSG A
* 2,490	77	Wetland pocket, assumed HSG D
* 8,584	39	Roadside ditch, HSG A
* 4,340	80	Roadside ditch, HSG D
* 21,306	98	Paved ROW and gravel shoulder
172,356	58	Weighted Average
149,663		86.83% Pervious Area
22,693		13.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0300	0.09		Sheet Flow, Sheet flow (A to B) Woods: Light underbrush n= 0.400 P2= 3.27"
9.0	713	0.0700	1.32		Shallow Concentrated Flow, SCF (B to C) Woodland Kv= 5.0 fps
27.1	813	Total			

Subcatchment 1S: SC 1 S

Hydrograph



Summary for Subcatchment 2N: SC 2 N

Runoff = 2.03 cfs @ 12.26 hrs, Volume= 0.210 af, Depth= 1.14"

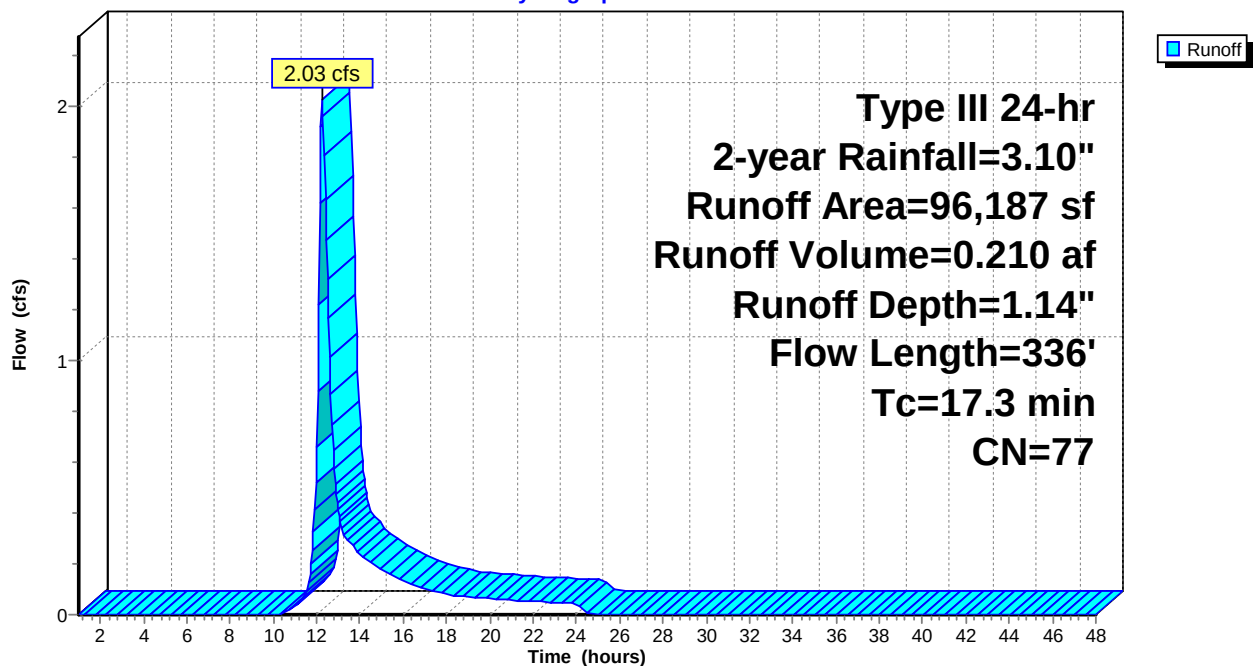
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
11,790	30	Woods, Good, HSG A
35,555	77	Woods, Good, HSG D
* 5,690	80	Road sideslope HSG D
* 12,892	98	Paved ROW and gravel shoulder
* 7,208	98	Rooftops and driveways
* 23,052	80	Lawns HSG D
96,187	77	Weighted Average
76,087		79.10% Pervious Area
20,100		20.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0500	0.11		Sheet Flow, Sheet Flow (A TO B)
					Woods: Light underbrush n= 0.400 P2= 3.27"
2.6	236	0.0100	1.50		Shallow Concentrated Flow, Wetlands
					Grassed Waterway Kv= 15.0 fps
17.3	336	Total			

Subcatchment 2N: SC 2 N

Hydrograph



Summary for Subcatchment 2S: SC 2 S

Runoff = 6.41 cfs @ 12.40 hrs, Volume= 0.826 af, Depth= 0.87"

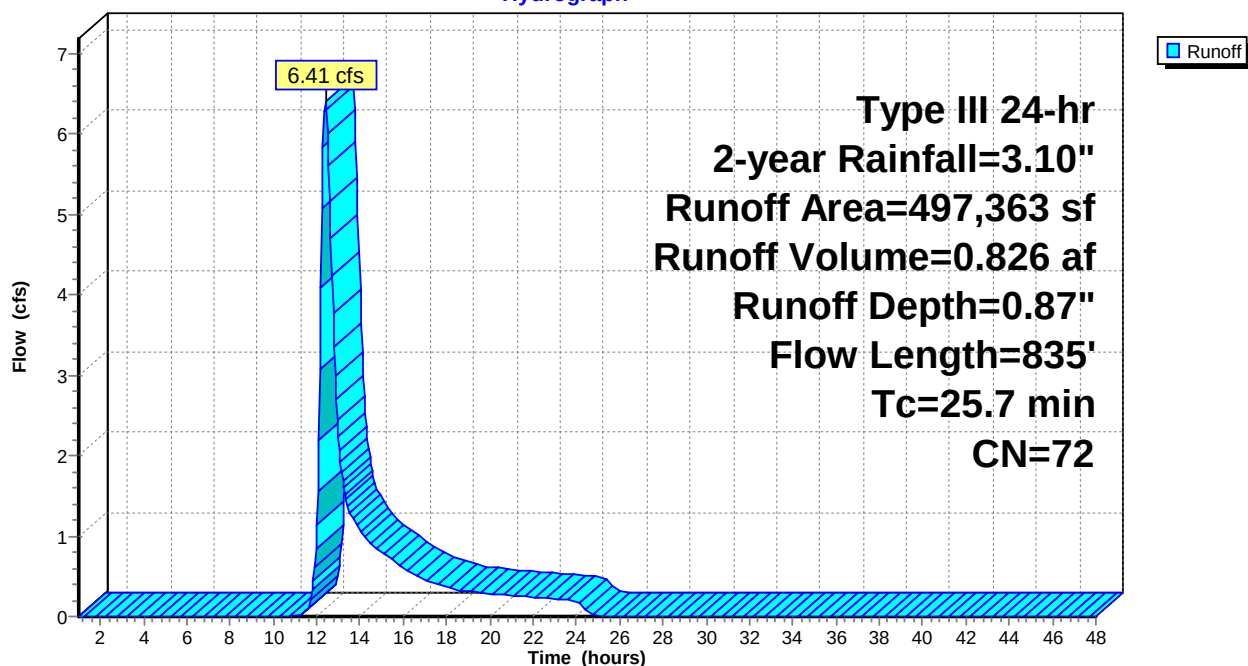
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
5,912	30	Woods, Good, HSG A
30,826	39	>75% Grass cover, Good, HSG A
* 3,896	98	Roofs/driveways/patios (HSG A)
24,173	55	Woods, Good, HSG B
6,557	70	Woods, Good, HSG C
146,595	70	Woods, Good, HSG C
247,584	77	Woods, Good, HSG D
10,866	80	>75% Grass cover, Good, HSG D
* 3,503	98	Roofs/driveways/patios (HSG D)
* 7,726	98	Wash. paved ROW and gravel shoulder
* 7,931	80	Roadside ditch, HSG D
* 1,794	98	Auburn, paved ROW
497,363	72	Weighted Average
480,444		96.60% Pervious Area
16,919		3.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	100	0.0700	0.07		Sheet Flow, Sheet Flow (A to B) Woods: Dense underbrush n= 0.800 P2= 3.27"
0.7	170	0.0700	3.97		Shallow Concentrated Flow, SCF (B TO C) Grassed Waterway Kv= 15.0 fps
2.6	565	0.0350	3.56	3.92	Channel Flow, Stream Area= 1.1 sf Perim= 3.0' r= 0.37' n= 0.040 Winding stream, pools & shoals
25.7	835	Total			

Subcatchment 2S: SC 2 S

Hydrograph



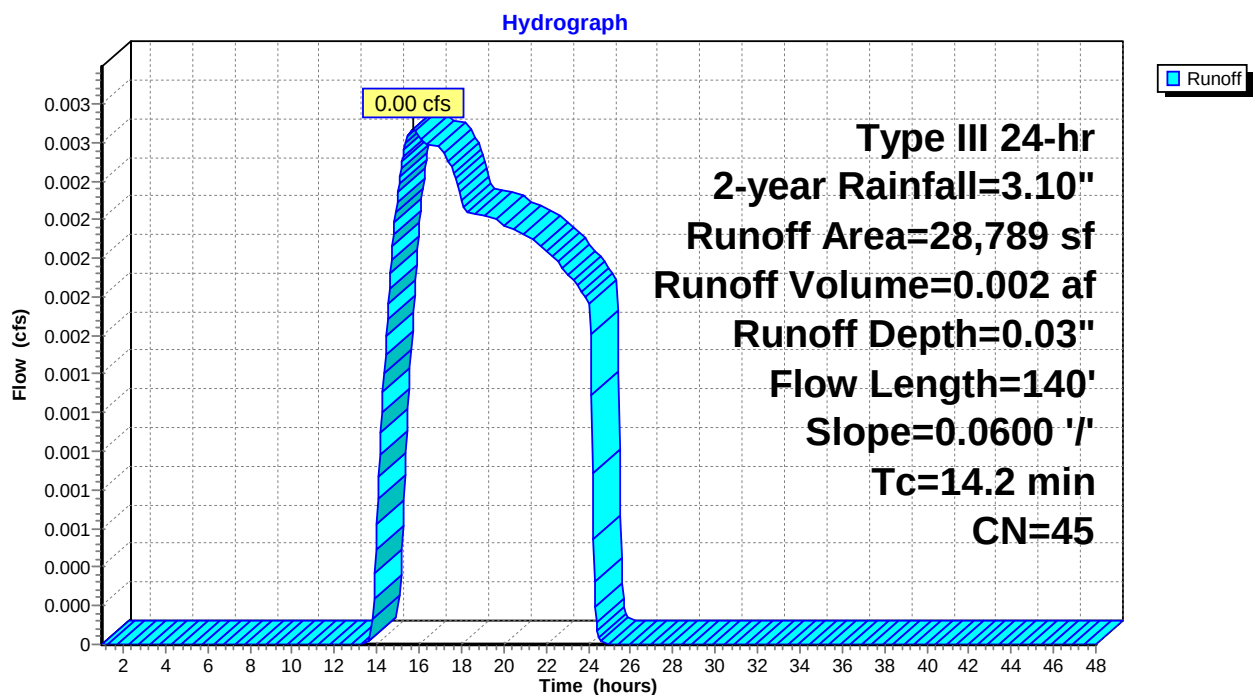
Summary for Subcatchment 3N: SC 3

Runoff = 0.00 cfs @ 15.75 hrs, Volume= 0.002 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)		CN	Description		
19,623		30	Woods, Good, HSG A		
9,166		77	Woods, Good, HSG D		
28,789		45	Weighted Average		
28,789			100.00% Pervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0600	0.12		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.27"
0.5	40	0.0600	1.22		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
14.2	140	Total			

Subcatchment 3N: SC 3



Summary for Subcatchment 4N: SC 4

Runoff = 0.01 cfs @ 15.23 hrs, Volume= 0.009 af, Depth= 0.06"

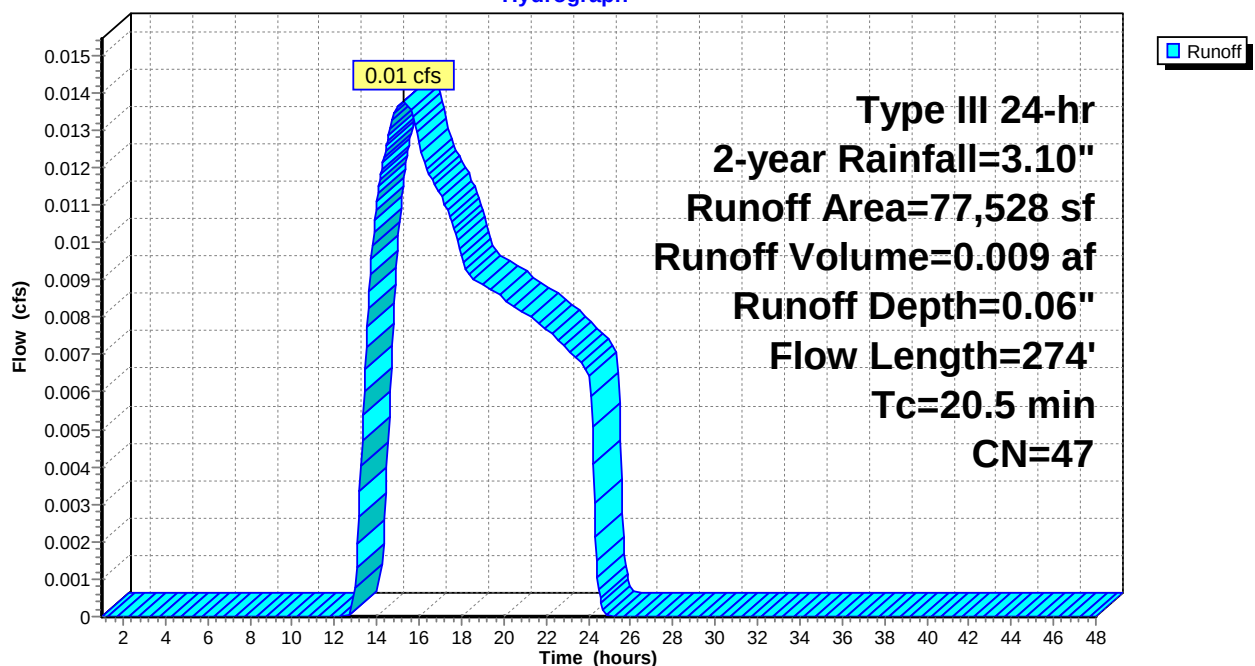
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
49,772	30	Woods, Good, HSG A
17,107	77	Woods, Good, HSG D
* 10,649	77	Woods, Good, HSG D
77,528	47	Weighted Average
77,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0300	0.09		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.27"
2.4	174	0.0600	1.22		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
20.5	274	Total			

Subcatchment 4N: SC 4

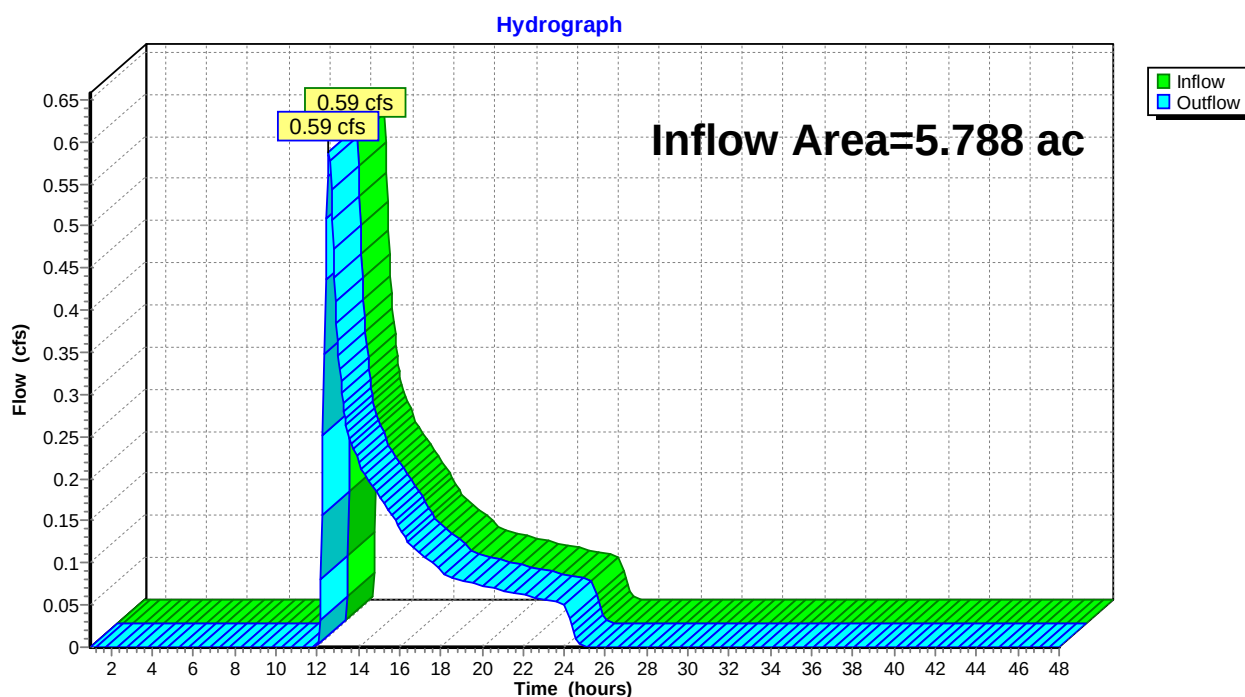
Hydrograph



Summary for Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

Inflow Area = 5.788 ac, 17.50% Impervious, Inflow Depth = 0.28" for 2-year event
Inflow = 0.59 cfs @ 12.58 hrs, Volume= 0.135 af
Outflow = 0.59 cfs @ 12.58 hrs, Volume= 0.135 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

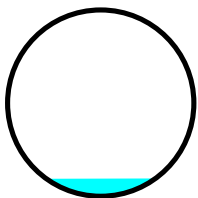
Summary for Reach 1R: N. DITCH CB OUTLET

Inflow Area = 1.831 ac, 26.86% Impervious, Inflow Depth = 0.22" for 2-year event
 Inflow = 0.13 cfs @ 12.55 hrs, Volume= 0.034 af
 Outflow = 0.13 cfs @ 12.55 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.4 min

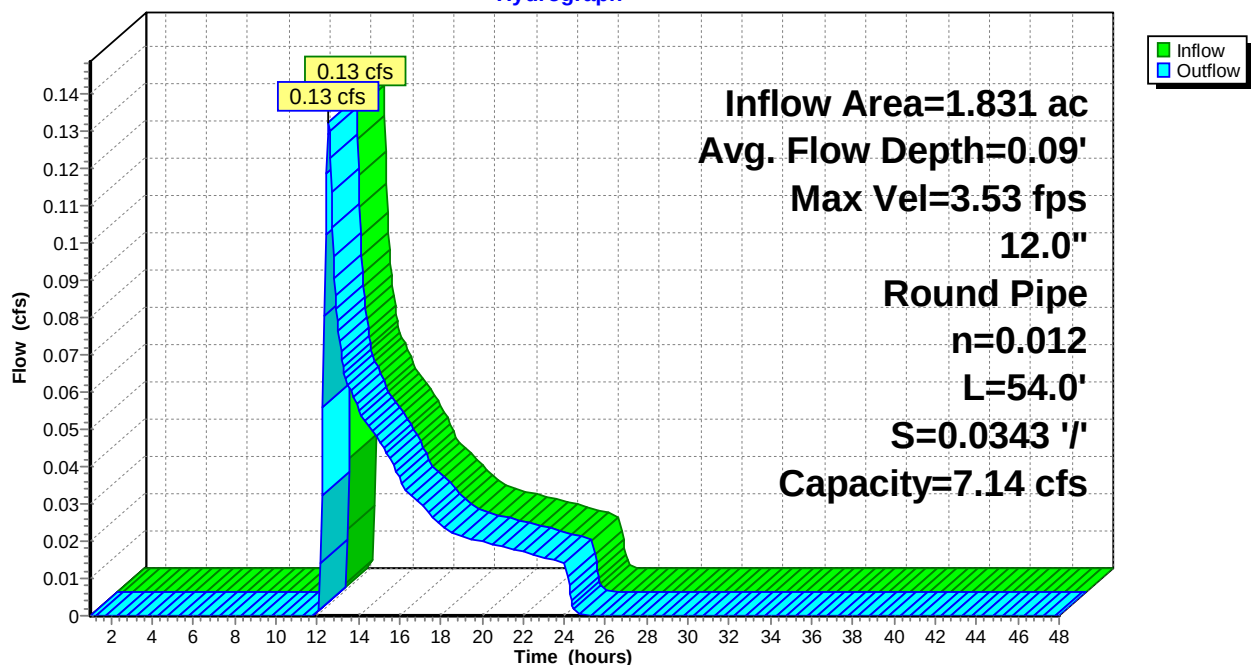
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.53 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.18 fps, Avg. Travel Time= 0.4 min

Peak Storage= 2 cf @ 12.55 hrs
 Average Depth at Peak Storage= 0.09'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.14 cfs

12.0" Round Pipe
 n= 0.012
 Length= 54.0' Slope= 0.0343 '/'
 Inlet Invert= 87.63', Outlet Invert= 85.78'

**Reach 1R: N. DITCH CB OUTLET**

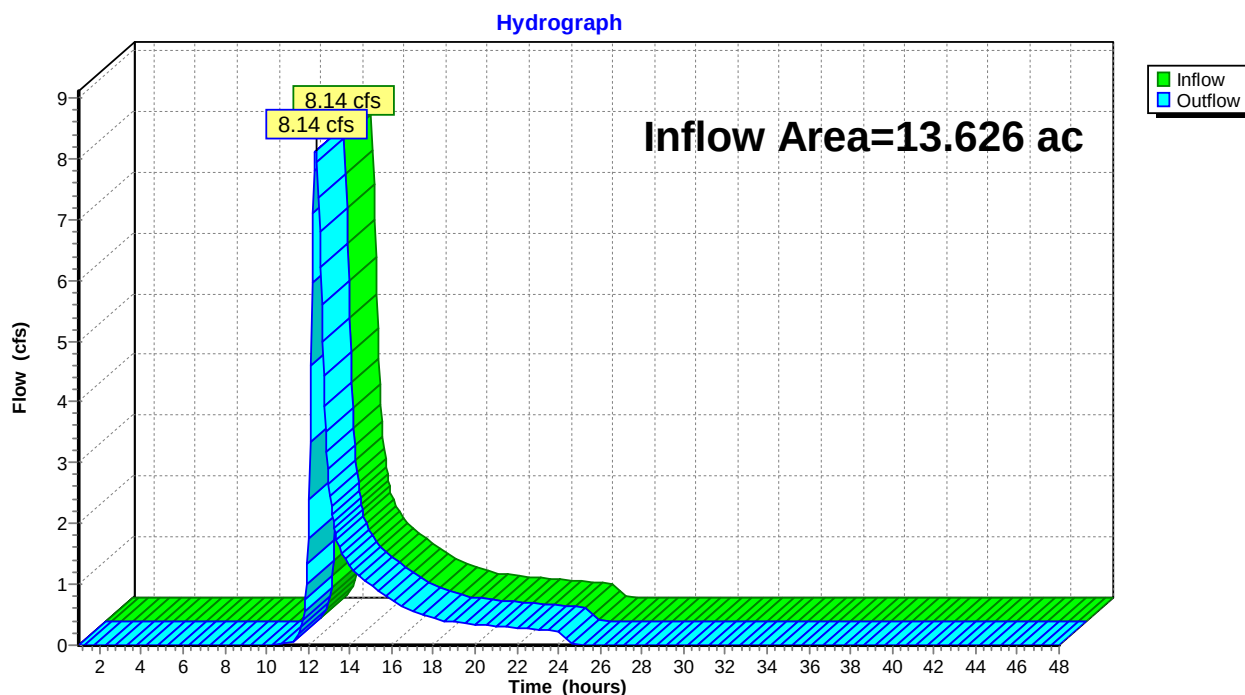
Hydrograph



Summary for Reach 2: POI #2 - LAMBERT CROSS CULVERT

Inflow Area = 13.626 ac, 6.24% Impervious, Inflow Depth = 0.91" for 2-year event
Inflow = 8.14 cfs @ 12.37 hrs, Volume= 1.036 af
Outflow = 8.14 cfs @ 12.37 hrs, Volume= 1.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 2: POI #2 - LAMBERT CROSS CULVERT

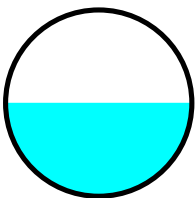
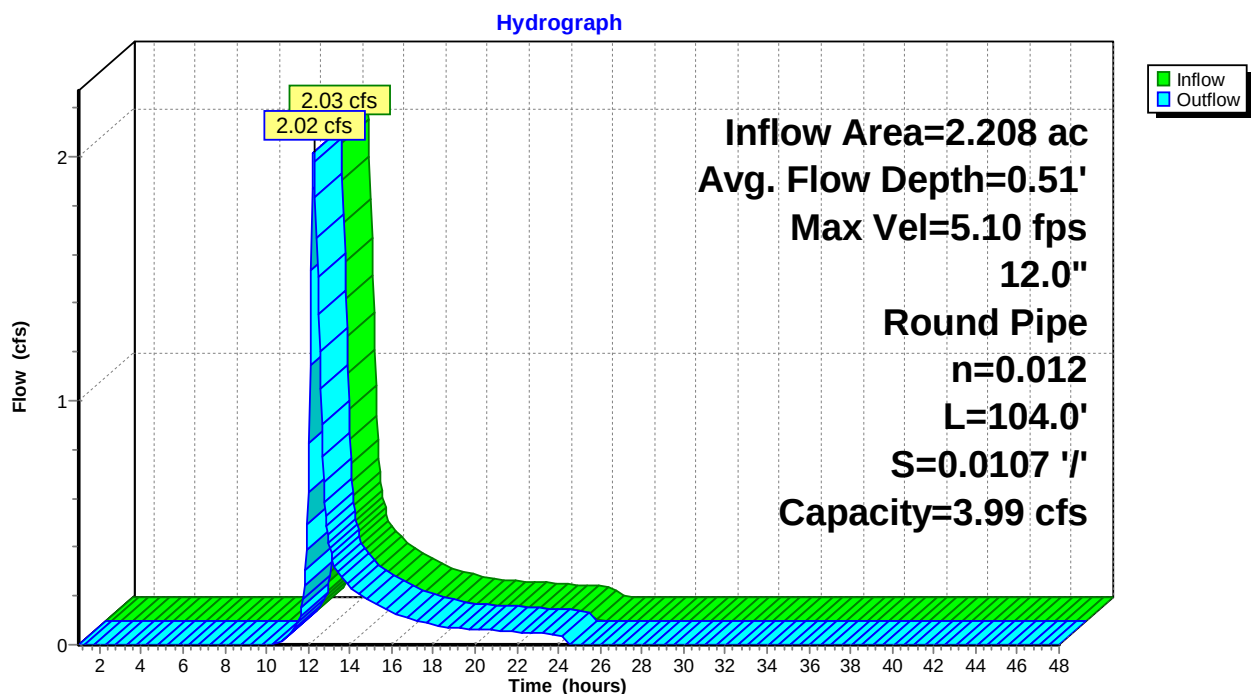
Summary for Reach 2R: WASH. CROSS CULVERT

Inflow Area = 2.208 ac, 20.90% Impervious, Inflow Depth = 1.14" for 2-year event
 Inflow = 2.03 cfs @ 12.26 hrs, Volume= 0.210 af
 Outflow = 2.02 cfs @ 12.27 hrs, Volume= 0.210 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.10 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.15 fps, Avg. Travel Time= 0.8 min

Peak Storage= 41 cf @ 12.26 hrs
 Average Depth at Peak Storage= 0.51'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.99 cfs

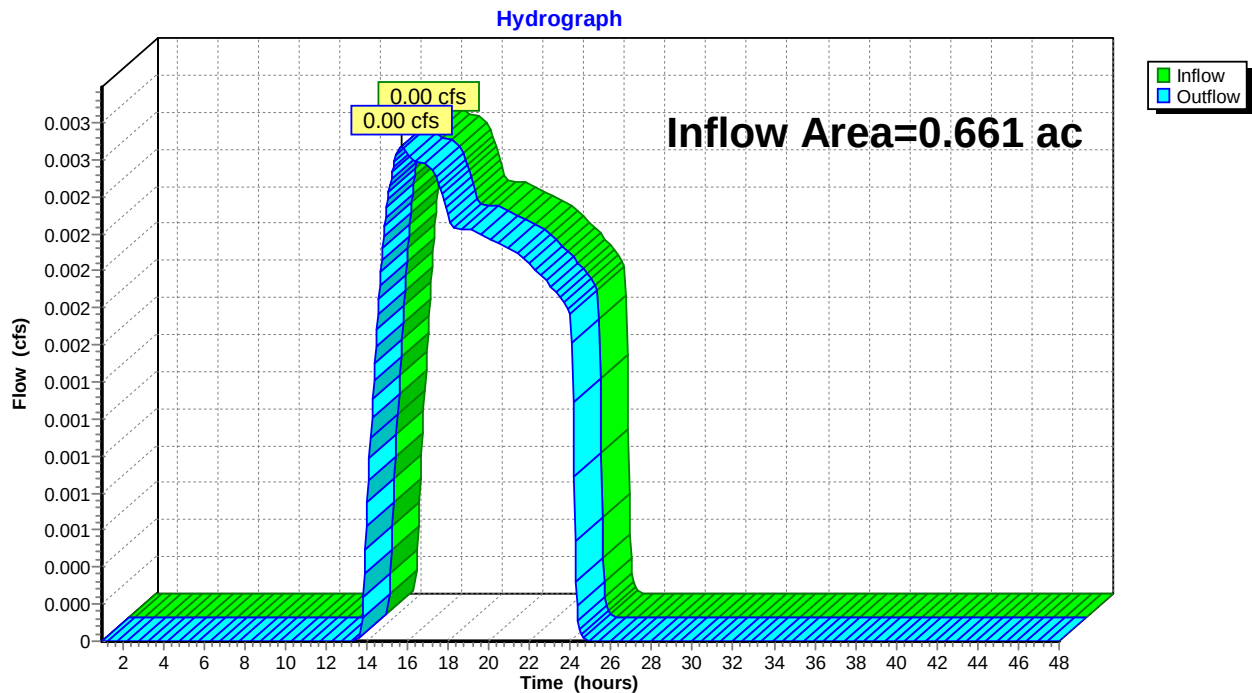
12.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 104.0' Slope= 0.0107 '/'
 Inlet Invert= 113.80', Outlet Invert= 112.69'

**Reach 2R: WASH. CROSS CULVERT**

Summary for Reach 3: POI #3 - FALMOUTH WETLANDS

Inflow Area = 0.661 ac, 0.00% Impervious, Inflow Depth = 0.03" for 2-year event
Inflow = 0.00 cfs @ 15.75 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 15.75 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

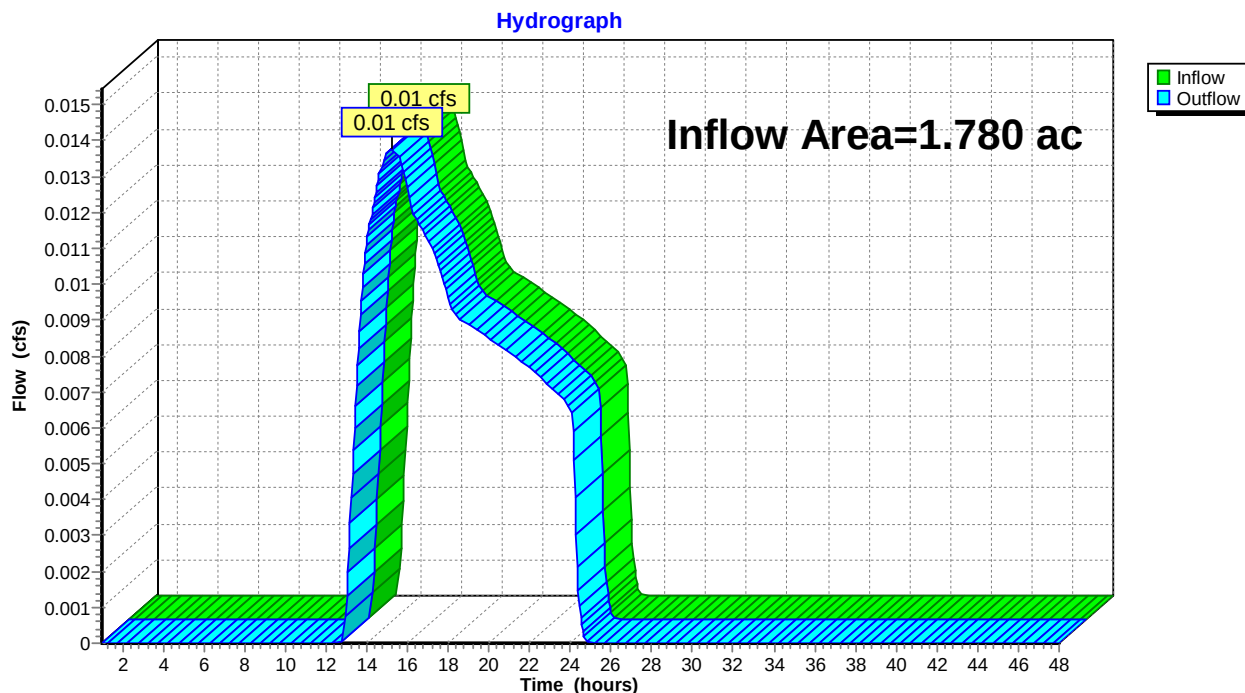
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 3: POI #3 - FALMOUTH WETLANDS

Summary for Reach 4: POI #4 - N STREAM

Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 0.06" for 2-year event
Inflow = 0.01 cfs @ 15.23 hrs, Volume= 0.009 af
Outflow = 0.01 cfs @ 15.23 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 4: POI #4 - N STREAM

Summary for Subcatchment 1 N: SC 1 N

Runoff = 0.86 cfs @ 12.34 hrs, Volume= 0.120 af, Depth= 0.79"

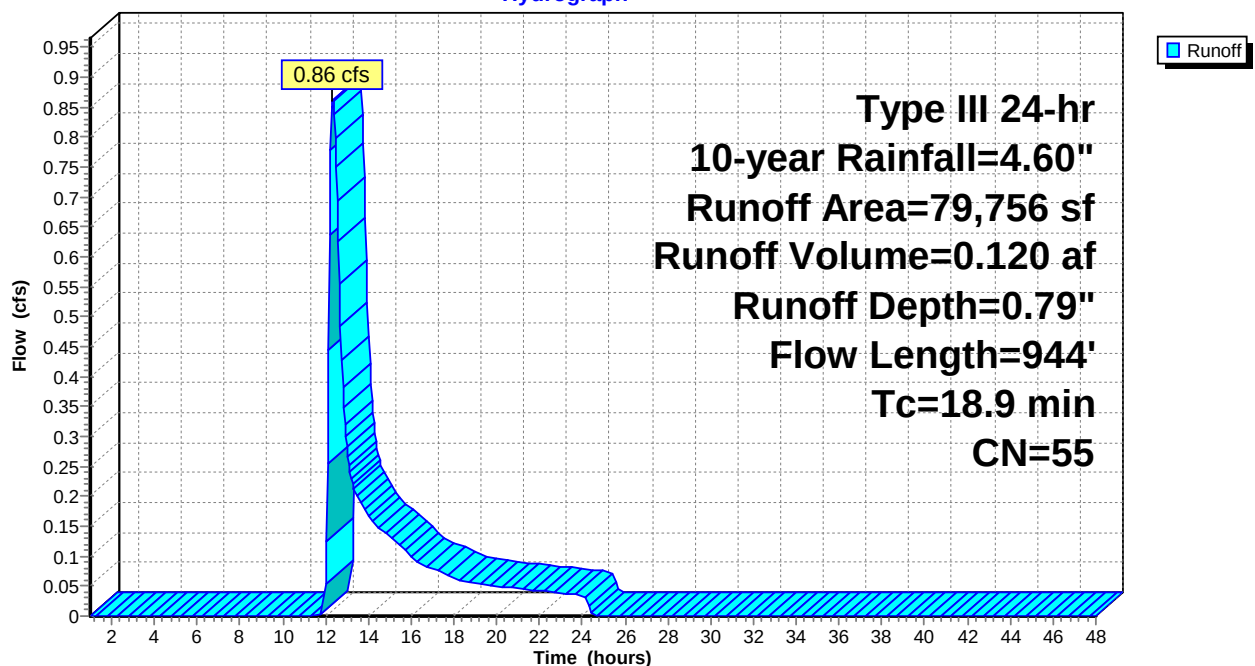
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	13,977	39	Roadside ditch and shrubs, HSG A
*	21,422	98	Paved ROW and gravel shoulder
	35,717	30	Woods, Good, HSG A
	5,802	77	Woods, Good, HSG D
*	2,838	80	Roadside ditch and shrubs, HSG D
	79,756	55	Weighted Average
	58,334		73.14% Pervious Area
	21,422		26.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0500	0.11		Sheet Flow, Sheet Flow (A to B) Woods: Light underbrush n= 0.400 P2= 3.27"
1.6	106	0.0500	1.12		Shallow Concentrated Flow, SCF (B TO C) Woodland Kv= 5.0 fps
2.6	738	0.0310	4.64	17.83	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 & 4.5 ' Top.W=7.60' n= 0.035 Earth, dense weeds
18.9	944	Total			

Subcatchment 1 N: SC 1 N

Hydrograph



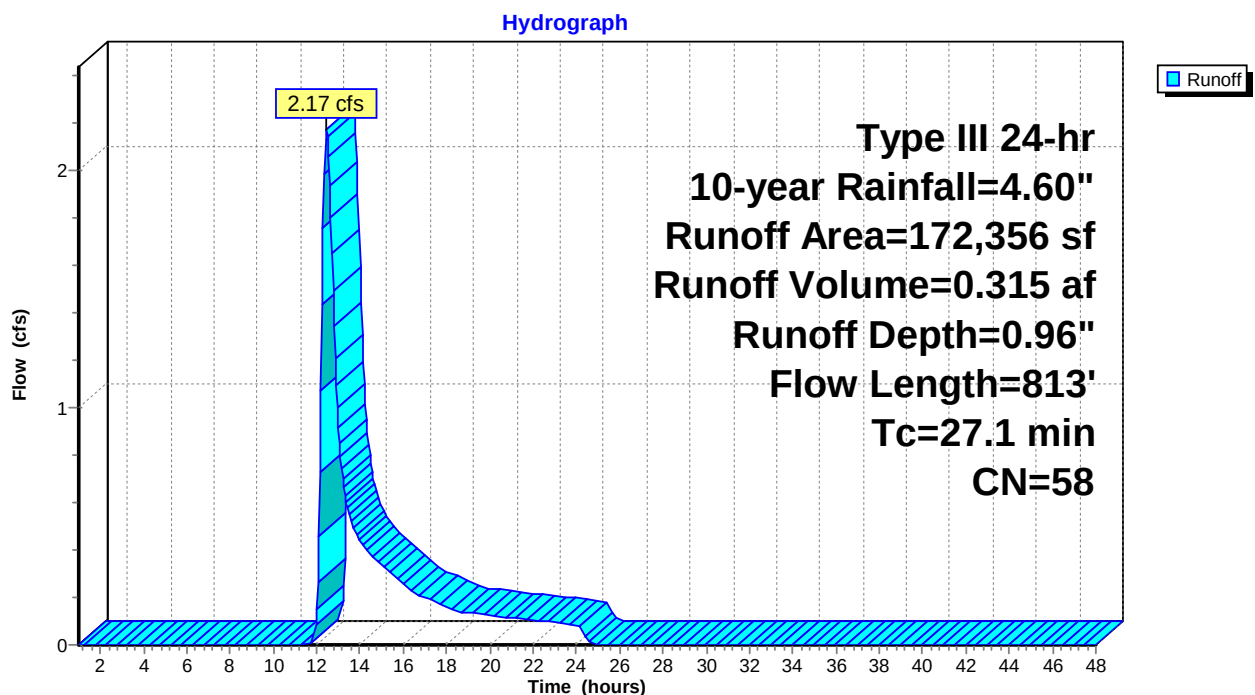
Summary for Subcatchment 1S: SC 1 S

Runoff = 2.17 cfs @ 12.46 hrs, Volume= 0.315 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
72,886	30	Woods, Good, HSG A
* 61,363	77	Woods, Good, HSG D
* 1,387	98	Roofs, HSG A
* 2,490	77	Wetland pocket, assumed HSG D
* 8,584	39	Roadside ditch, HSG A
* 4,340	80	Roadside ditch, HSG D
* 21,306	98	Paved ROW and gravel shoulder
172,356	58	Weighted Average
149,663		86.83% Pervious Area
22,693		13.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0300	0.09		Sheet Flow, Sheet flow (A to B)
					Woods: Light underbrush n= 0.400 P2= 3.27"
9.0	713	0.0700	1.32		Shallow Concentrated Flow, SCF (B to C)
					Woodland Kv= 5.0 fps
27.1	813	Total			

Subcatchment 1S: SC 1 S

Summary for Subcatchment 2N: SC 2 N

Runoff = 4.21 cfs @ 12.25 hrs, Volume= 0.422 af, Depth= 2.29"

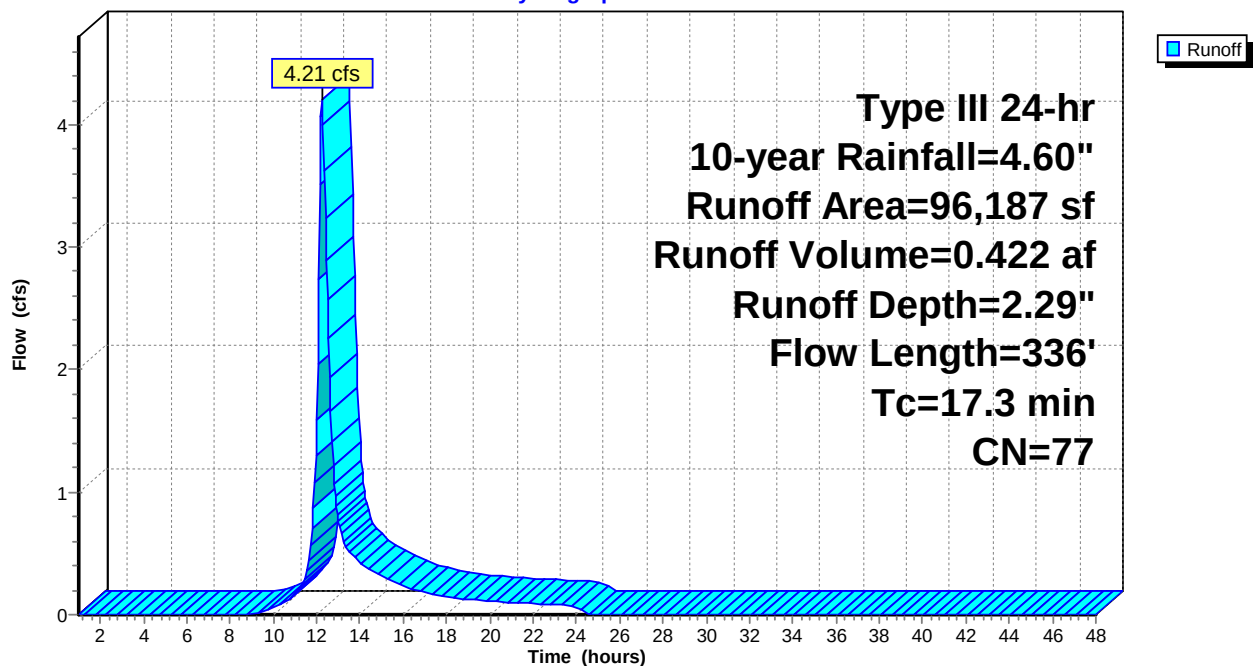
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
11,790	30	Woods, Good, HSG A
35,555	77	Woods, Good, HSG D
* 5,690	80	Road sideslope HSG D
* 12,892	98	Paved ROW and gravel shoulder
* 7,208	98	Rooftops and driveways
* 23,052	80	Lawns HSG D
96,187	77	Weighted Average
76,087		79.10% Pervious Area
20,100		20.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0500	0.11		Sheet Flow, Sheet Flow (A TO B)
					Woods: Light underbrush n= 0.400 P2= 3.27"
2.6	236	0.0100	1.50		Shallow Concentrated Flow, Wetlands
					Grassed Waterway Kv= 15.0 fps
17.3	336	Total			

Subcatchment 2N: SC 2 N

Hydrograph



Summary for Subcatchment 2S: SC 2 S

Runoff = 15.03 cfs @ 12.37 hrs, Volume= 1.803 af, Depth= 1.89"

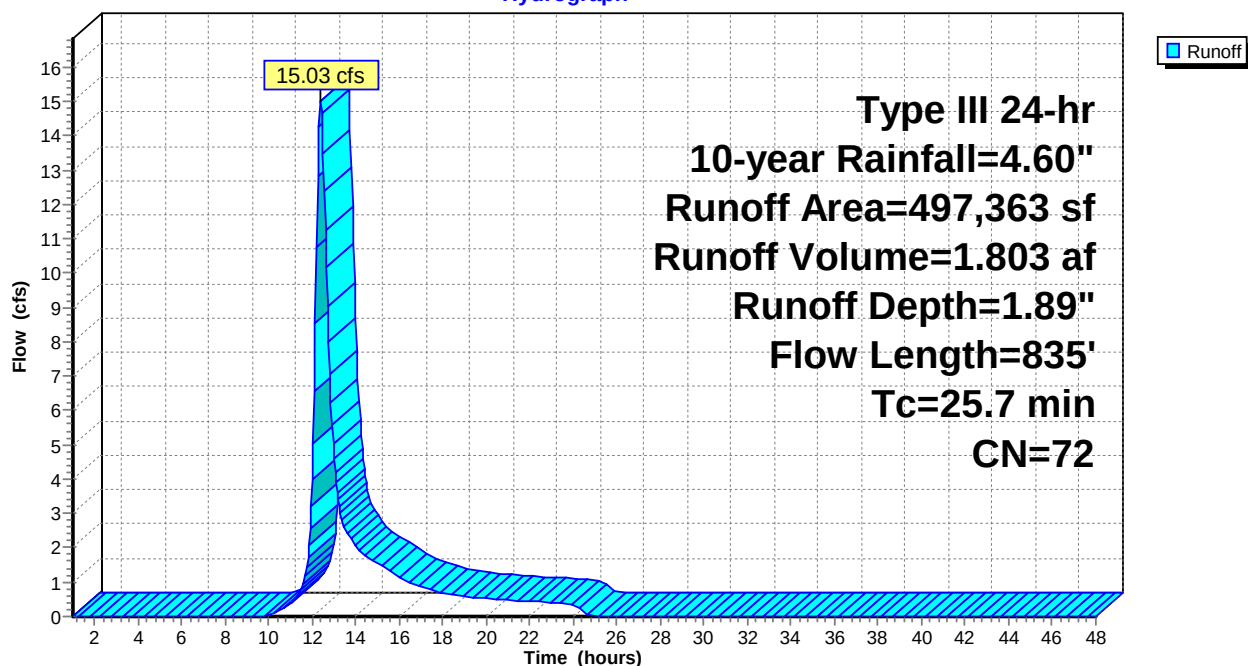
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
5,912	30	Woods, Good, HSG A
30,826	39	>75% Grass cover, Good, HSG A
* 3,896	98	Roofs/driveways/patios (HSG A)
24,173	55	Woods, Good, HSG B
6,557	70	Woods, Good, HSG C
146,595	70	Woods, Good, HSG C
247,584	77	Woods, Good, HSG D
10,866	80	>75% Grass cover, Good, HSG D
* 3,503	98	Roofs/driveways/patios (HSG D)
* 7,726	98	Wash. paved ROW and gravel shoulder
* 7,931	80	Roadside ditch, HSG D
* 1,794	98	Auburn, paved ROW
497,363	72	Weighted Average
480,444		96.60% Pervious Area
16,919		3.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	100	0.0700	0.07		Sheet Flow, Sheet Flow (A to B) Woods: Dense underbrush n= 0.800 P2= 3.27"
0.7	170	0.0700	3.97		Shallow Concentrated Flow, SCF (B TO C) Grassed Waterway Kv= 15.0 fps
2.6	565	0.0350	3.56	3.92	Channel Flow, Stream Area= 1.1 sf Perim= 3.0' r= 0.37' n= 0.040 Winding stream, pools & shoals
25.7	835	Total			

Subcatchment 2S: SC 2 S

Hydrograph



Summary for Subcatchment 3N: SC 3

Runoff = 0.07 cfs @ 12.48 hrs, Volume= 0.018 af, Depth= 0.32"

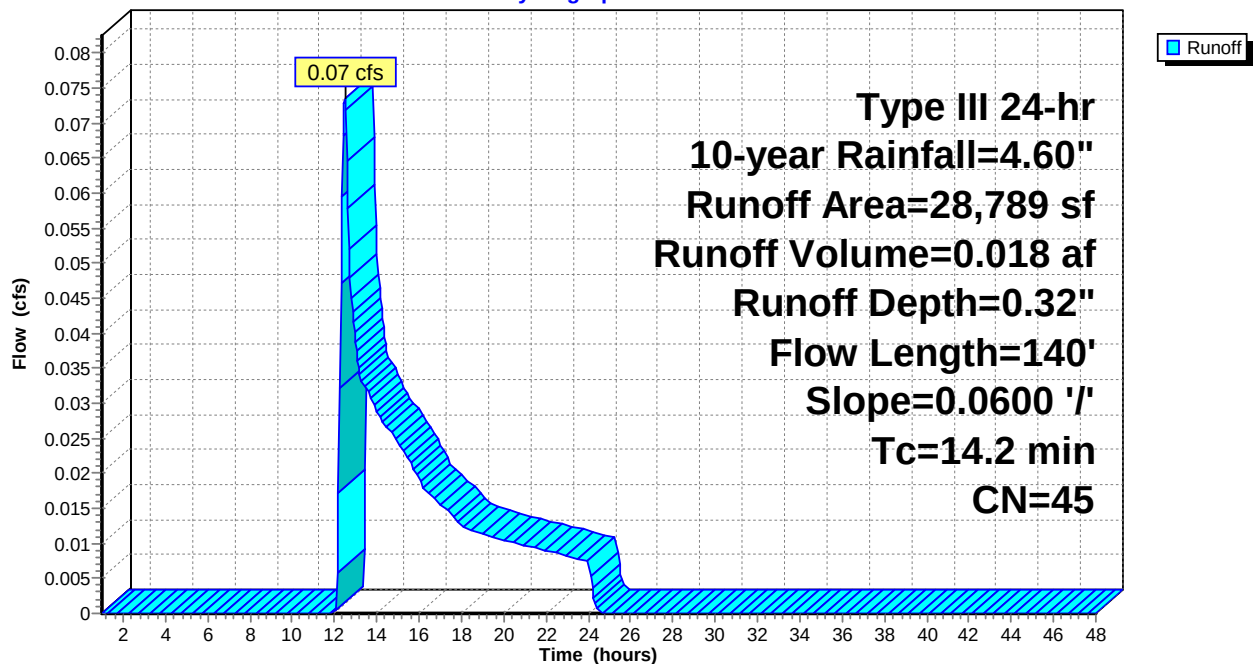
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
19,623	30	Woods, Good, HSG A
9,166	77	Woods, Good, HSG D
28,789	45	Weighted Average
28,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0600	0.12		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.27"
0.5	40	0.0600	1.22		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
14.2	140	Total			

Subcatchment 3N: SC 3

Hydrograph



Summary for Subcatchment 4N: SC 4

Runoff = 0.27 cfs @ 12.53 hrs, Volume= 0.060 af, Depth= 0.40"

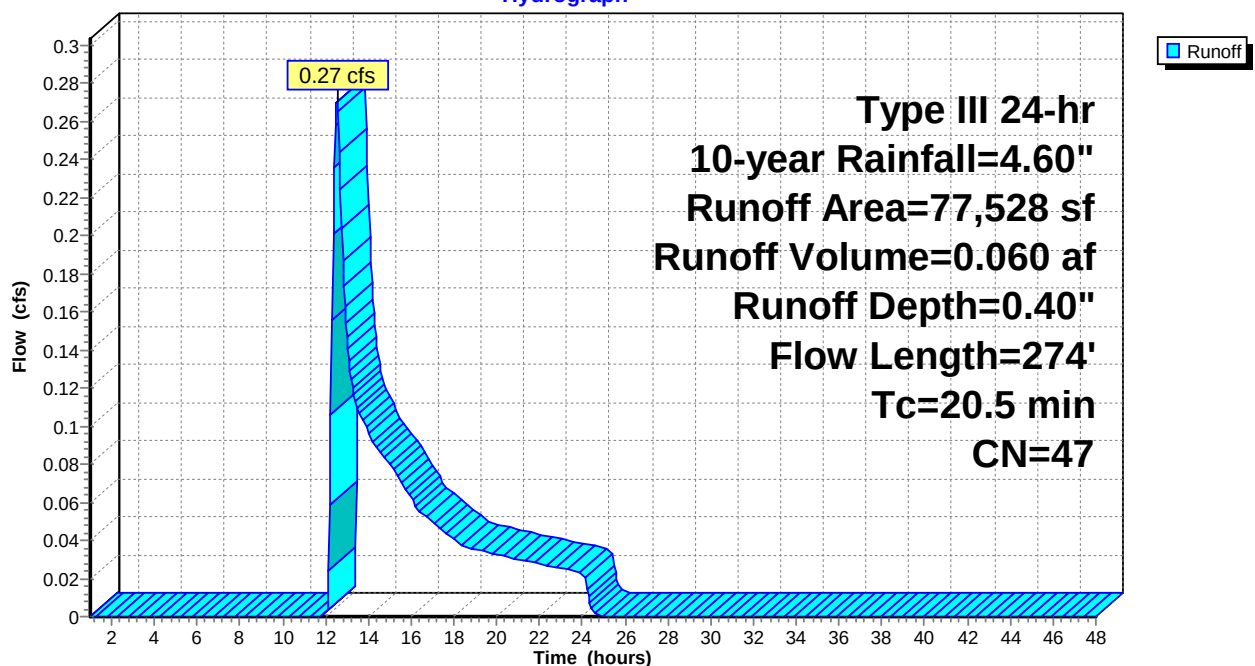
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
49,772	30	Woods, Good, HSG A
17,107	77	Woods, Good, HSG D
* 10,649	77	Woods, Good, HSG D
77,528	47	Weighted Average
77,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0300	0.09		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.27"
2.4	174	0.0600	1.22		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
20.5	274	Total			

Subcatchment 4N: SC 4

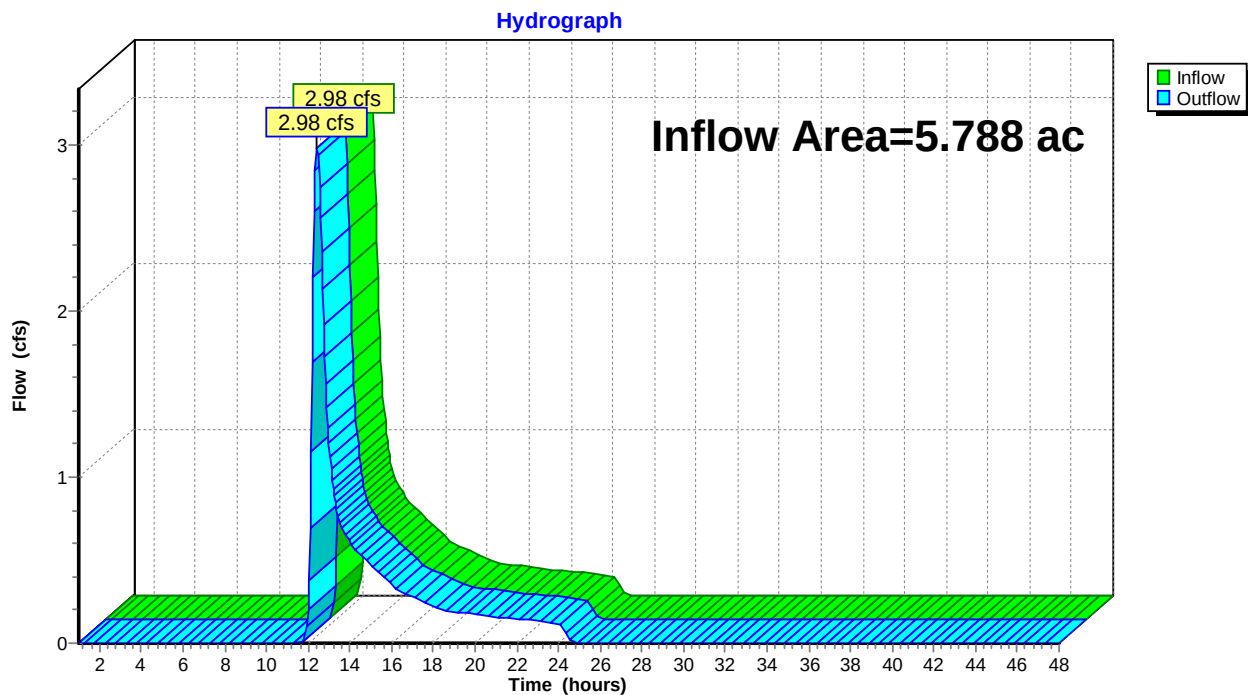
Hydrograph



Summary for Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

Inflow Area = 5.788 ac, 17.50% Impervious, Inflow Depth = 0.90" for 10-year event
Inflow = 2.98 cfs @ 12.43 hrs, Volume= 0.435 af
Outflow = 2.98 cfs @ 12.43 hrs, Volume= 0.435 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

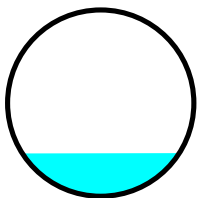
Summary for Reach 1R: N. DITCH CB OUTLET

Inflow Area = 1.831 ac, 26.86% Impervious, Inflow Depth = 0.79" for 10-year event
 Inflow = 0.86 cfs @ 12.34 hrs, Volume= 0.120 af
 Outflow = 0.86 cfs @ 12.35 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.3 min

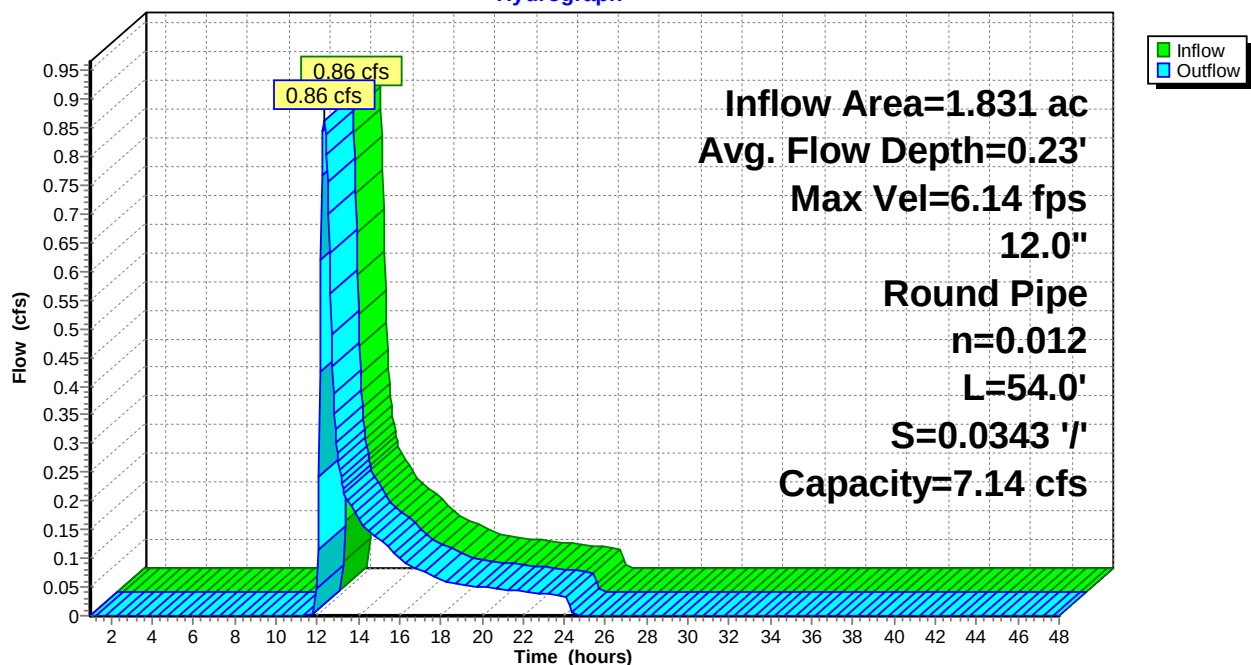
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.14 fps, Min. Travel Time= 0.1 min
 Avg. Velocity= 3.00 fps, Avg. Travel Time= 0.3 min

Peak Storage= 8 cf @ 12.34 hrs
 Average Depth at Peak Storage= 0.23'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.14 cfs

12.0" Round Pipe
 n= 0.012
 Length= 54.0' Slope= 0.0343 '/'
 Inlet Invert= 87.63', Outlet Invert= 85.78'

**Reach 1R: N. DITCH CB OUTLET**

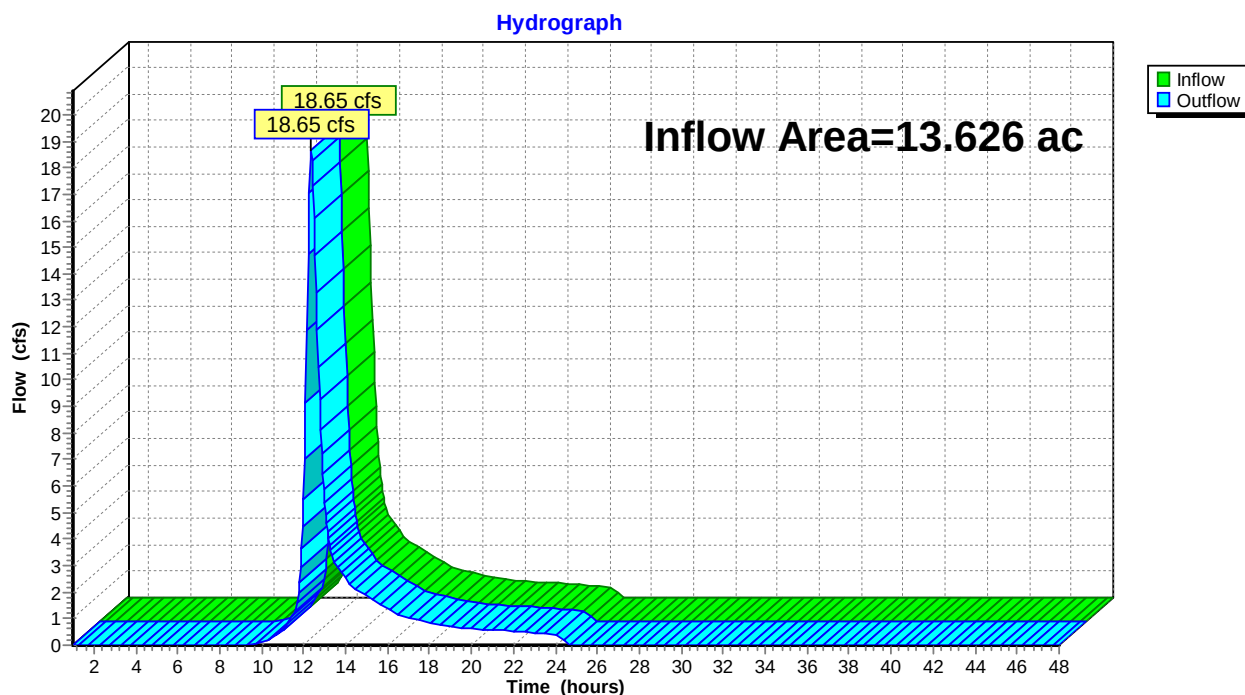
Hydrograph



Summary for Reach 2: POI #2 - LAMBERT CROSS CULVERT

Inflow Area = 13.626 ac, 6.24% Impervious, Inflow Depth = 1.96" for 10-year event
Inflow = 18.65 cfs @ 12.35 hrs, Volume= 2.224 af
Outflow = 18.65 cfs @ 12.35 hrs, Volume= 2.224 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 2: POI #2 - LAMBERT CROSS CULVERT

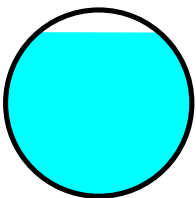
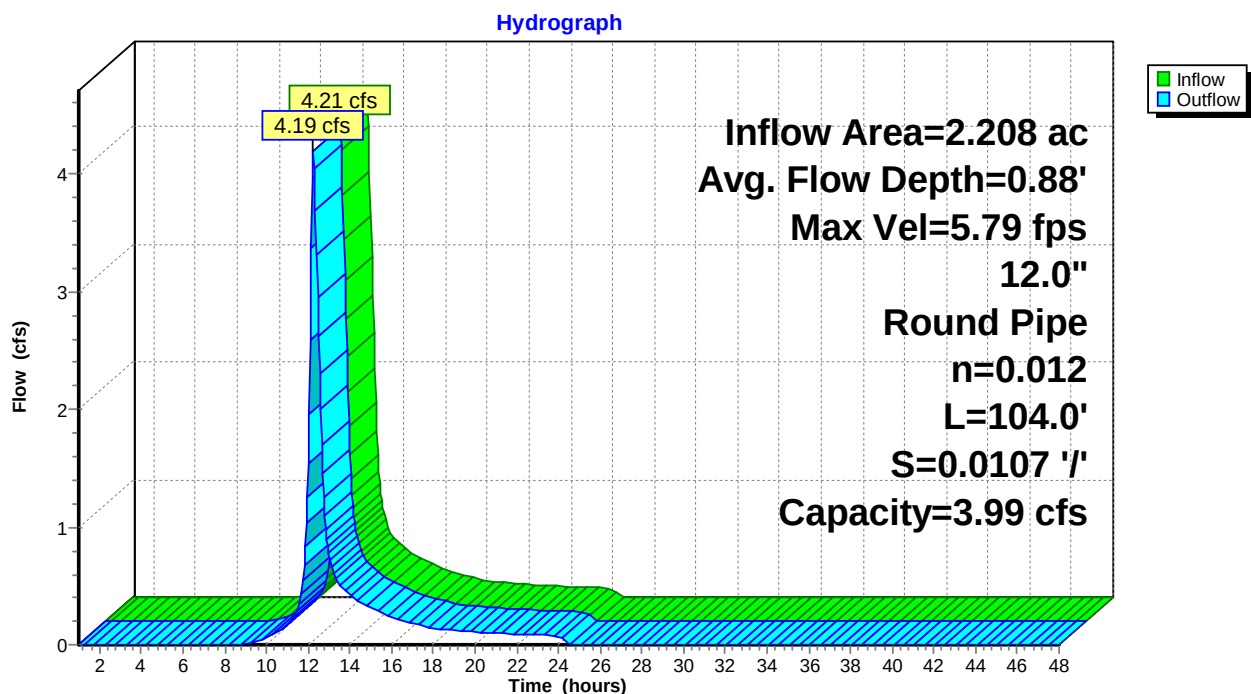
Summary for Reach 2R: WASH. CROSS CULVERT

Inflow Area = 2.208 ac, 20.90% Impervious, Inflow Depth = 2.29" for 10-year event
 Inflow = 4.21 cfs @ 12.25 hrs, Volume= 0.422 af
 Outflow = 4.19 cfs @ 12.26 hrs, Volume= 0.422 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.79 fps, Min. Travel Time= 0.3 min
 Avg. Velocity= 2.51 fps, Avg. Travel Time= 0.7 min

Peak Storage= 76 cf @ 12.25 hrs
 Average Depth at Peak Storage= 0.88'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.99 cfs

12.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 104.0' Slope= 0.0107 '/'
 Inlet Invert= 113.80', Outlet Invert= 112.69'

**Reach 2R: WASH. CROSS CULVERT**

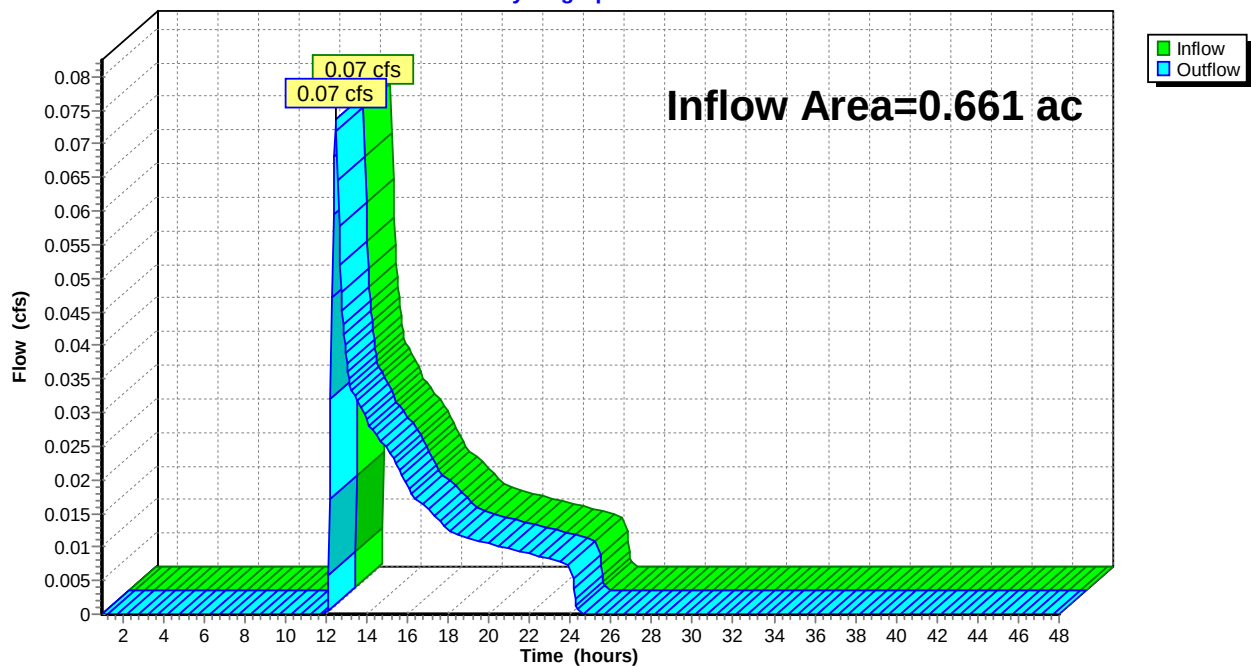
Summary for Reach 3: POI #3 - FALMOUTH WETLANDS

Inflow Area = 0.661 ac, 0.00% Impervious, Inflow Depth = 0.32" for 10-year event
Inflow = 0.07 cfs @ 12.48 hrs, Volume= 0.018 af
Outflow = 0.07 cfs @ 12.48 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 3: POI #3 - FALMOUTH WETLANDS

Hydrograph



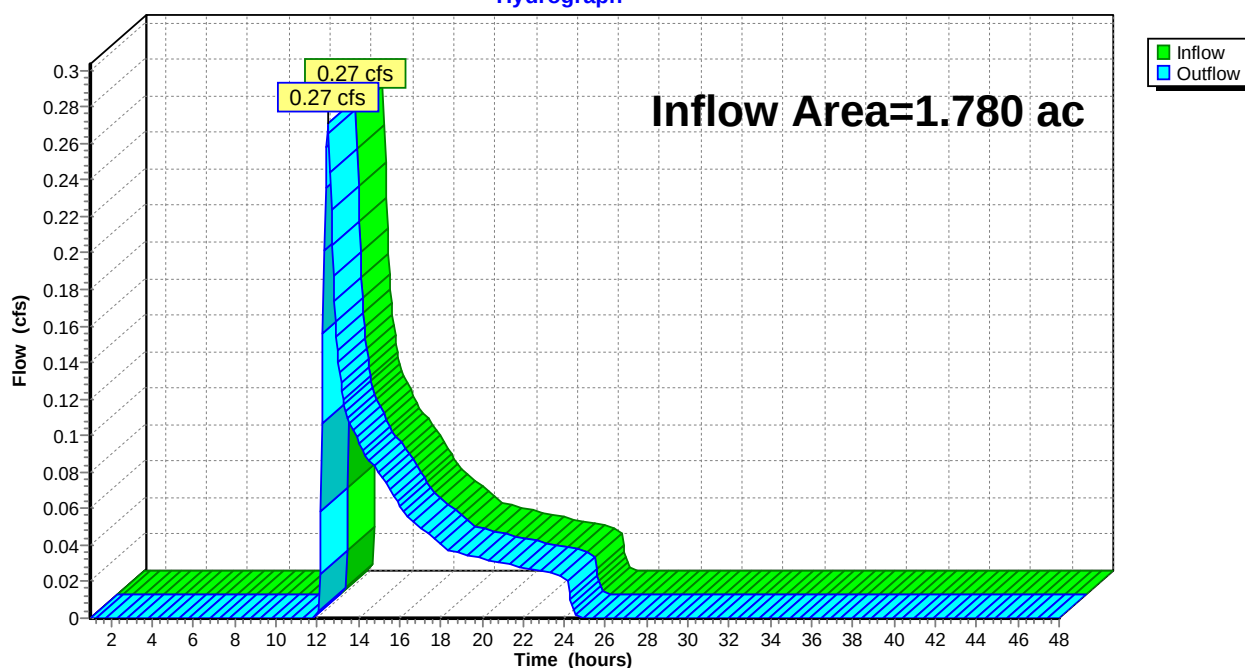
Summary for Reach 4: POI #4 - N STREAM

Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 0.40" for 10-year event
Inflow = 0.27 cfs @ 12.53 hrs, Volume= 0.060 af
Outflow = 0.27 cfs @ 12.53 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 4: POI #4 - N STREAM

Hydrograph



Summary for Subcatchment 1 N: SC 1 N

Runoff = 1.80 cfs @ 12.30 hrs, Volume= 0.214 af, Depth= 1.40"

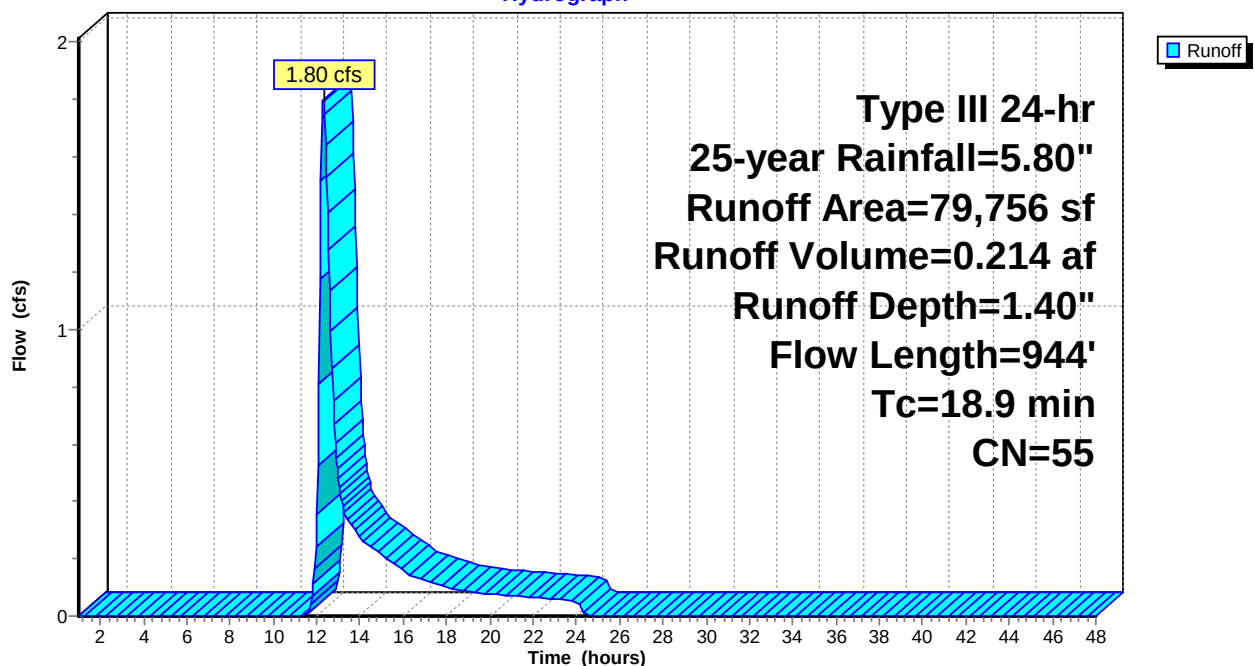
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	13,977	39	Roadside ditch and shrubs, HSG A
*	21,422	98	Paved ROW and gravel shoulder
	35,717	30	Woods, Good, HSG A
	5,802	77	Woods, Good, HSG D
*	2,838	80	Roadside ditch and shrubs, HSG D
	79,756	55	Weighted Average
	58,334		73.14% Pervious Area
	21,422		26.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0500	0.11		Sheet Flow, Sheet Flow (A to B) Woods: Light underbrush n= 0.400 P2= 3.27"
1.6	106	0.0500	1.12		Shallow Concentrated Flow, SCF (B TO C) Woodland Kv= 5.0 fps
2.6	738	0.0310	4.64	17.83	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 & 4.5 ' Top.W=7.60' n= 0.035 Earth, dense weeds
18.9	944	Total			

Subcatchment 1 N: SC 1 N

Hydrograph



Summary for Subcatchment 1S: SC 1 S

Runoff = 4.10 cfs @ 12.42 hrs, Volume= 0.539 af, Depth= 1.63"

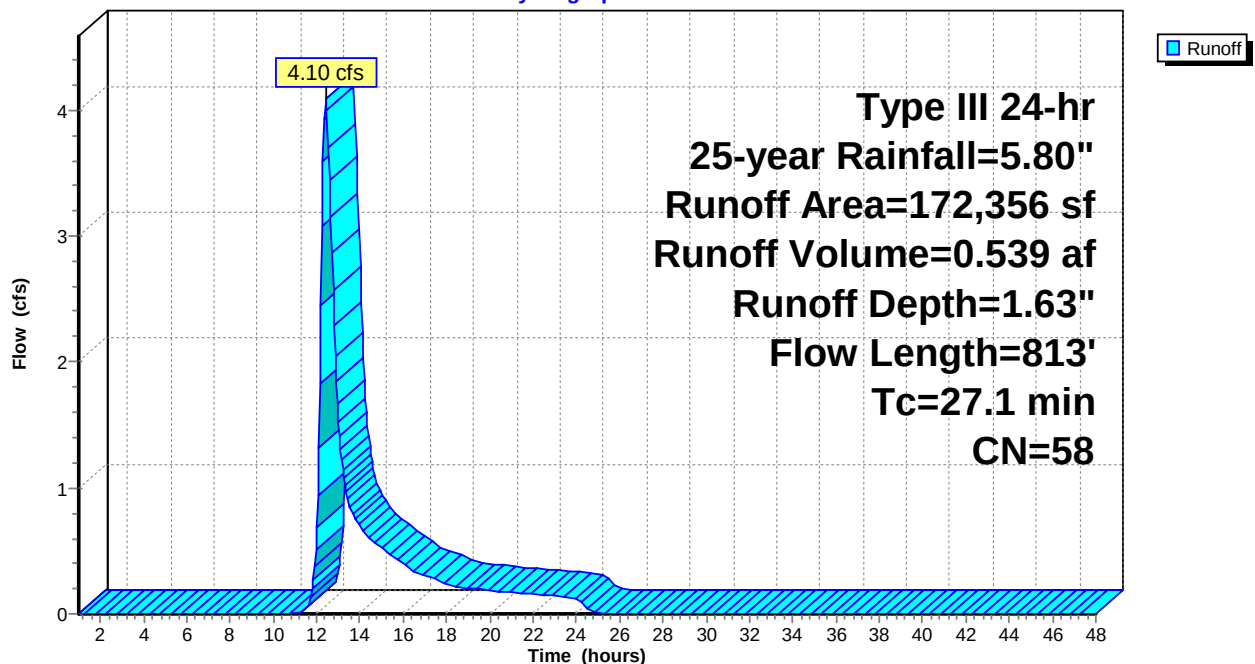
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
72,886	30	Woods, Good, HSG A
* 61,363	77	Woods, Good, HSG D
* 1,387	98	Roofs, HSG A
* 2,490	77	Wetland pocket, assumed HSG D
* 8,584	39	Roadside ditch, HSG A
* 4,340	80	Roadside ditch, HSG D
* 21,306	98	Paved ROW and gravel shoulder
172,356	58	Weighted Average
149,663		86.83% Pervious Area
22,693		13.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0300	0.09		Sheet Flow, Sheet flow (A to B)
					Woods: Light underbrush n= 0.400 P2= 3.27"
9.0	713	0.0700	1.32		Shallow Concentrated Flow, SCF (B to C)
					Woodland Kv= 5.0 fps
27.1	813	Total			

Subcatchment 1S: SC 1 S

Hydrograph



Summary for Subcatchment 2N: SC 2 N

Runoff = 6.09 cfs @ 12.24 hrs, Volume= 0.608 af, Depth= 3.31"

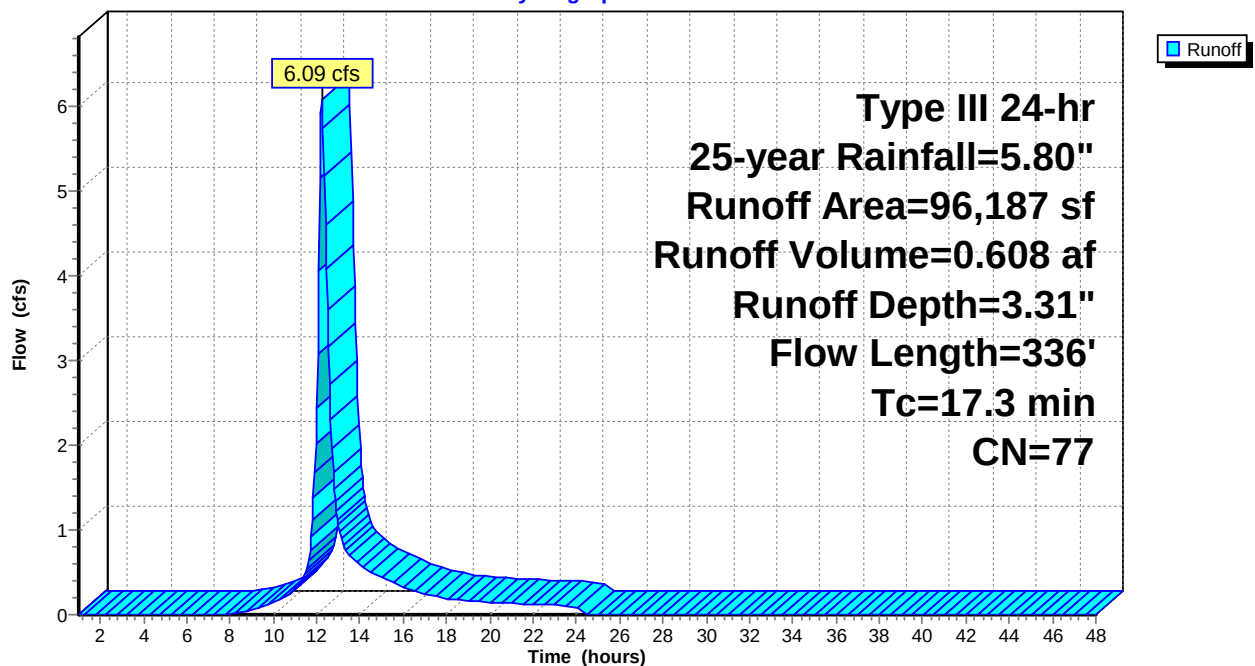
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
11,790	30	Woods, Good, HSG A
35,555	77	Woods, Good, HSG D
* 5,690	80	Road sideslope HSG D
* 12,892	98	Paved ROW and gravel shoulder
* 7,208	98	Rooftops and driveways
* 23,052	80	Lawns HSG D
96,187	77	Weighted Average
76,087		79.10% Pervious Area
20,100		20.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.7	100	0.0500	0.11		Sheet Flow, Sheet Flow (A TO B)
					Woods: Light underbrush n= 0.400 P2= 3.27"
2.6	236	0.0100	1.50		Shallow Concentrated Flow, Wetlands
					Grassed Waterway Kv= 15.0 fps
17.3	336	Total			

Subcatchment 2N: SC 2 N

Hydrograph



Summary for Subcatchment 2S: SC 2 S

Runoff = 22.81 cfs @ 12.37 hrs, Volume= 2.693 af, Depth= 2.83"

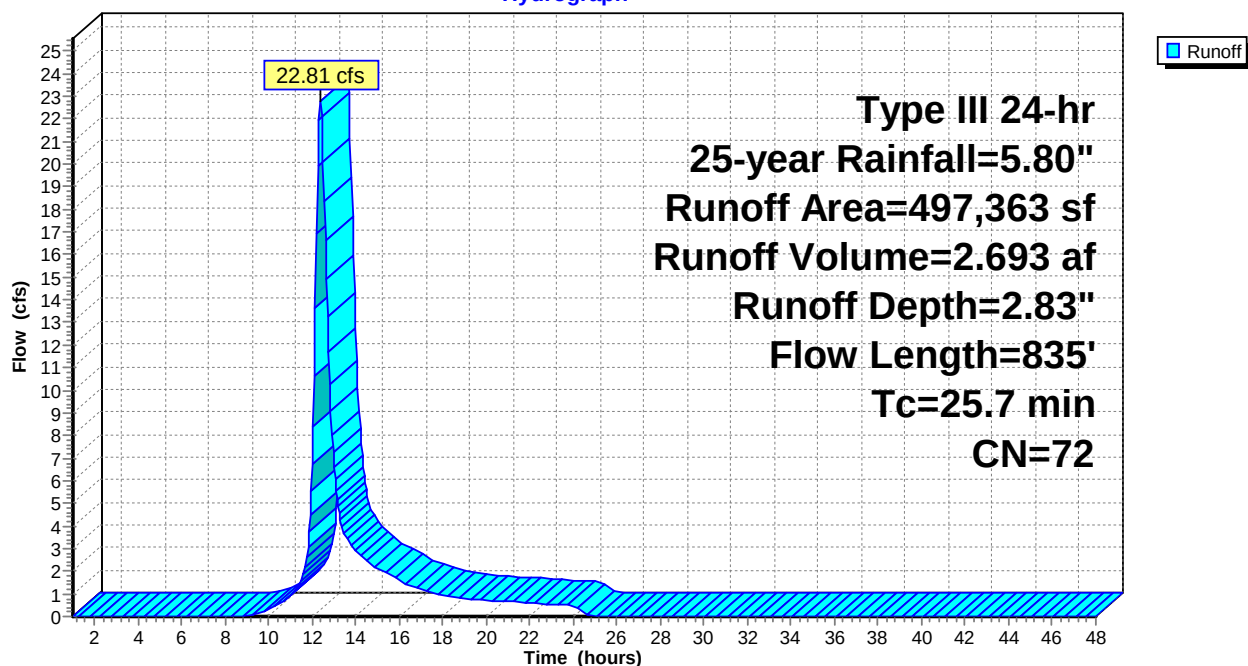
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
5,912	30	Woods, Good, HSG A
30,826	39	>75% Grass cover, Good, HSG A
* 3,896	98	Roofs/driveways/patios (HSG A)
24,173	55	Woods, Good, HSG B
6,557	70	Woods, Good, HSG C
146,595	70	Woods, Good, HSG C
247,584	77	Woods, Good, HSG D
10,866	80	>75% Grass cover, Good, HSG D
* 3,503	98	Roofs/driveways/patios (HSG D)
* 7,726	98	Wash. paved ROW and gravel shoulder
* 7,931	80	Roadside ditch, HSG D
* 1,794	98	Auburn, paved ROW
497,363	72	Weighted Average
480,444		96.60% Pervious Area
16,919		3.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	100	0.0700	0.07		Sheet Flow, Sheet Flow (A to B) Woods: Dense underbrush n= 0.800 P2= 3.27"
0.7	170	0.0700	3.97		Shallow Concentrated Flow, SCF (B TO C) Grassed Waterway Kv= 15.0 fps
2.6	565	0.0350	3.56	3.92	Channel Flow, Stream Area= 1.1 sf Perim= 3.0' r= 0.37' n= 0.040 Winding stream, pools & shoals
25.7	835	Total			

Subcatchment 2S: SC 2 S

Hydrograph



Summary for Subcatchment 3N: SC 3

Runoff = 0.25 cfs @ 12.32 hrs, Volume= 0.040 af, Depth= 0.72"

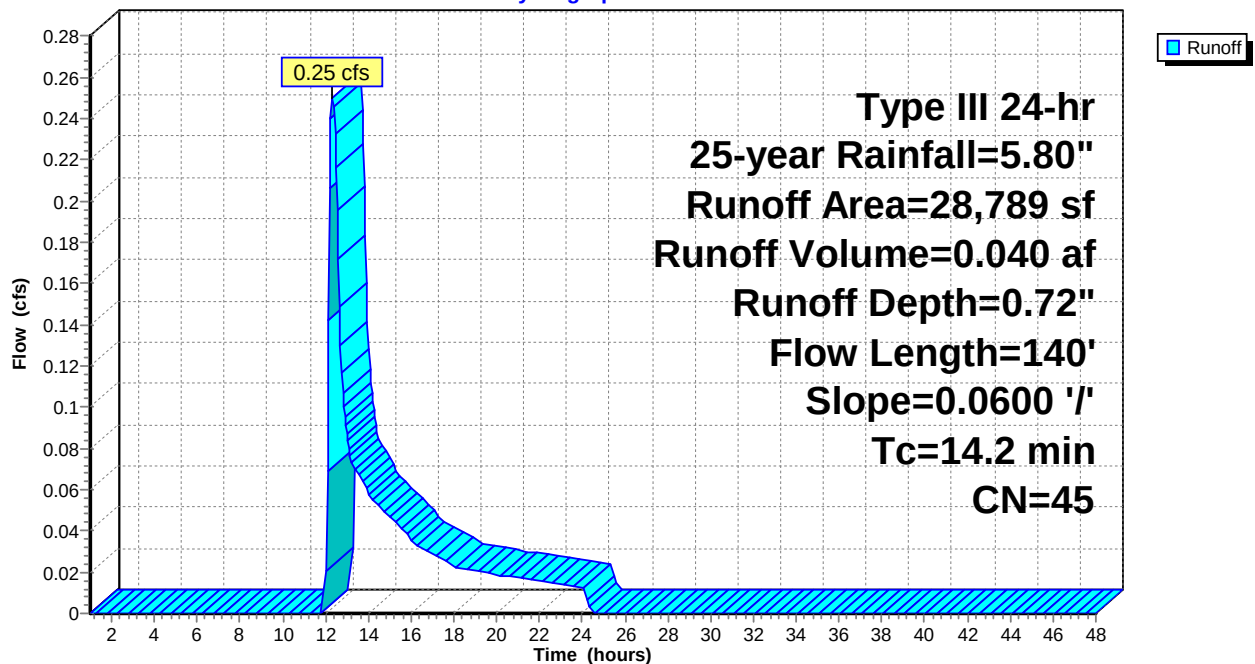
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
19,623	30	Woods, Good, HSG A
9,166	77	Woods, Good, HSG D
28,789	45	Weighted Average
28,789		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0600	0.12		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.27"
0.5	40	0.0600	1.22		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
14.2	140	Total			

Subcatchment 3N: SC 3

Hydrograph



Summary for Subcatchment 4N: SC 4

Runoff = 0.80 cfs @ 12.40 hrs, Volume= 0.126 af, Depth= 0.85"

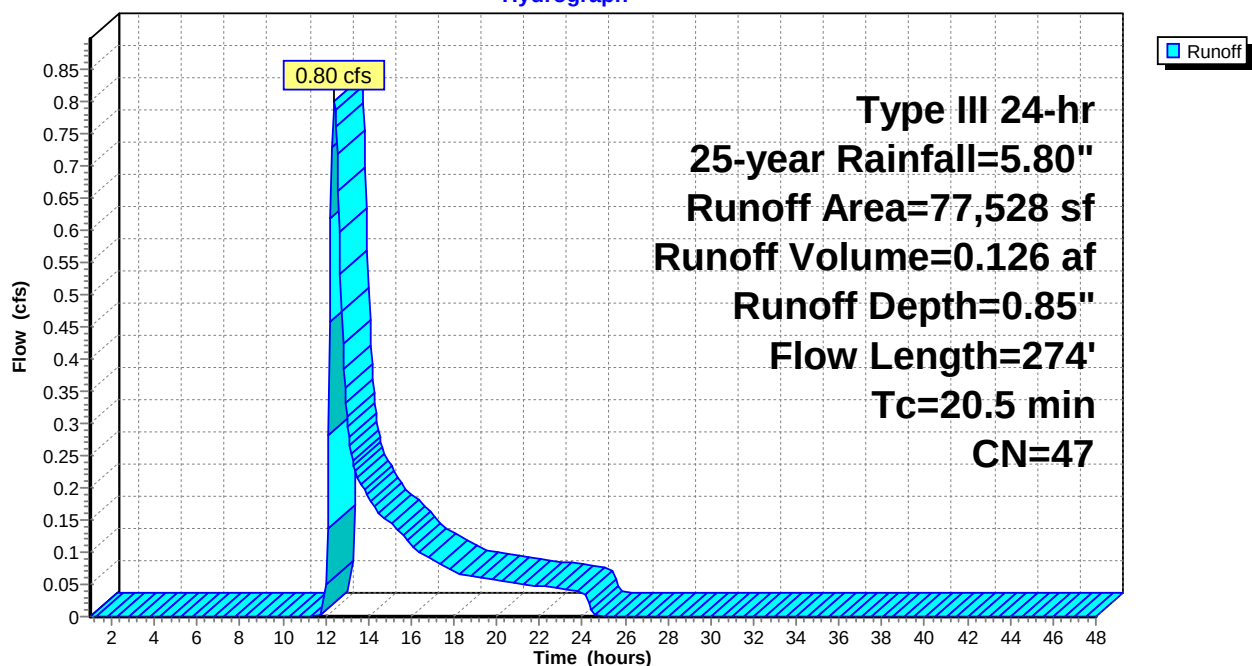
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
49,772	30	Woods, Good, HSG A
17,107	77	Woods, Good, HSG D
* 10,649	77	Woods, Good, HSG D
77,528	47	Weighted Average
77,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0300	0.09		Sheet Flow, A-B
					Woods: Light underbrush n= 0.400 P2= 3.27"
2.4	174	0.0600	1.22		Shallow Concentrated Flow, B-C
					Woodland Kv= 5.0 fps
20.5	274	Total			

Subcatchment 4N: SC 4

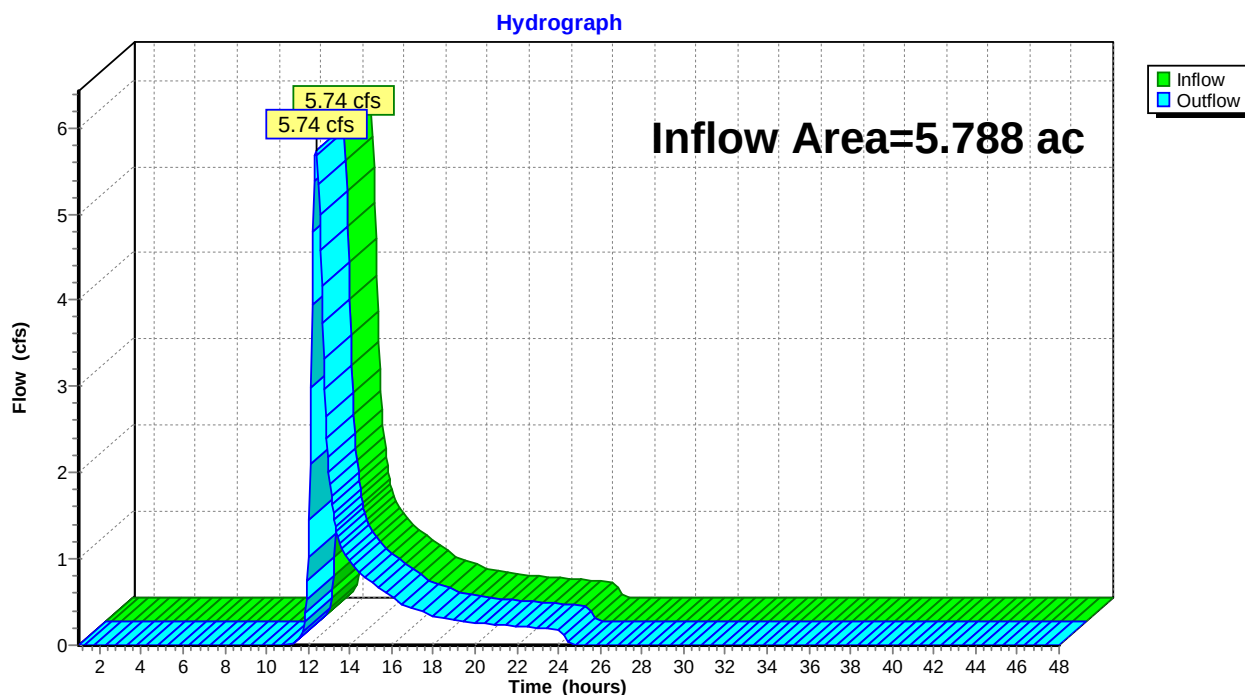
Hydrograph



Summary for Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

Inflow Area = 5.788 ac, 17.50% Impervious, Inflow Depth = 1.56" for 25-year event
Inflow = 5.74 cfs @ 12.39 hrs, Volume= 0.753 af
Outflow = 5.74 cfs @ 12.39 hrs, Volume= 0.753 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

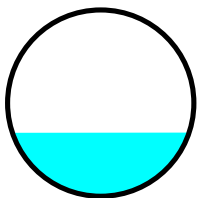
Summary for Reach 1R: N. DITCH CB OUTLET

Inflow Area = 1.831 ac, 26.86% Impervious, Inflow Depth = 1.40" for 25-year event
 Inflow = 1.80 cfs @ 12.30 hrs, Volume= 0.214 af
 Outflow = 1.80 cfs @ 12.31 hrs, Volume= 0.214 af, Atten= 0%, Lag= 0.2 min

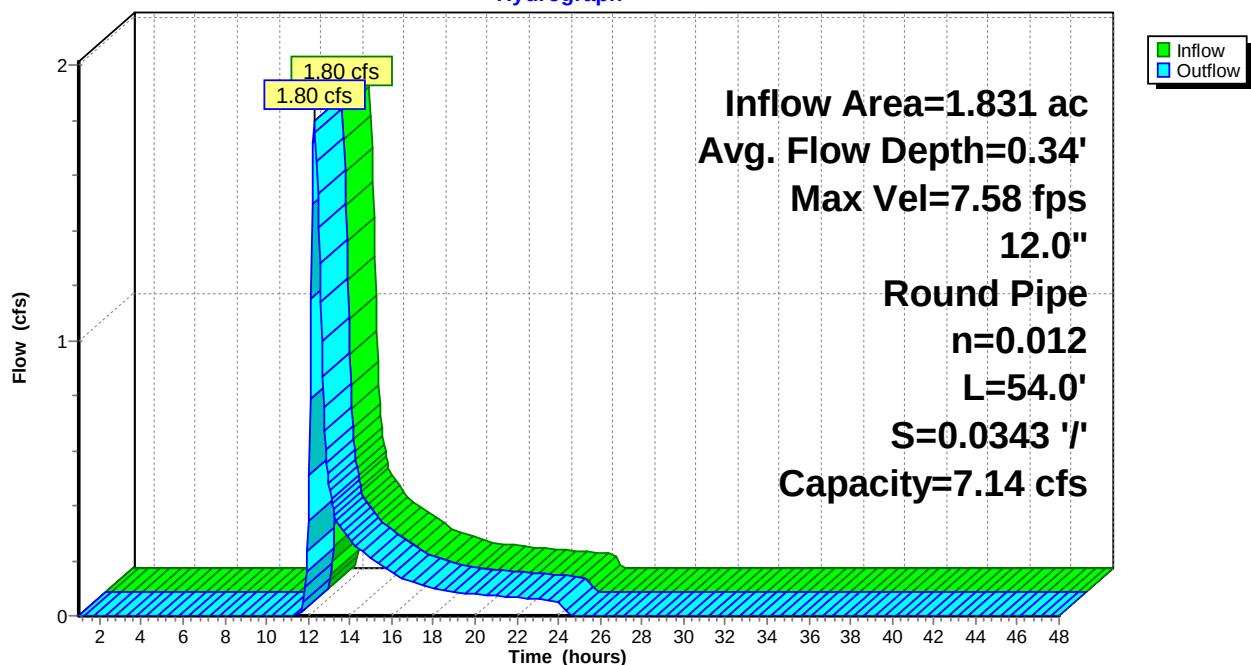
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.58 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.44 fps, Avg. Travel Time= 0.3 min

Peak Storage= 13 cf @ 12.30 hrs
 Average Depth at Peak Storage= 0.34'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.14 cfs

12.0" Round Pipe
 n= 0.012
 Length= 54.0' Slope= 0.0343 '/'
 Inlet Invert= 87.63', Outlet Invert= 85.78'

**Reach 1R: N. DITCH CB OUTLET**

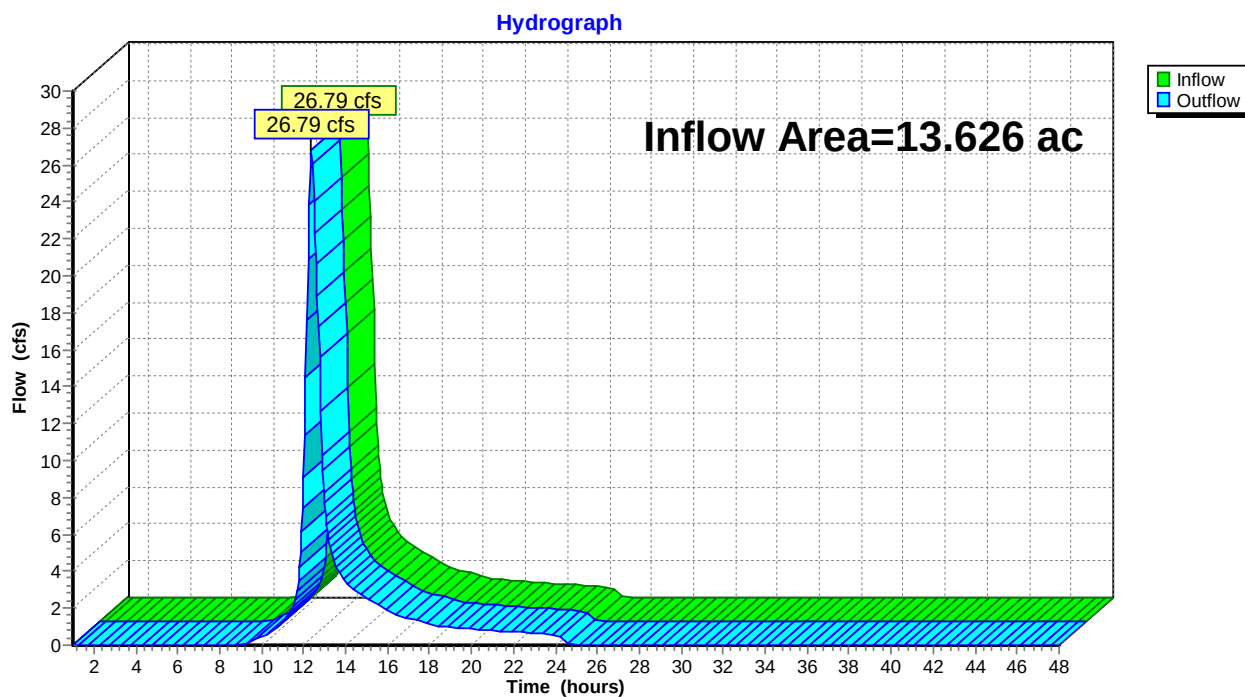
Hydrograph



Summary for Reach 2: POI #2 - LAMBERT CROSS CULVERT

Inflow Area = 13.626 ac, 6.24% Impervious, Inflow Depth = 2.91" for 25-year event
Inflow = 26.79 cfs @ 12.37 hrs, Volume= 3.301 af
Outflow = 26.79 cfs @ 12.37 hrs, Volume= 3.301 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 2: POI #2 - LAMBERT CROSS CULVERT

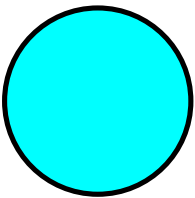
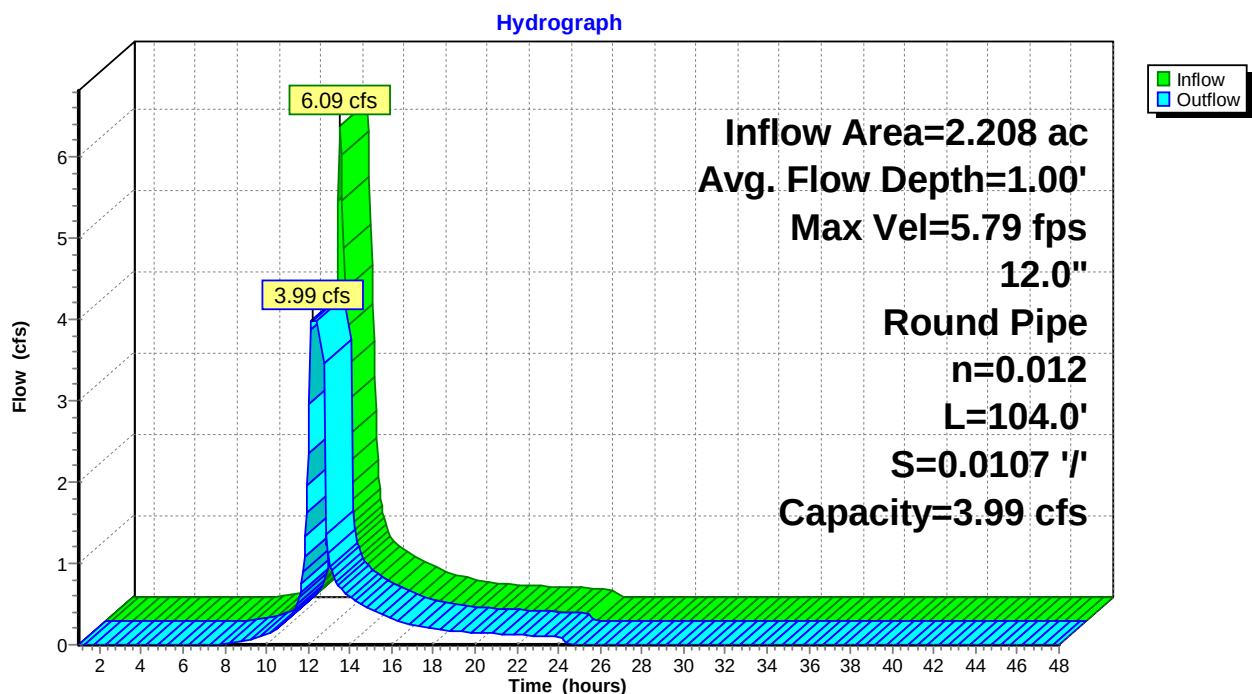
Summary for Reach 2R: WASH. CROSS CULVERT

Inflow Area = 2.208 ac, 20.90% Impervious, Inflow Depth = 3.31" for 25-year event
 Inflow = 6.09 cfs @ 12.24 hrs, Volume= 0.608 af
 Outflow = 3.99 cfs @ 12.20 hrs, Volume= 0.608 af, Atten= 35%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.79 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.68 fps, Avg. Travel Time= 0.6 min

Peak Storage= 82 cf @ 12.15 hrs
 Average Depth at Peak Storage= 1.00'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.99 cfs

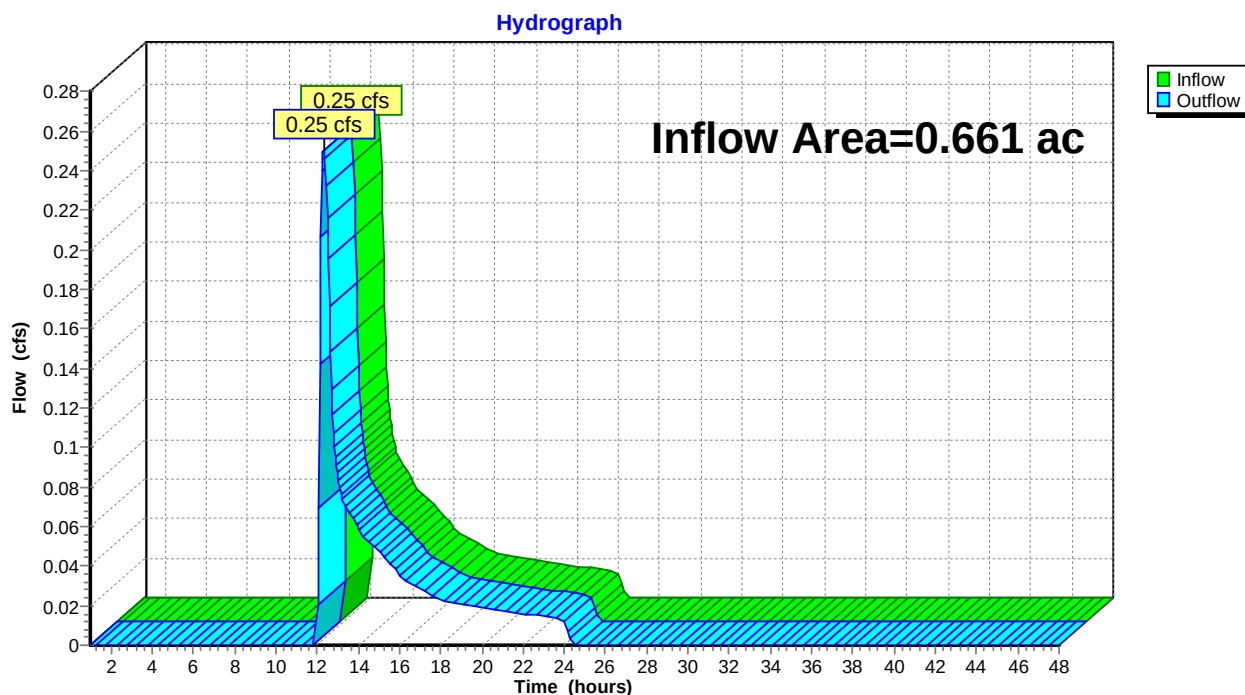
12.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 104.0' Slope= 0.0107 '/'
 Inlet Invert= 113.80', Outlet Invert= 112.69'

**Reach 2R: WASH. CROSS CULVERT**

Summary for Reach 3: POI #3 - FALMOUTH WETLANDS

Inflow Area = 0.661 ac, 0.00% Impervious, Inflow Depth = 0.72" for 25-year event
Inflow = 0.25 cfs @ 12.32 hrs, Volume= 0.040 af
Outflow = 0.25 cfs @ 12.32 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 3: POI #3 - FALMOUTH WETLANDS

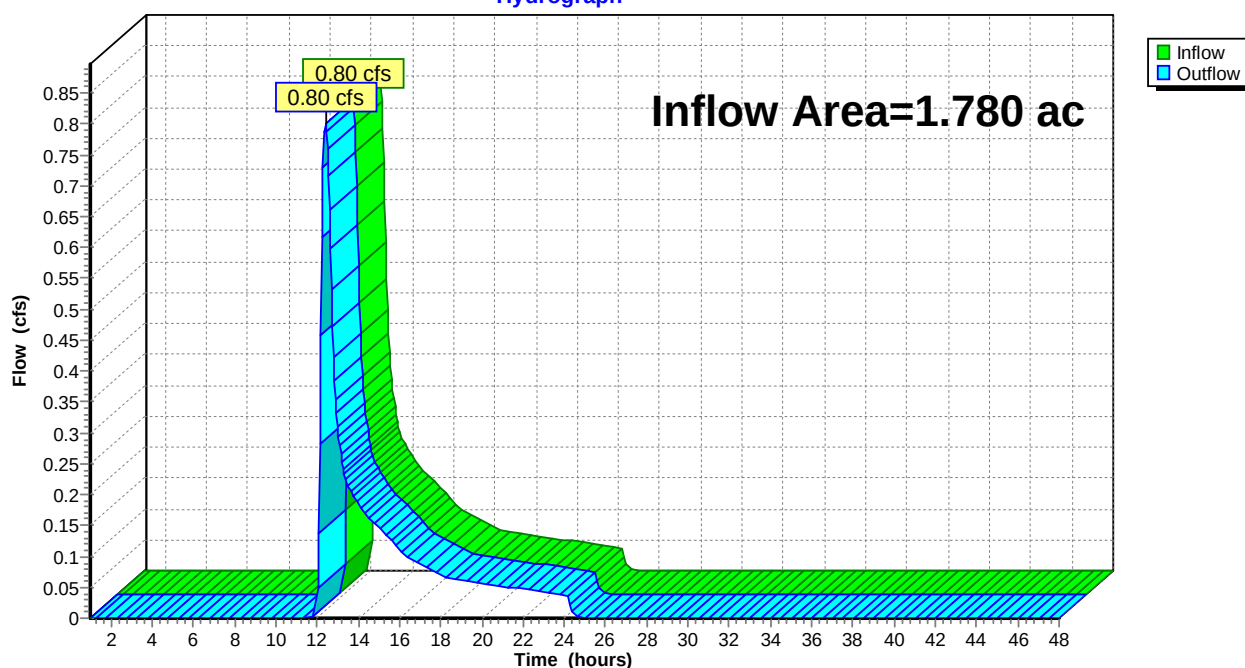
Summary for Reach 4: POI #4 - N STREAM

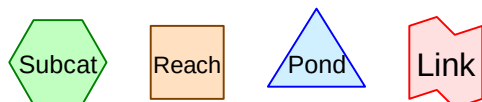
Inflow Area = 1.780 ac, 0.00% Impervious, Inflow Depth = 0.85" for 25-year event
Inflow = 0.80 cfs @ 12.40 hrs, Volume= 0.126 af
Outflow = 0.80 cfs @ 12.40 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach 4: POI #4 - N STREAM

Hydrograph





1145 POST

Prepared by HP Inc.

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.020	98	5' pavers/ s. mews (1.5S)
1.143	39	>75% Grass cover, Good, HSG A (1.3S, 1.4S, 2.2S)
0.724	80	>75% Grass cover, Good, HSG D (1.2S, 1.4S, 1.5S, 2.1S, 2.2S, 4.3N)
0.008	98	A.2 patios (1.2N)
0.017	98	A.9/A.10 rear patios (1.7S)
0.035	98	Auburn St (2.2S)
0.045	98	Curb & Pavement (4.1N)
0.005	98	Curbing (2.1S)
0.013	98	Curved Patio (1.5S)
0.053	98	Front Patios (1.5S)
0.016	80	Grass Pavers (1.5S)
0.010	80	Grass pavers (1.4N, 1.6S)
0.509	98	IMPERV (1.5N)
0.123	39	Landscaped/open space (1.6S)
0.019	80	Landscaping Auburn St (2.2S)
0.155	80	Landscaping/ HSG D (1.6S)
0.007	39	Landscaping/esplanade (1.9N)
0.060	39	Landscaping/lawn, HSG A (1.3N)
0.065	80	Landscaping/open space (2.1N)
0.119	39	Landscaping/open space, HSG A (1.1N, 4.2N)
0.030	39	Landscaping/openspace/rain garden/ HSG A (1.4N)
0.063	39	Landscaping/roadside ditch (1.1N)
0.046	39	Landscaping/slope, HSG A (4.3N)
0.076	80	Landscaping/slope, HSG D (3.1N)
0.083	39	Landscaping/swale, HSG A (3.1N)
0.260	39	Lawn/landscaping, HSG A (4.1N)
0.080	80	Lawn/landscaping, HSG D (1.7S)
0.065	39	Lawn/landscaping/HSG A (1.2N)
0.075	39	Lawn/landscaping/ditch, HSG A (1.7N)
0.489	80	Lawns/landscaping, HSG D (2.1N)
0.055	98	Long Patio (1.5S)
0.065	98	N sidewalk (2.1N)
0.302	39	Open space, landscaping, HSG A (1.8N)
0.150	98	Parking lot (4.2N)
0.149	98	Patios (1.3N, 1.5S, 1.6S, 4.1N)
0.014	98	Paved Walkway (4.1N)
0.096	98	Paved driveaisle (2.1S)
0.059	98	Paved walkway (1.8N)
0.001	98	Paver walkway (1.4N)
0.036	98	Pavers & covered pav (1.8N)
0.030	98	Porous Horizontal (2.1S)
0.120	98	Porous Pavement (4.1N)
0.026	98	Porous Vertical (2.1S)
0.056	98	Porous pavement (4.2N)
0.006	98	Rear Patio (1.4S)
0.012	98	Rear walkway/patio (2.1S)

1145 POST

Prepared by HP Inc.

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Page 3

Area Listing (all nodes) (continued)

Area (acres)	CN	Description (subcatchment-numbers)
0.171	80	Road sideslope (2.1N)
0.179	39	Roadside ditch and shrubs, HSG A (1.1N)
0.195	80	Roadside ditch/slope (2.2S)
0.620	98	Roofs (1.1S)
0.089	98	Roofs/driveways/patios (HSG A) (2.2S)
0.080	98	Roofs/driveways/patios (HSG D) (2.2S)
0.010	98	Rooftop (2.1N)
0.156	98	Rooftop and driveway (2.1N)
0.159	98	Sidewalk (1.2S, 1.3N, 2.2S, 4.2N)
0.010	98	Sidewalks (1.5S)
0.105	39	Slope behind patios, HSG A (2.2S)
0.003	98	Solid Waste Location (4.1N)
0.000	98	Transformer (1.5S)
0.032	98	Unconnected roofs, HSG A (1.6S)
0.008	98	Walkway (1.7S)
0.020	98	Walkway/patio (2.1S)
0.473	98	Wash Ave (1.2N, 1.3N, 1.6N, 1.9N, 2.2S)
0.133	39	Wash Ave ditch (1.6S)
0.084	98	Wash. Ave (1.2S)
0.251	98	Wash. Ave and S. Conc apron (2.1N)
0.386	98	Washington ave, cross walks (1.6S)
1.734	30	Woods, Good, HSG A (1.1N, 1.6S, 2.1N, 3.1N, 4.3N)
0.555	55	Woods, Good, HSG B (2.2S)
3.516	70	Woods, Good, HSG C (2.2S)
6.911	77	Woods, Good, HSG D (2.1N, 2.2S, 3.1N, 4.3N)
0.001	98	bus shelter (1.3N)
0.001	98	bustop (1.2S)
0.009	98	driveway (1.2S)
0.004	98	dumpster pad (2.1S)
0.003	80	grass pavers (1.2N)
0.009	98	patio (1.2S)
0.029	98	patio/covered pav (1.3S)
0.011	98	patios (1.8N)
0.152	98	paved drive aisle (1.3S)
0.039	98	paved walkway (1.4S)
0.001	98	pavers (1.2N)
0.138	98	porous (1.3S, 1.5S)
0.065	98	sidewalk (1.2N, 1.2S, 1.9N)
0.000	98	t pad (1.2S)
0.000	98	transformer (1.8N)
0.000	98	transformer pad (4.1N)
0.025	98	walkway (1.3S)
21.957	71	TOTAL AREA

Summary for Subcatchment 1.1N: SC 1.1N

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

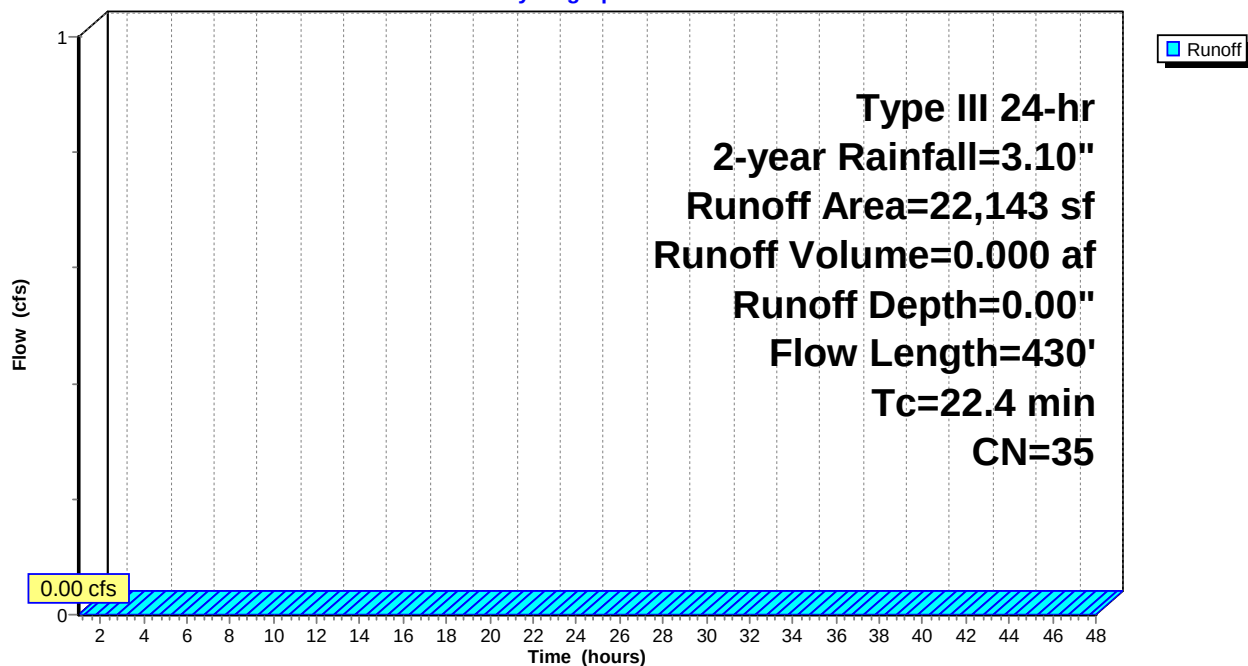
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	7,797	39	Roadside ditch and shrubs, HSG A
	9,907	30	Woods, Good, HSG A
*	1,713	39	Landscaping/open space, HSG A
*	2,726	39	Landscaping/roadside ditch
	22,143	35	Weighted Average
	22,143		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	70	0.0400	0.06		Sheet Flow, SF (A to B) Woods: Dense underbrush n= 0.800 P2= 3.27"
0.1	20	0.4000	3.16		Shallow Concentrated Flow, SCF (B to C) Woodland Kv= 5.0 fps
1.2	340	0.0310	4.64	17.83	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 & 4.5 ' Top.W=7.60' n= 0.035
22.4	430	Total			

Subcatchment 1.1N: SC 1.1N

Hydrograph



Summary for Subcatchment 1.1S: Roofs

Runoff = 1.82 cfs @ 12.09 hrs, Volume= 0.148 af, Depth= 2.87"

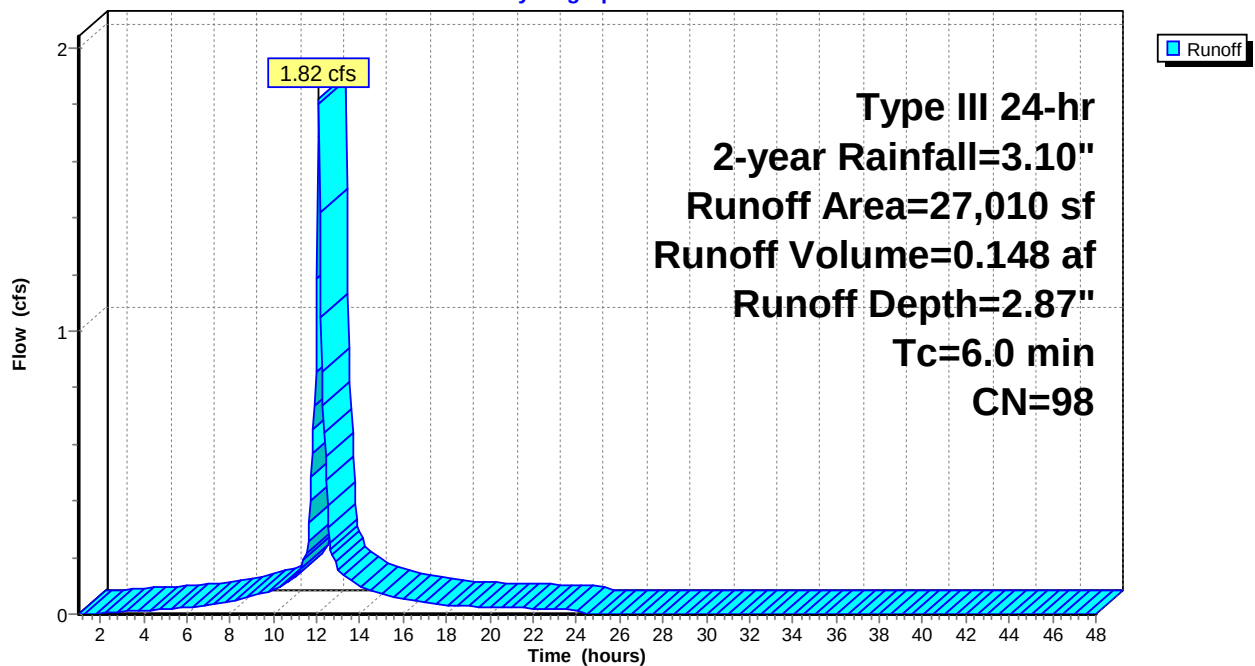
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	27,010	98	Roofs
	27,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.1S: Roofs

Hydrograph



Summary for Subcatchment 1.2N: SC 1.2N

Runoff = 0.29 cfs @ 12.10 hrs, Volume= 0.021 af, Depth= 1.26"

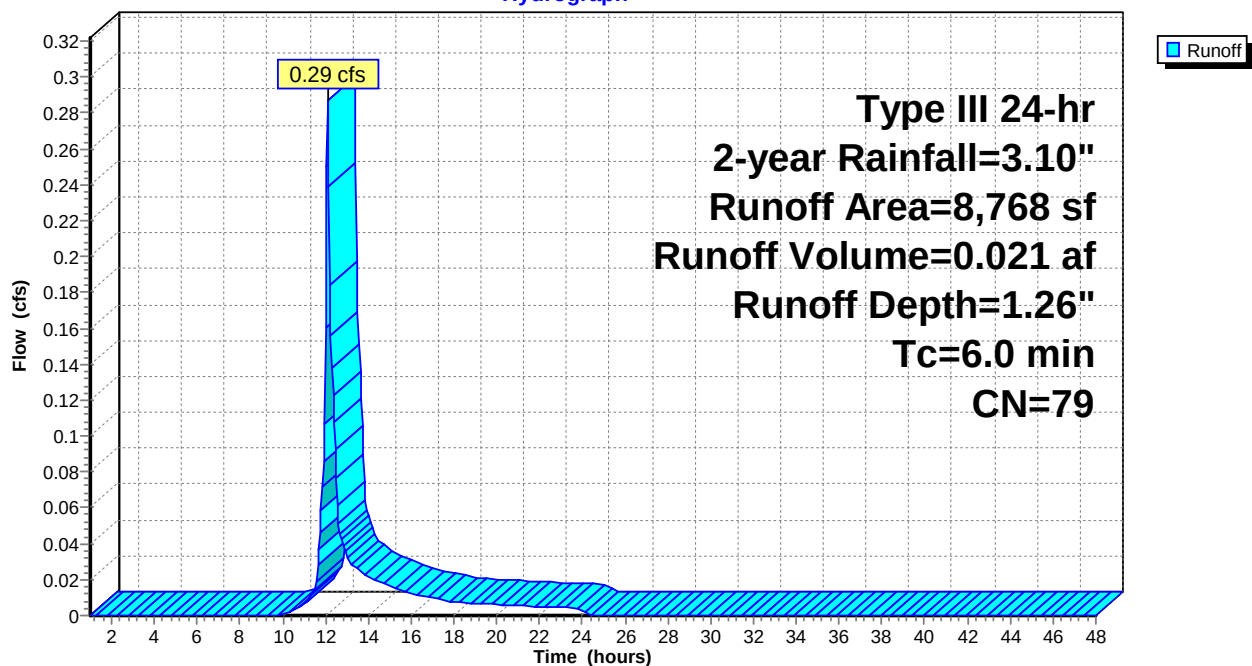
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	3,404	98	Wash Ave
*	360	98	A.2 patios
*	1,978	98	sidewalk
*	40	98	pavers
*	149	80	grass pavers
*	2,837	39	Lawn/landscaping/HSG A
	8,768	79	Weighted Average
	2,986		34.06% Pervious Area
	5,782		65.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.2N: SC 1.2N

Hydrograph



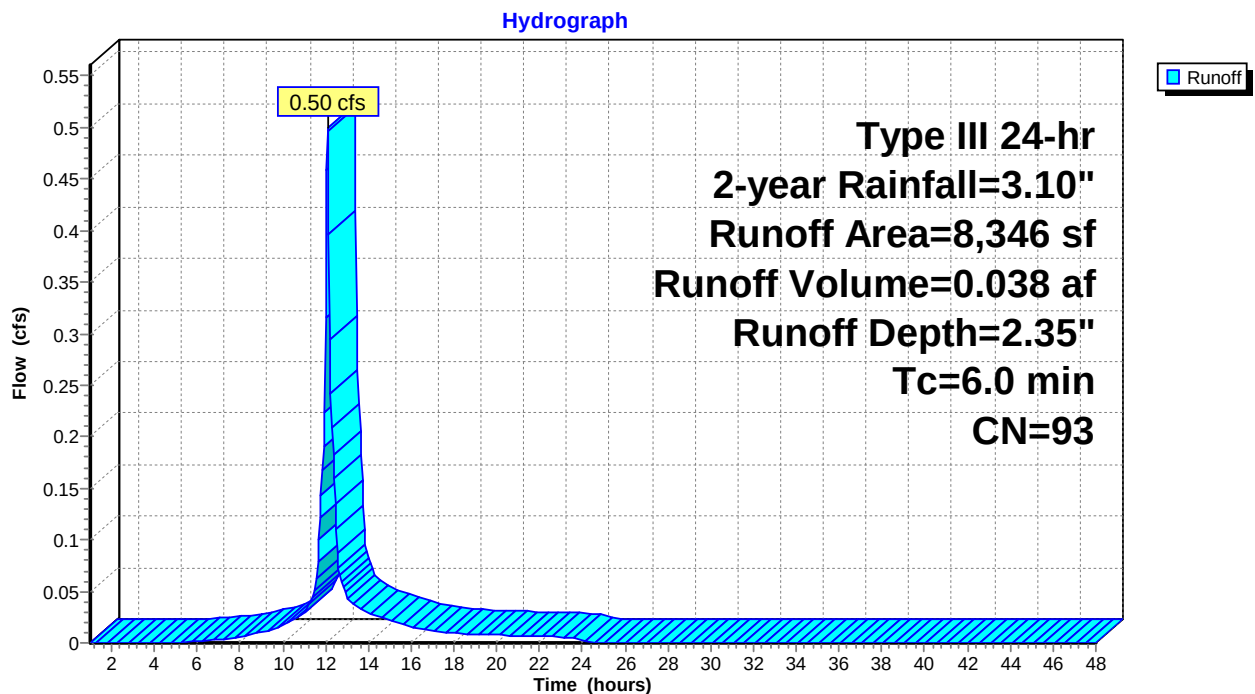
Summary for Subcatchment 1.2S: Property Frontage

Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	3,666	98	Wash. Ave
*	1,206	98	Sidewalk
*	406	98	patio
*	16	98	t pad
*	374	98	driveway
*	518	98	sidewalk
*	48	98	bustop
	2,112	80	>75% Grass cover, Good, HSG D
	8,346	93	Weighted Average
	2,112		25.31% Pervious Area
	6,234		74.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.2S: Property Frontage

Summary for Subcatchment 1.3N: SC 1.3N

Runoff = 0.22 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 1.14"

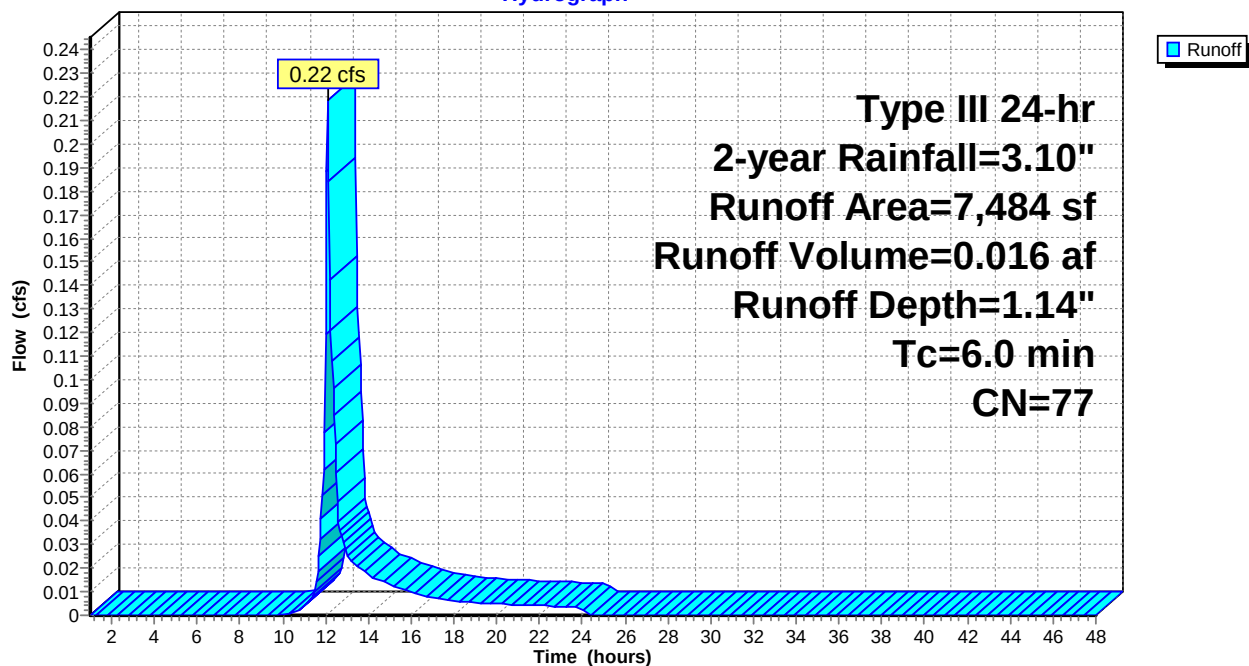
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	3,472	98	Wash Ave
*	230	98	Patios
*	48	98	bus shelter
*	1,130	98	Sidewalk
*	2,604	39	Landscaping/lawn, HSG A
	7,484	77	Weighted Average
	2,604		34.79% Pervious Area
	4,880		65.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.3N: SC 1.3N

Hydrograph



Summary for Subcatchment 1.3S: West Parking Lot

Runoff = 0.11 cfs @ 15.54 hrs, Volume= 0.055 af, Depth= 2.35"

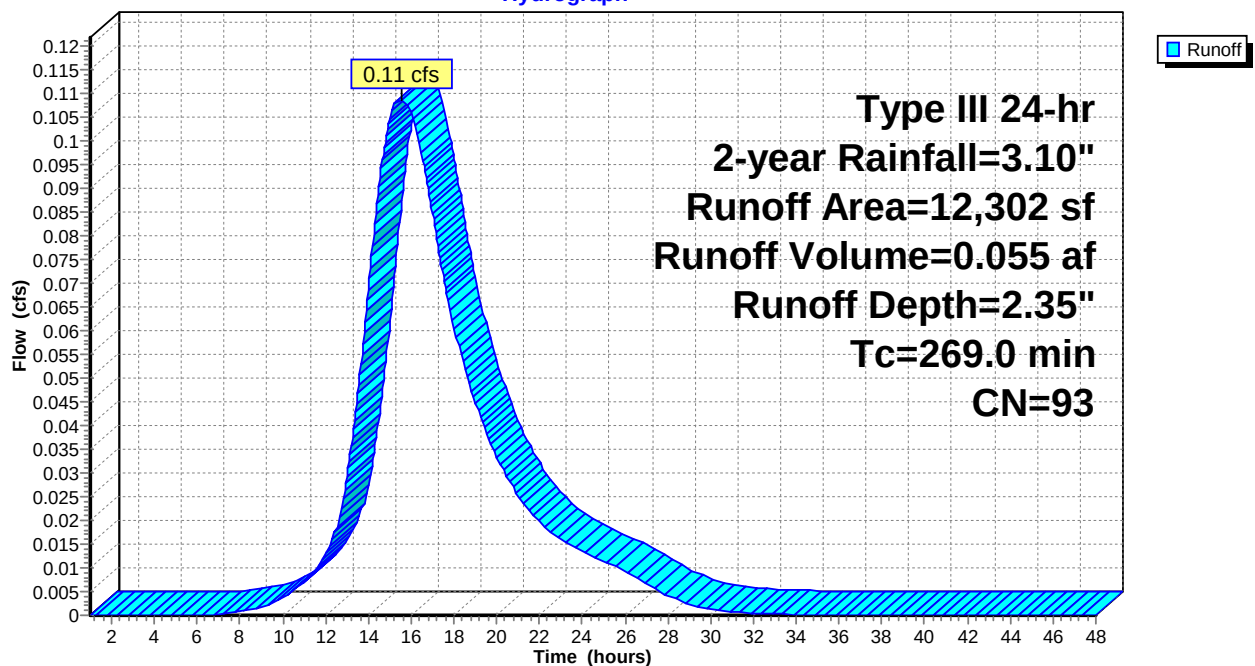
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	2,279	98	porous
*	6,635	98	paved drive aisle
*	1,068	98	walkway
*	1,252	98	patio/covered pav
	1,068	39	>75% Grass cover, Good, HSG A
	12,302	93	Weighted Average
	1,068		8.68% Pervious Area
	11,234		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 1.3S: West Parking Lot

Hydrograph



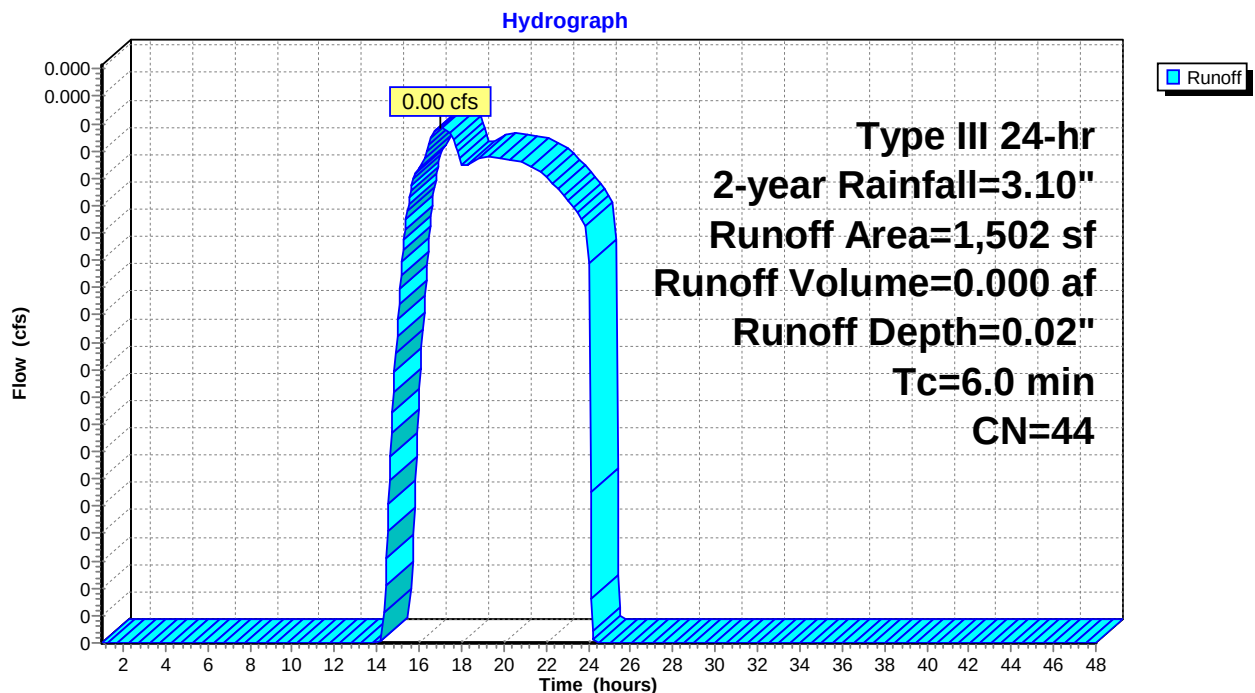
Summary for Subcatchment 1.4N: SC 1.4N

Runoff = 0.00 cfs @ 17.04 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	131	80	Grass pavers
*	45	98	Paver walkway
*	1,326	39	Landscaping/openspace/rain garden/ HSG A
	1,502	44	Weighted Average
	1,457		97.00% Pervious Area
	45		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.4N: SC 1.4N

Summary for Subcatchment 1.4S: Common

Runoff = 0.14 cfs @ 12.19 hrs, Volume= 0.017 af, Depth= 0.48"

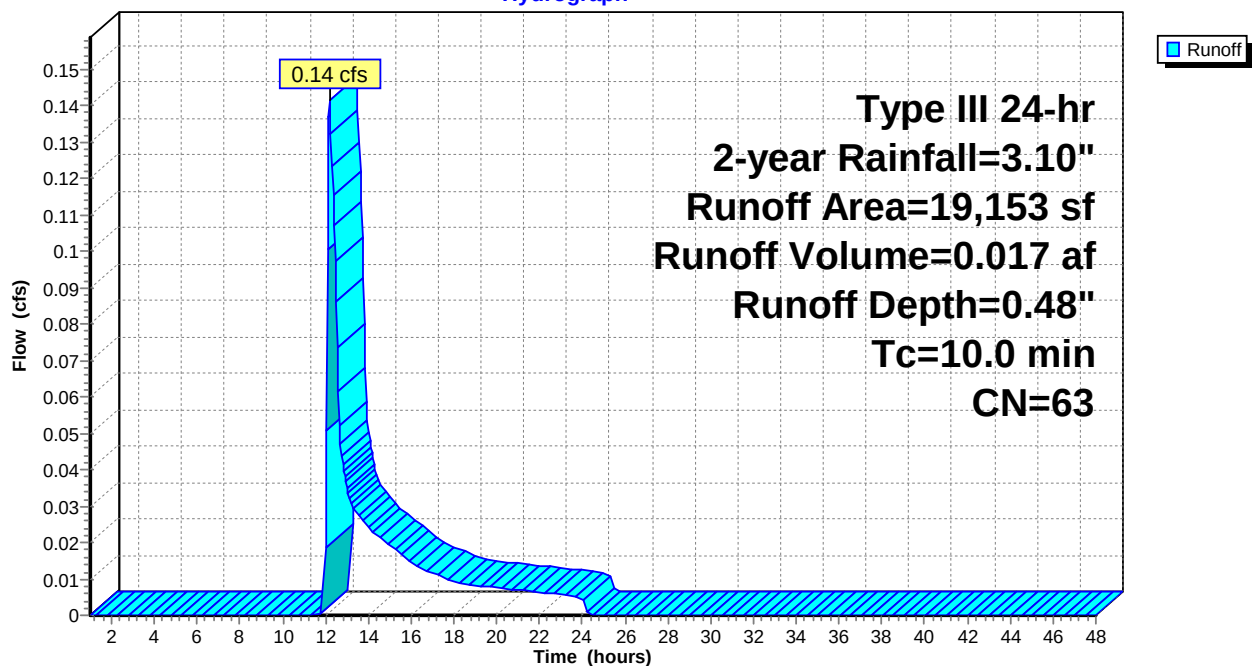
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,688	98	paved walkway
*	153	98	Rear Patio
*	112	98	Rear Patio
	8,600	39	>75% Grass cover, Good, HSG A
	8,600	80	>75% Grass cover, Good, HSG D
	19,153	63	Weighted Average
	17,200		89.80% Pervious Area
	1,953		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.4S: Common

Hydrograph



Summary for Subcatchment 1.5N: Roofs

Runoff = 1.50 cfs @ 12.09 hrs, Volume= 0.122 af, Depth= 2.87"

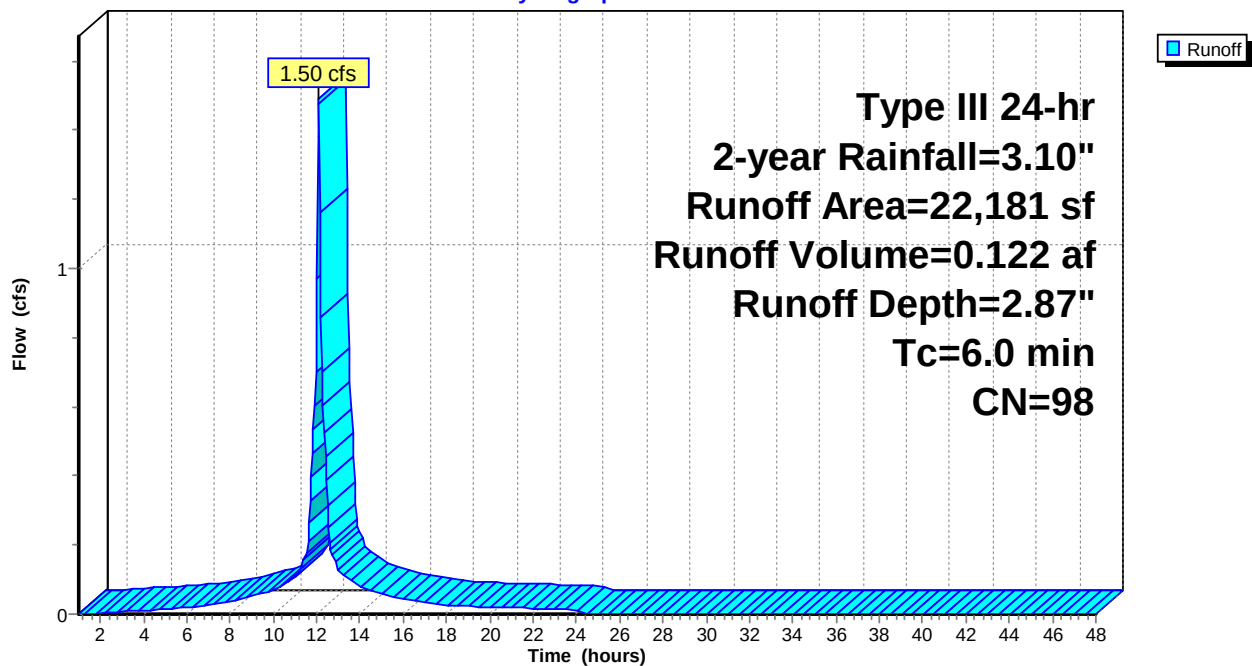
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	22,181	98	IMPERV
	22,181		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.5N: Roofs

Hydrograph



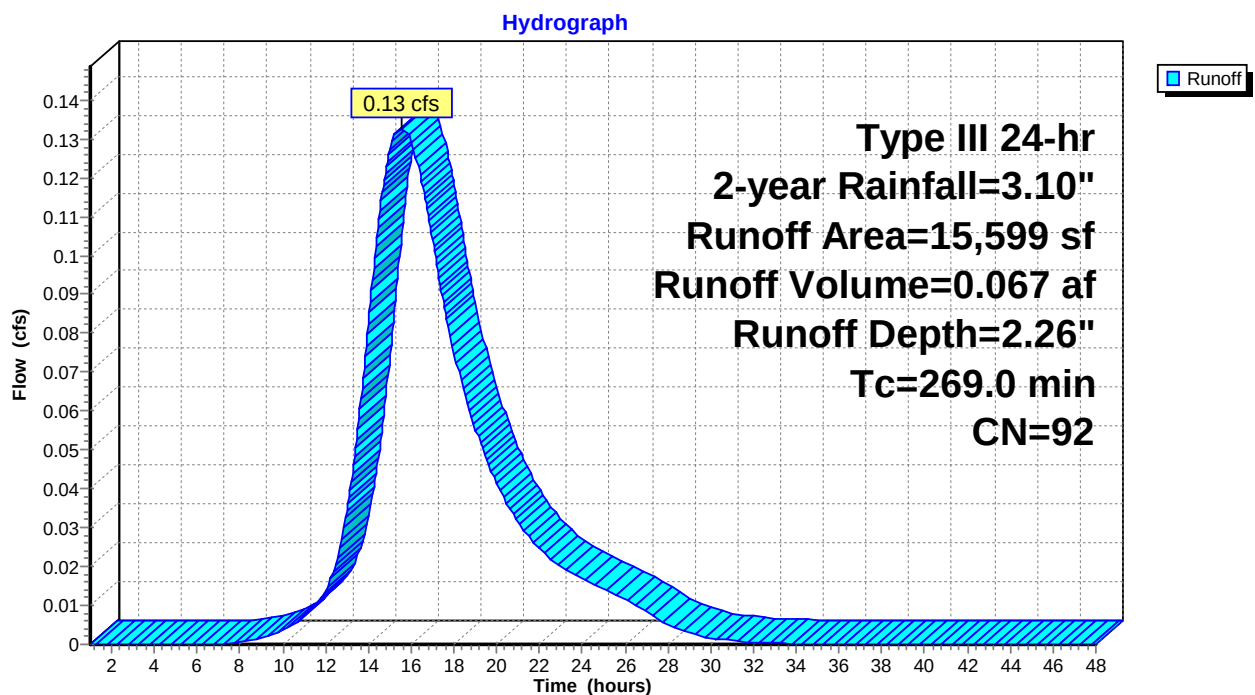
Summary for Subcatchment 1.5S: A.7, A.10, C.3, C.2 Aisle

Runoff = 0.13 cfs @ 15.55 hrs, Volume= 0.067 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	879	98	5' pavers/ s. mews
*	3,722	98	porous
*	442	98	Front Patios
*	759	98	Front Patios
*	1,033	98	Long Patio
*	585	98	Curved Patio
*	536	98	Front Patios
*	592	98	Front Patios
*	1,360	98	Long Patio
*	679	80	Grass Pavers
*	425	98	Patios
*	16	98	Transformer
*	446	98	Sidewalks
*	4,125	80	>75% Grass cover, Good, HSG D
	15,599	92	Weighted Average
	4,804		30.80% Pervious Area
	10,795		69.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 1.5S: A.7, A.10, C.3, C.2 Aisle

Summary for Subcatchment 1.6N: SC 1.6N

Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 2.87"

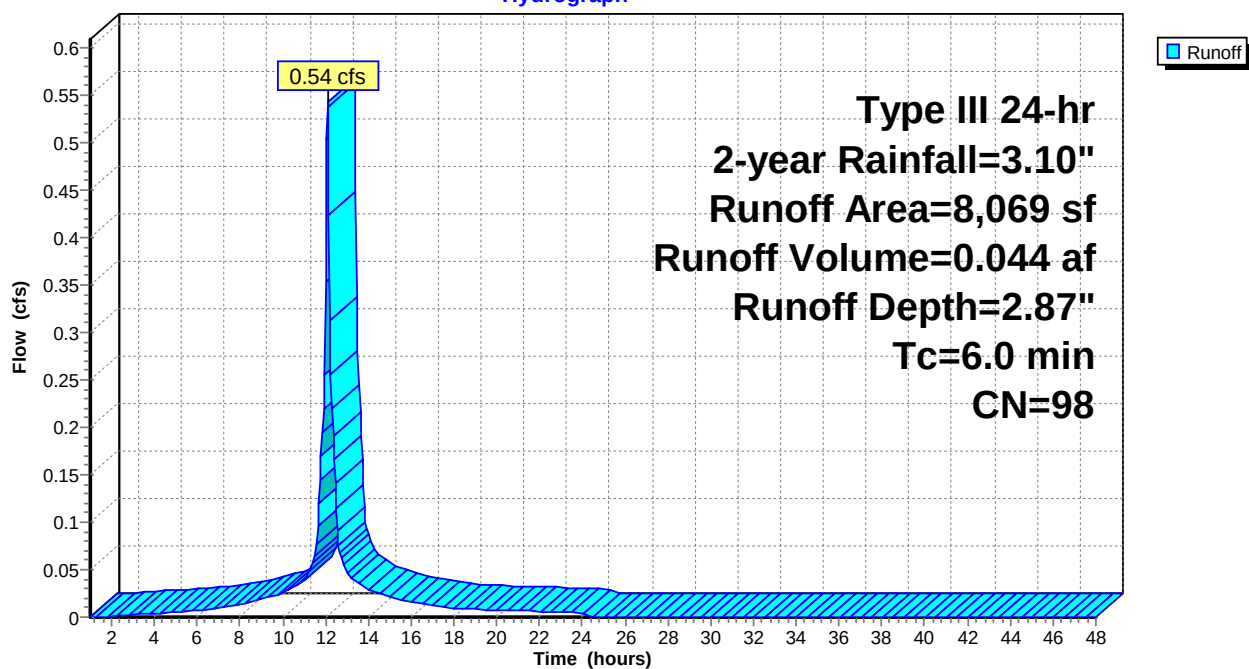
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	8,069	98	Wash Ave
	8,069		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.6N: SC 1.6N

Hydrograph



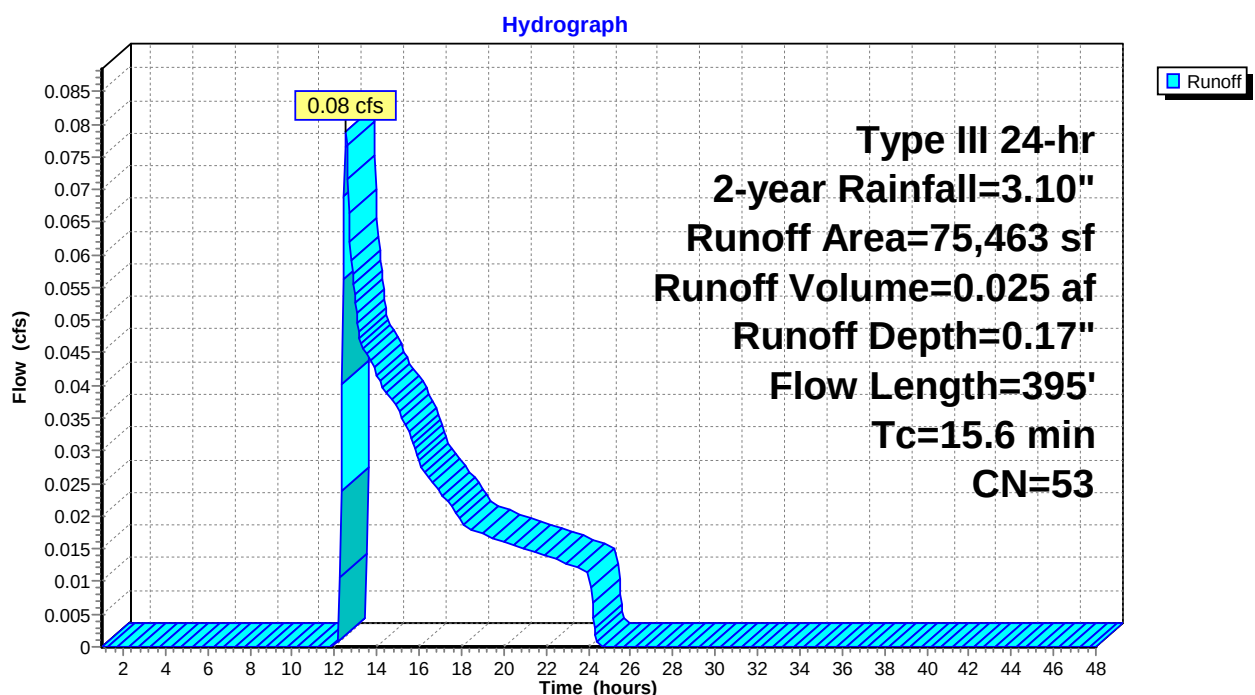
Summary for Subcatchment 1.6S: Developed/Undeveloped area

Runoff = 0.08 cfs @ 12.55 hrs, Volume= 0.025 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
37,858	30	Woods, Good, HSG A
* 5,348	39	Landscaped/open space
1,387	98	Unconnected roofs, HSG A
* 5,781	39	Wash Ave ditch
* 16,824	98	Washington ave, cross walks
* 1,195	98	Patios
* 305	80	Grass pavers
* 6,765	80	Landscaping/ HSG D
75,463	53	Weighted Average
56,057		74.28% Pervious Area
19,406		25.72% Impervious Area
1,387		7.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0500	0.17		Sheet Flow, Sheet flow (A to B) Grass: Dense n= 0.240 P2= 3.27"
5.5	203	0.0600	0.61		Shallow Concentrated Flow, SCF (B to C) Forest w/Heavy Litter Kv= 2.5 fps
0.3	92	0.0400	5.40	17.28	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 ' / ' Top.W=6.00' n= 0.035
15.6	395	Total			

Subcatchment 1.6S: Developed/Undeveloped area

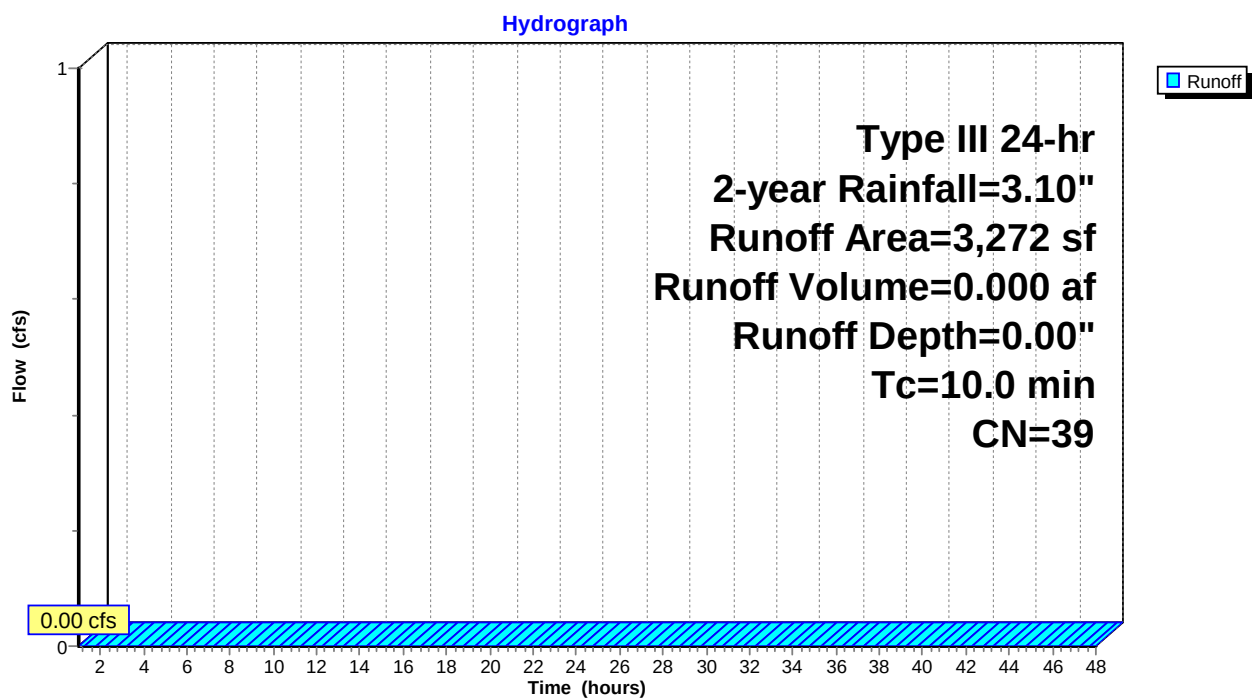
Summary for Subcatchment 1.7N: SC 1.7N

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
* 3,272	39	Lawn/lanscaping/ditch, HSG A
3,272		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.7N: SC 1.7N

Summary for Subcatchment 1.7S: SC 1.7S

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 1.60"

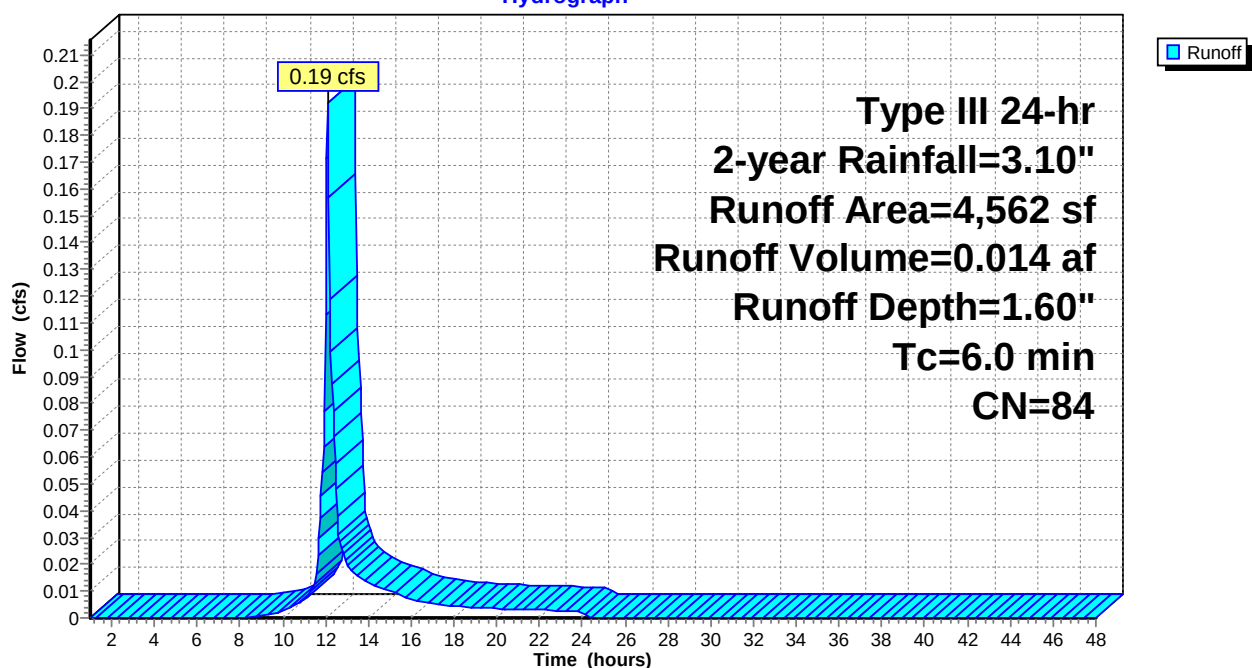
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	724	98	A.9/A.10 rear patios
*	356	98	Walkway
*	3,482	80	Lawn/landscaping, HSG D
	4,562	84	Weighted Average
	3,482		76.33% Pervious Area
	1,080		23.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.7S: SC 1.7S

Hydrograph



Summary for Subcatchment 1.8N: Common

Runoff = 0.03 cfs @ 12.44 hrs, Volume= 0.007 af, Depth= 0.20"

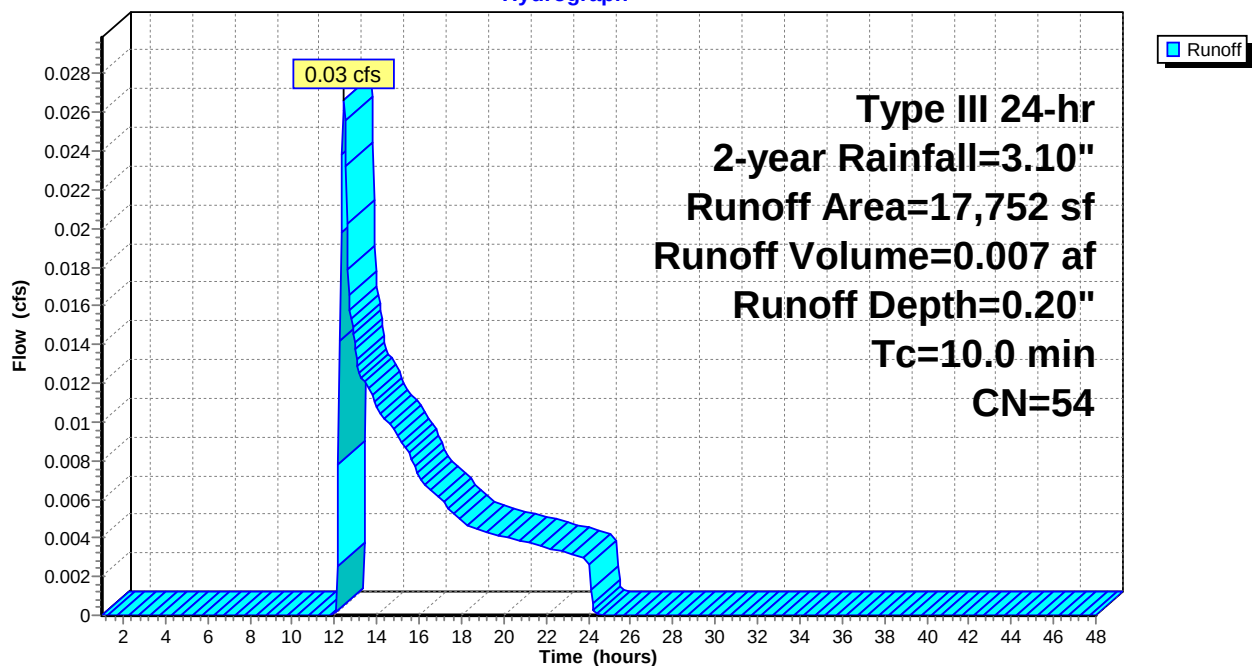
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	2,549	98	Paved walkway
*	1,558	98	Pavers & covered pav
*	472	98	patios
*	16	98	transformer
*	13,157	39	Open space, landscaping, HSG A
	17,752	54	Weighted Average
	13,157		74.12% Pervious Area
	4,595		25.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.8N: Common

Hydrograph



Summary for Subcatchment 1.9N: SC 1.9N

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.004 af, Depth= 1.67"

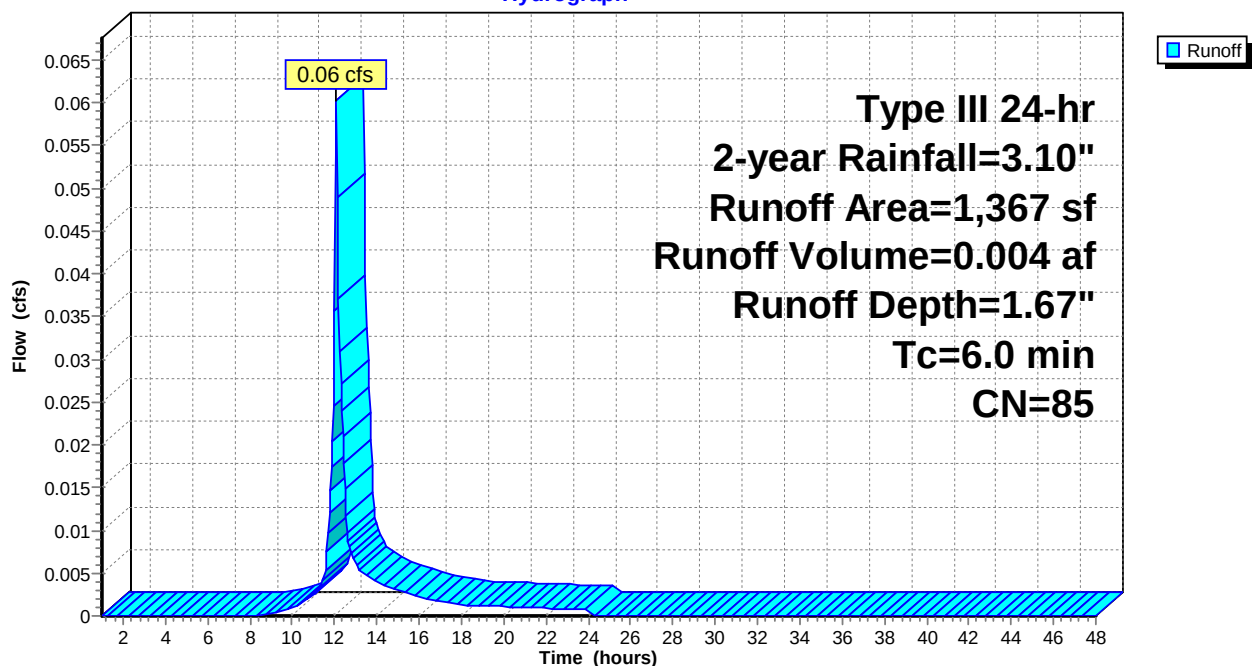
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	719	98	Wash Ave
*	336	98	sidewalk
*	312	39	Landscaping/esplanade
	1,367	85	Weighted Average
	312		22.82% Pervious Area
	1,055		77.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.9N: SC 1.9N

Hydrograph



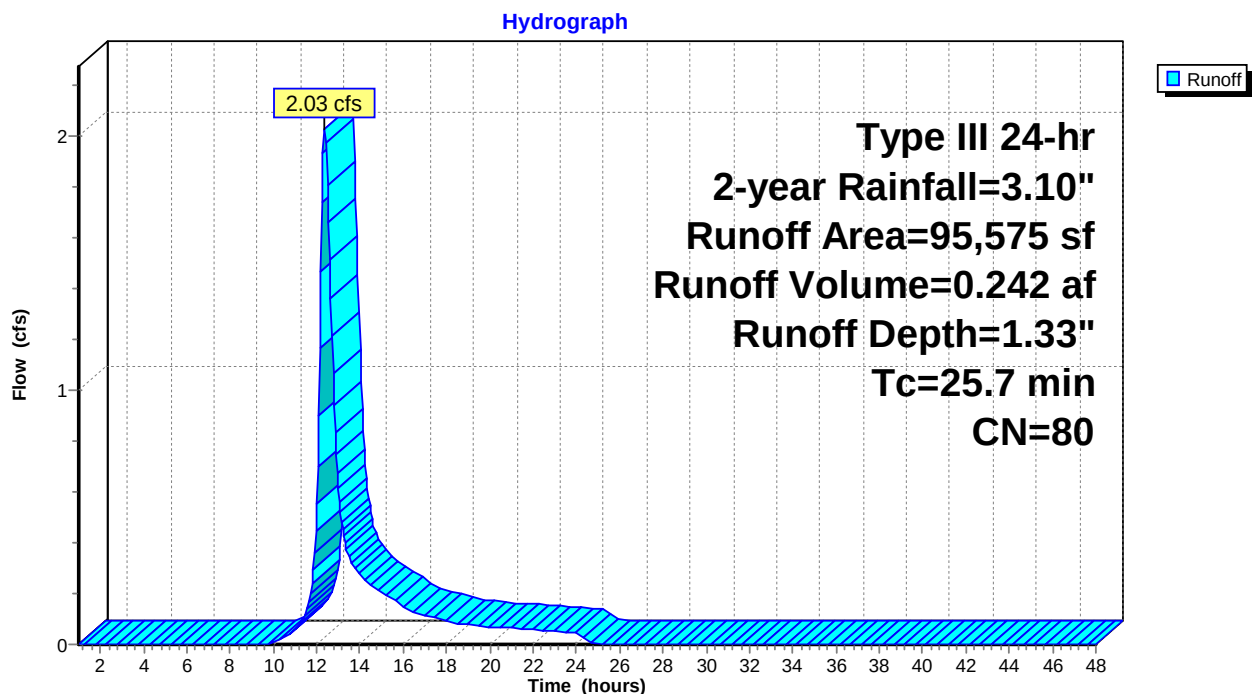
Summary for Subcatchment 2.1N: SC 2.1N

Runoff = 2.03 cfs @ 12.37 hrs, Volume= 0.242 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	7,465	80	Road sideslope
	37,683	77	Woods, Good, HSG D
*	2,842	98	N sidewalk
*	10,913	98	Wash. Ave and S. Conc apron
*	6,794	98	Rooftop and driveway
*	414	98	Rooftop
*	21,315	80	Lawns/landscaping, HSG D
	5,316	30	Woods, Good, HSG A
*	2,833	80	Landscaping/open space
	95,575	80	Weighted Average
	74,612		78.07% Pervious Area
	20,963		21.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7					Direct Entry, Direct input of pre Tc

Subcatchment 2.1N: SC 2.1N

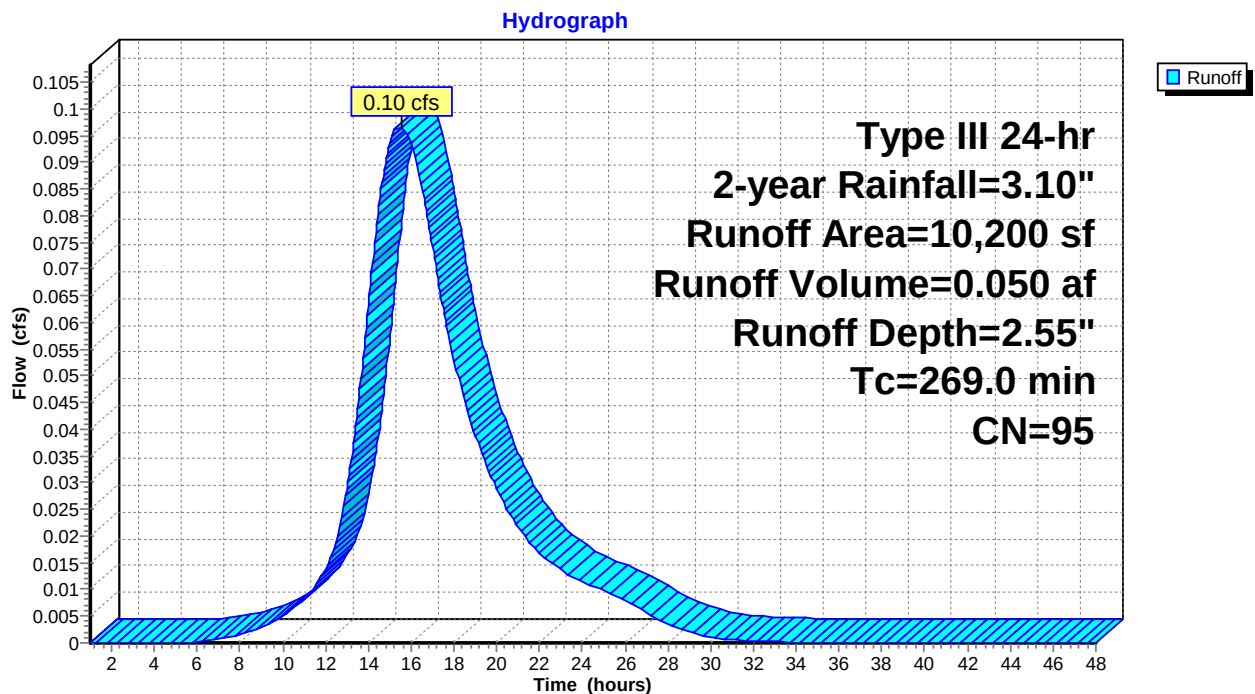
Summary for Subcatchment 2.1S: Eastern Parking Lot

Runoff = 0.10 cfs @ 15.51 hrs, Volume= 0.050 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,296	98	Porous Horizontal
*	4,187	98	Paved driveaisle
*	857	98	Walkway/patio
*	501	98	Rear walkway/patio
*	180	98	dumpster pad
*	1,134	98	Porous Vertical
*	234	98	Curbing
	1,811	80	>75% Grass cover, Good, HSG D
	10,200	95	Weighted Average
	1,811		17.75% Pervious Area
	8,389		82.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 2.1S: Eastern Parking Lot

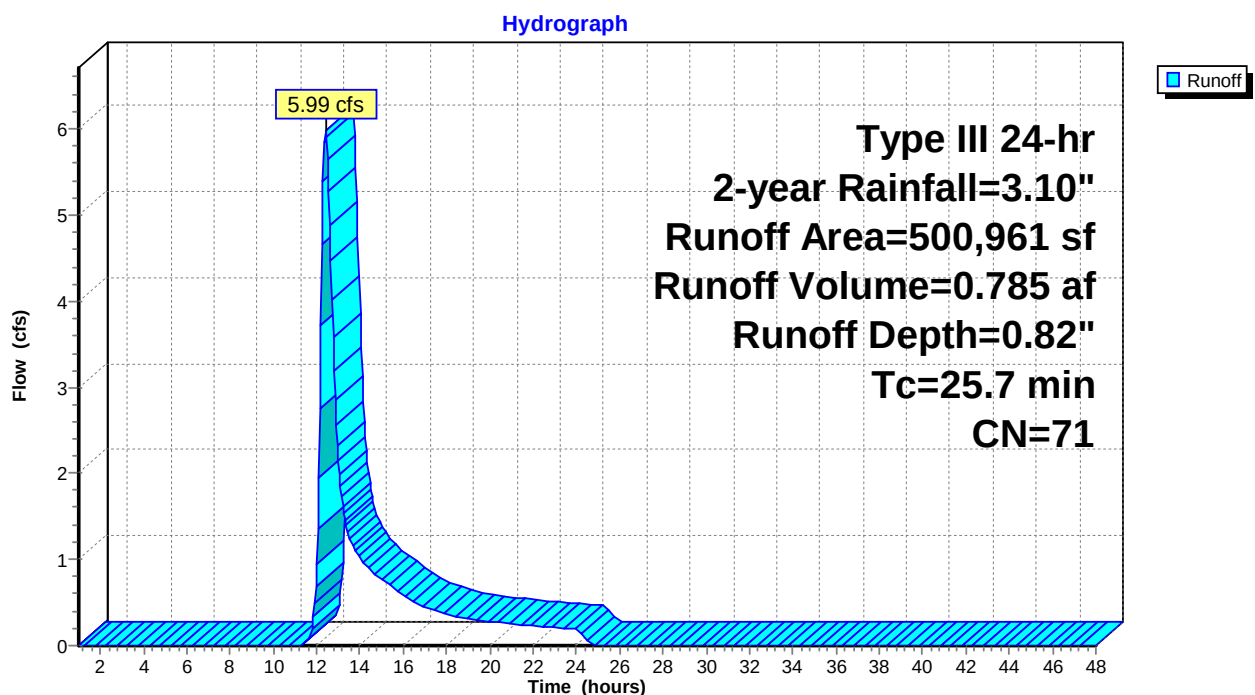
Summary for Subcatchment 2.2S: Developed/nondeveloped area

Runoff = 5.99 cfs @ 12.41 hrs, Volume= 0.785 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	4,589	39	Slope behind patios, HSG A
*	30,826	39	>75% Grass cover, Good, HSG A
*	3,896	98	Roofs/driveways/patios (HSG A)
	24,173	55	Woods, Good, HSG B
	6,557	70	Woods, Good, HSG C
	146,595	70	Woods, Good, HSG C
	240,888	77	Woods, Good, HSG D
*	10,866	80	>75% Grass cover, Good, HSG D
*	3,503	98	Roofs/driveways/patios (HSG D)
*	4,921	98	Wash Ave
*	4,026	98	Sidewalk
*	8,474	80	Roadside ditch/slope
*	1,546	98	Auburn St
*	820	80	Landscaping Auburn St
	9,281	39	>75% Grass cover, Good, HSG A
	500,961	71	Weighted Average
	483,069		96.43% Pervious Area
	17,892		3.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7					Direct Entry, copy from pre

Subcatchment 2.2S: Developed/nondeveloped area

Summary for Subcatchment 3.1N: SC 3.1N

Runoff = 0.04 cfs @ 12.43 hrs, Volume= 0.009 af, Depth= 0.28"

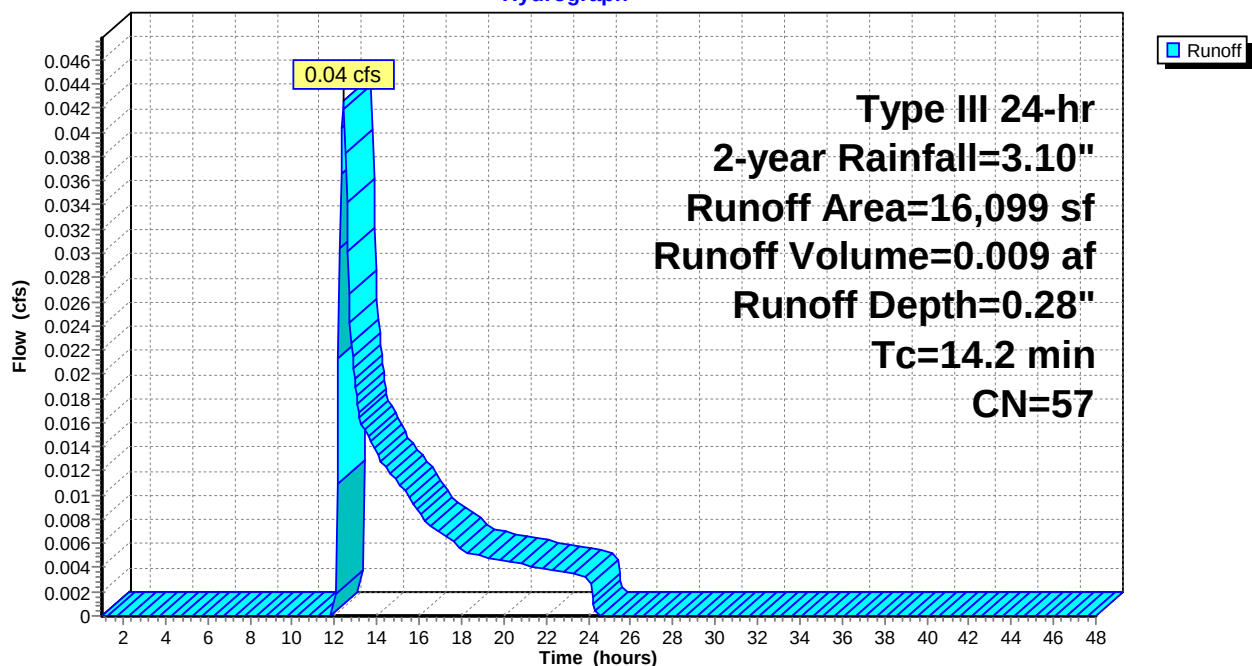
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
	4,070	30	Woods, Good, HSG A
*	3,619	39	Landscaping/swale, HSG A
	5,115	77	Woods, Good, HSG D
*	3,295	80	Landscaping/slope, HSG D
	16,099	57	Weighted Average
	16,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2					Direct Entry, Direct input of pre Tc

Subcatchment 3.1N: SC 3.1N

Hydrograph



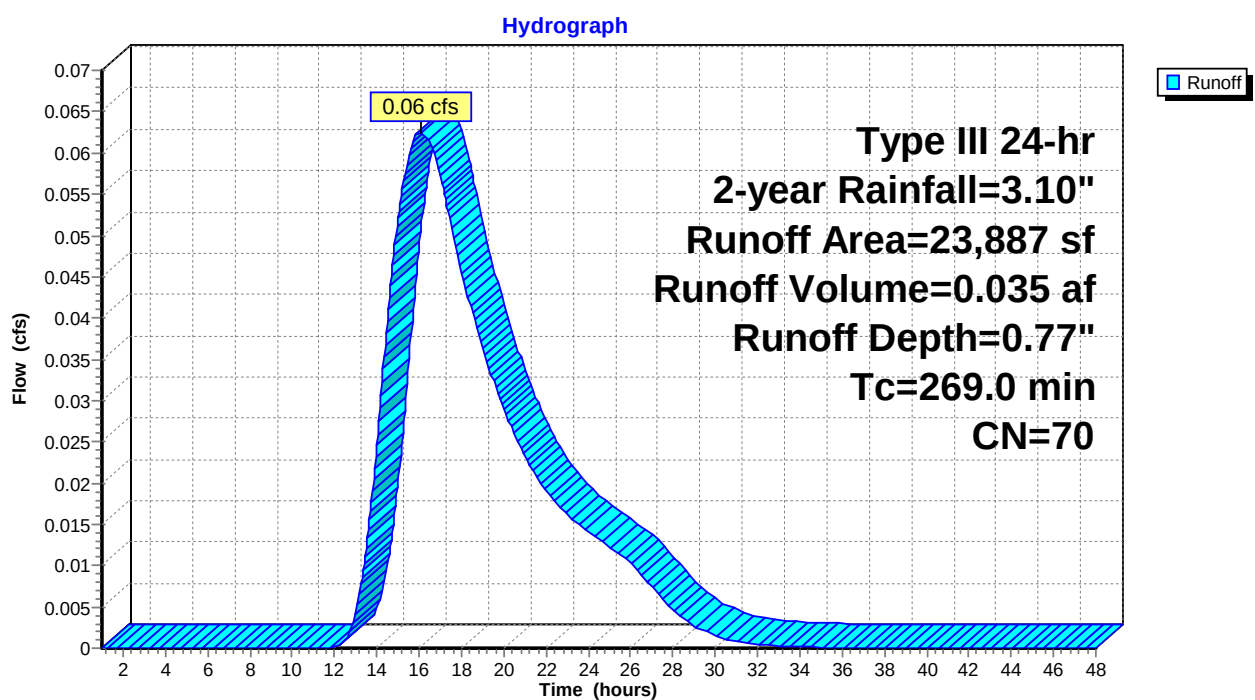
Summary for Subcatchment 4.1N: 4.1N

Runoff = 0.06 cfs @ 16.12 hrs, Volume= 0.035 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,940	98	Curb & Pavement
*	5,213	98	Porous Pavement
*	2,866	98	Patios
*	612	98	Patios
*	16	98	transformer pad
*	185	98	Paved Walkway
*	394	98	Paved Walkway
*	408	98	Patios
*	655	98	Patios
*	128	98	Solid Waste Location
*	112	98	Patios
*	46	98	Paved Walkway
*	11,312	39	Lawn/landscaping, HSG A
	23,887	70	Weighted Average
	11,312		47.36% Pervious Area
	12,575		52.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 4.1N: 4.1N

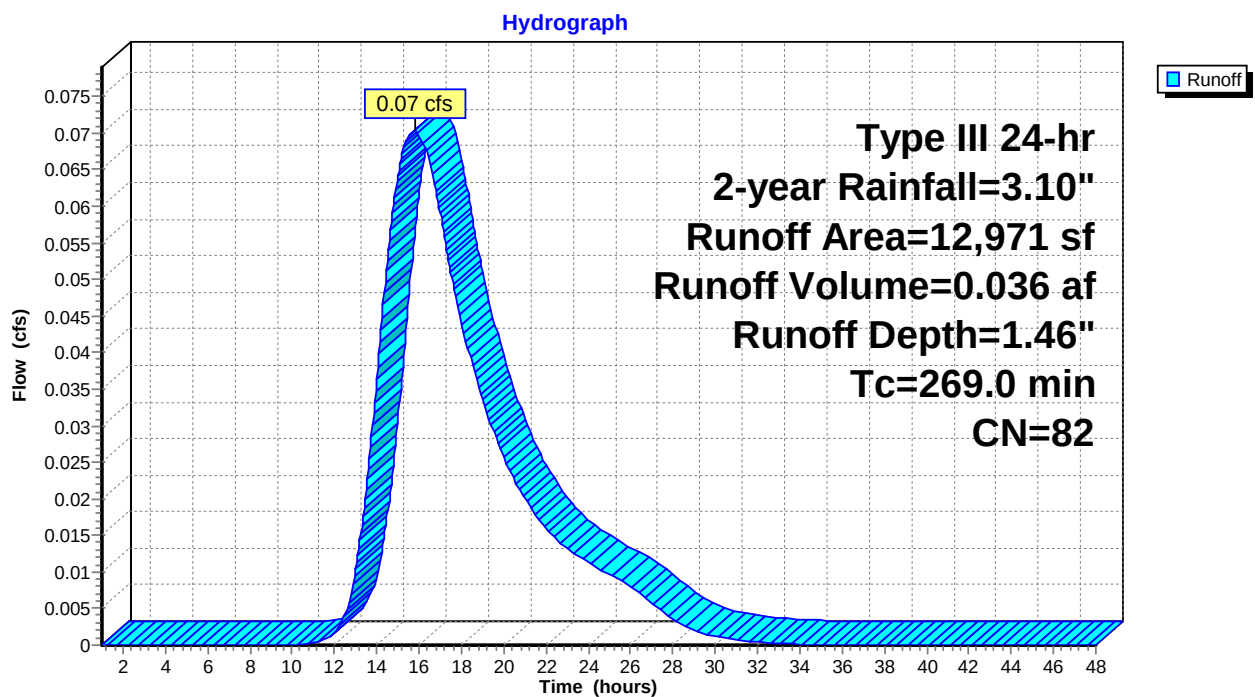
Summary for Subcatchment 4.2N: Eastern Parking Lot

Runoff = 0.07 cfs @ 15.83 hrs, Volume= 0.036 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

	Area (sf)	CN	Description
*	569	98	Sidewalk
*	2,420	98	Porous pavement
*	6,517	98	Parking lot
*	3,465	39	Landscaping/open space, HSG A
	12,971	82	Weighted Average
	3,465		26.71% Pervious Area
	9,506		73.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 4.2N: Eastern Parking Lot

Summary for Subcatchment 4.3N: SC 4.3N

Runoff = 0.07 cfs @ 12.57 hrs, Volume= 0.018 af, Depth= 0.22"

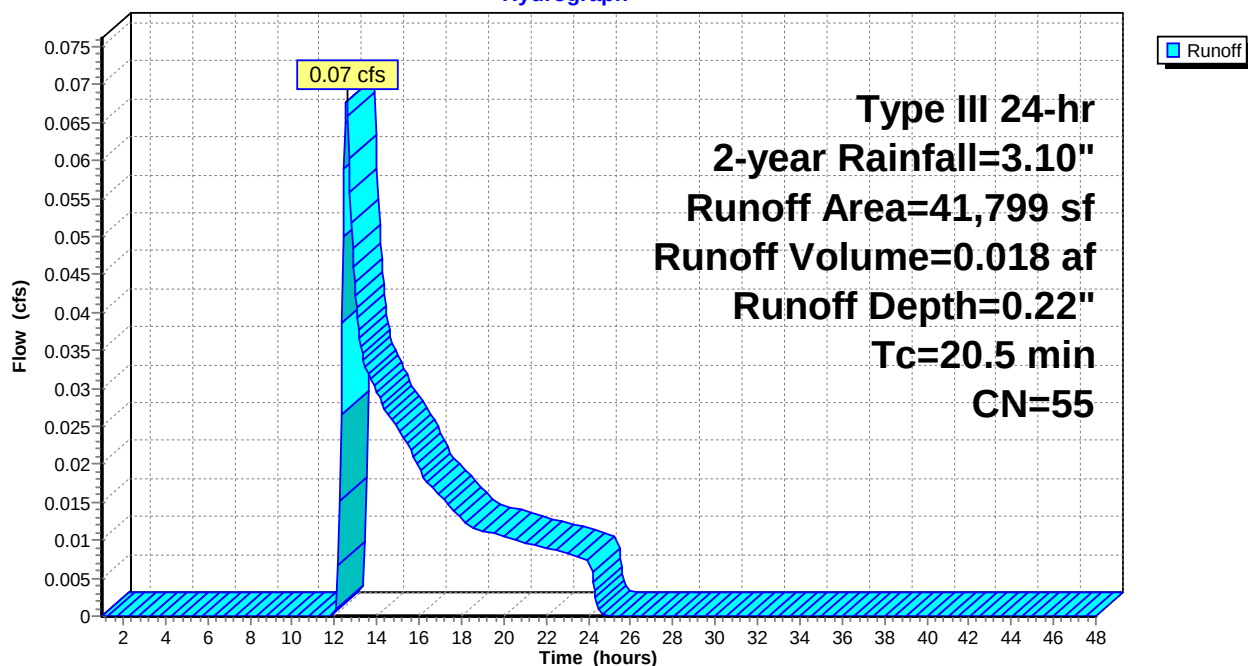
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.10"

Area (sf)	CN	Description
4,033	80	>75% Grass cover, Good, HSG D
6,717	77	Woods, Good, HSG D
18,402	30	Woods, Good, HSG A
* 1,998	39	Landscaping/slope, HSG A
* 10,649	77	Woods, Good, HSG D
41,799	55	Weighted Average
41,799		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5					Direct Entry, copy from pre

Subcatchment 4.3N: SC 4.3N

Hydrograph



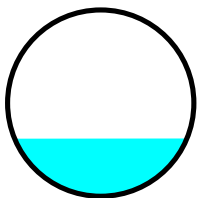
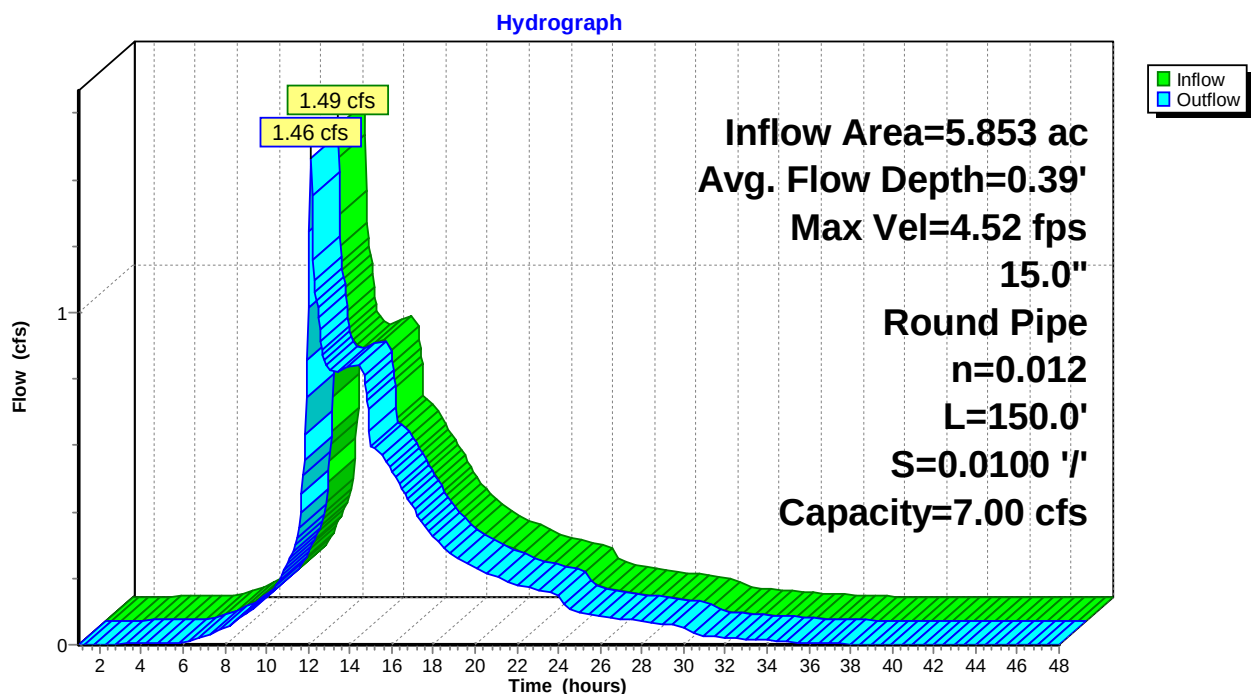
Summary for Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

Inflow Area = 5.853 ac, 48.76% Impervious, Inflow Depth = 1.16" for 2-year event
 Inflow = 1.49 cfs @ 12.11 hrs, Volume= 0.565 af
 Outflow = 1.46 cfs @ 12.12 hrs, Volume= 0.565 af, Atten= 2%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.52 fps, Min. Travel Time= 0.6 min
 Avg. Velocity= 1.67 fps, Avg. Travel Time= 1.5 min

Peak Storage= 49 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.39'
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.00 cfs

15.0" Round Pipe
 n= 0.012 Concrete pipe, finished
 Length= 150.0' Slope= 0.0100 '/'
 Inlet Invert= 87.18', Outlet Invert= 85.68'

**Reach 1: POI #1 - LAMBERT/WASH INTERSECTION**

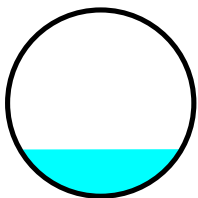
Summary for Reach 1R: N. DITCH CB OUTLET

Inflow Area = 2.285 ac, 52.04% Impervious, Inflow Depth = 1.26" for 2-year event
 Inflow = 1.01 cfs @ 12.10 hrs, Volume= 0.240 af
 Outflow = 1.01 cfs @ 12.10 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.2 min

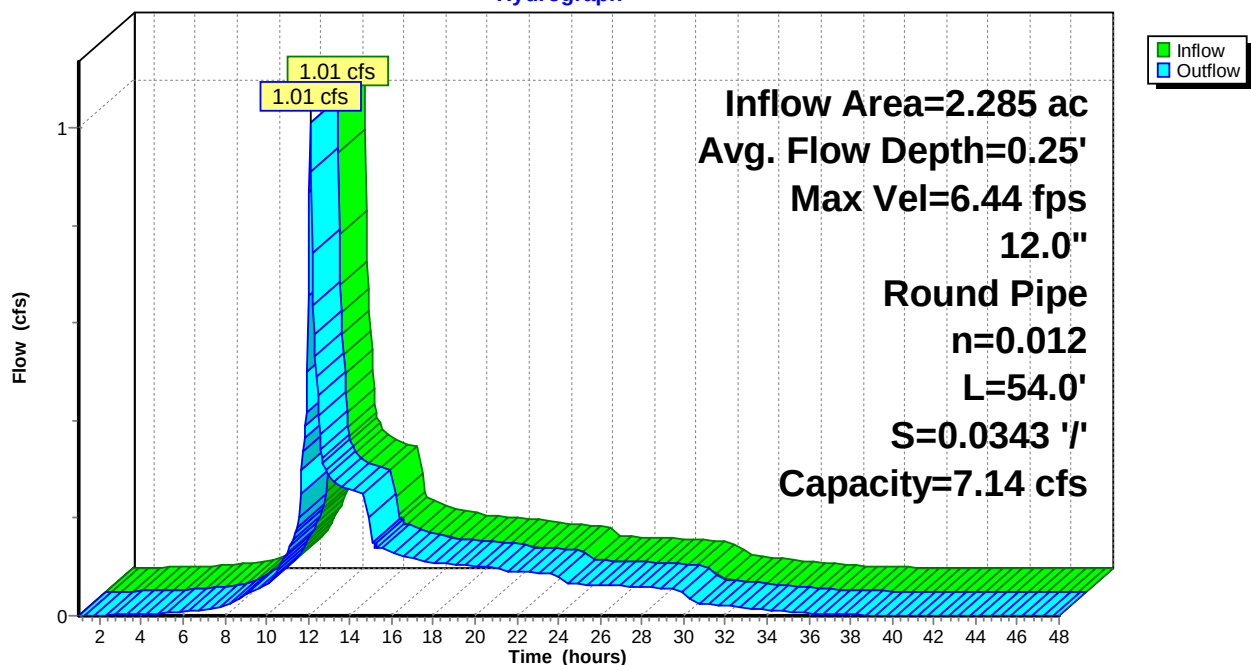
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.44 fps, Min. Travel Time= 0.1 min
 Avg. Velocity= 2.30 fps, Avg. Travel Time= 0.4 min

Peak Storage= 9 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.25'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.14 cfs

12.0" Round Pipe
 n= 0.012
 Length= 54.0' Slope= 0.0343 '/'
 Inlet Invert= 87.63', Outlet Invert= 85.78'

**Reach 1R: N. DITCH CB OUTLET**

Hydrograph



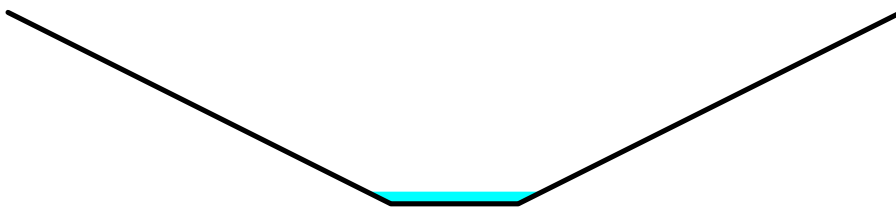
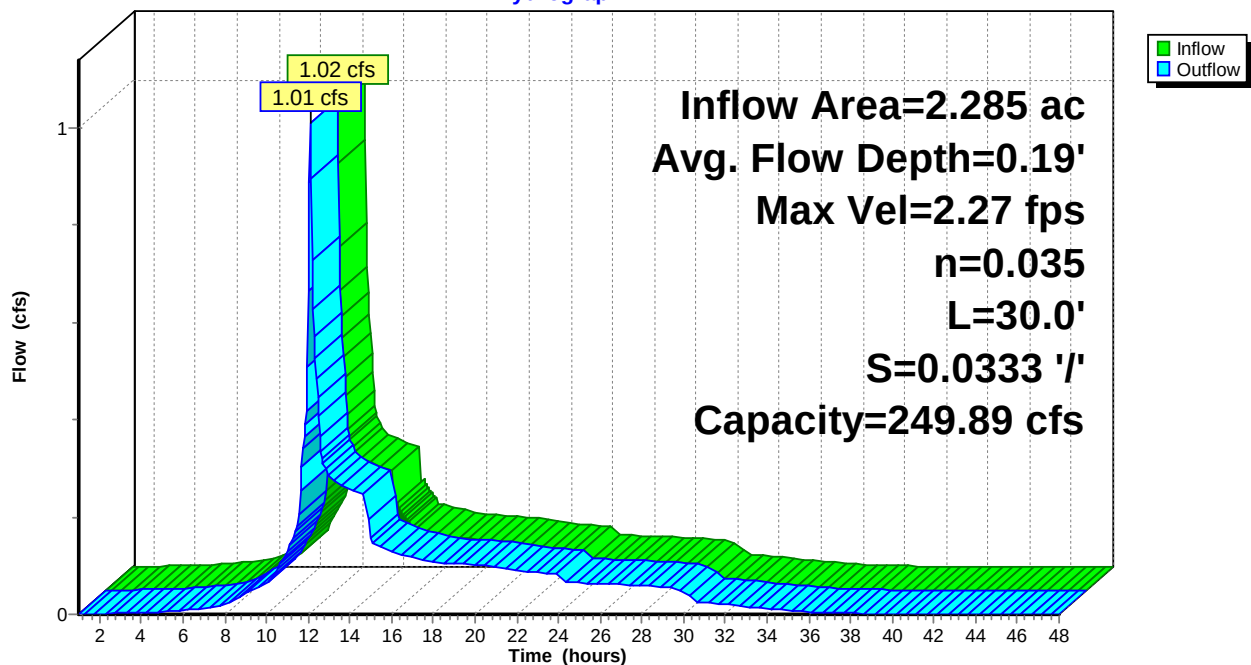
Summary for Reach 2R: N. DITCH

Inflow Area = 2.285 ac, 52.04% Impervious, Inflow Depth = 1.26" for 2-year event
 Inflow = 1.02 cfs @ 12.10 hrs, Volume= 0.240 af
 Outflow = 1.01 cfs @ 12.10 hrs, Volume= 0.240 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.27 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 0.88 fps, Avg. Travel Time= 0.6 min

Peak Storage= 13 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 3.00' Flow Area= 24.0 sf, Capacity= 249.89 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
 Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
 Length= 30.0' Slope= 0.0333 ' '
 Inlet Invert= 94.00', Outlet Invert= 93.00'

**Reach 2R: N. DITCH****Hydrograph**

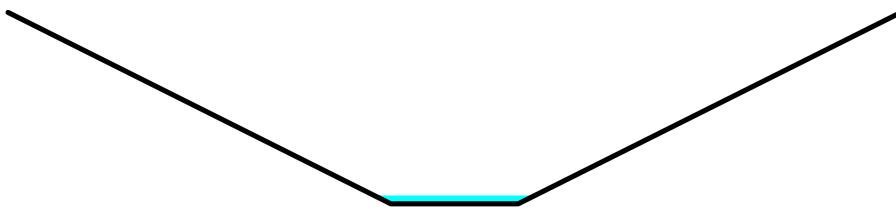
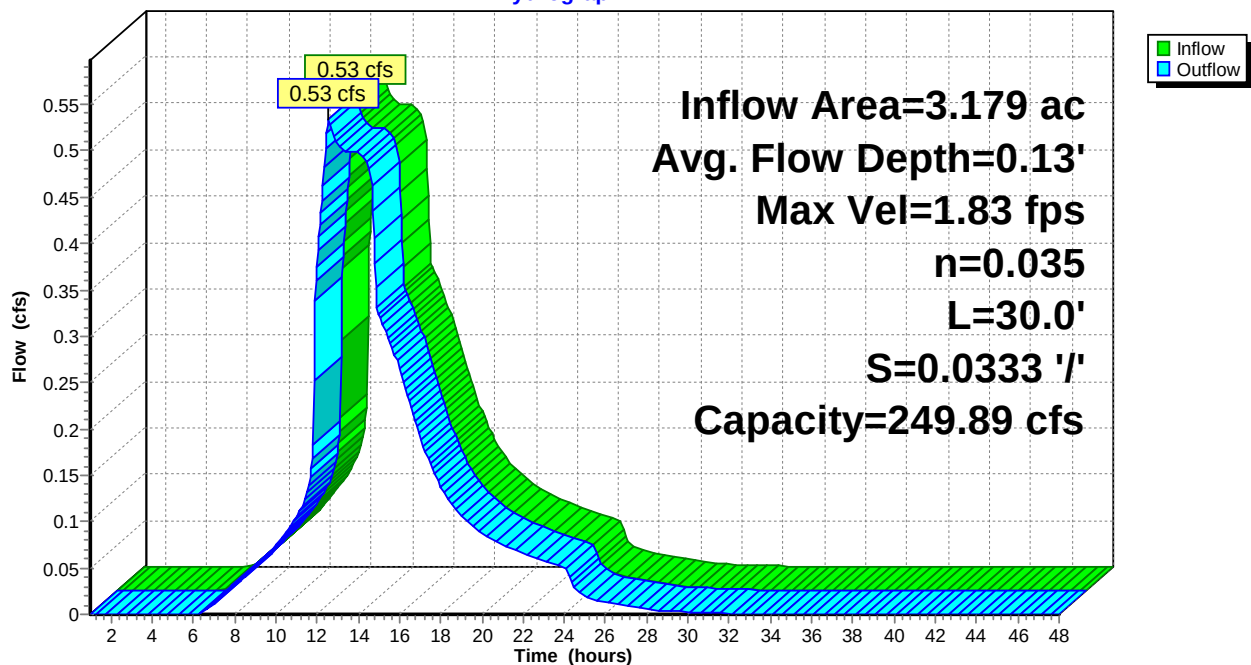
Summary for Reach 3R: S. DITCH

Inflow Area = 3.179 ac, 43.82% Impervious, Inflow Depth = 0.96" for 2-year event
Inflow = 0.53 cfs @ 12.56 hrs, Volume= 0.254 af
Outflow = 0.53 cfs @ 12.57 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.83 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 0.5 min

Peak Storage= 9 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 3.00' Flow Area= 24.0 sf, Capacity= 249.89 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 ' Top Width= 14.00'
Length= 30.0' Slope= 0.0333 ' / '
Inlet Invert= 94.00', Outlet Invert= 93.00'

**Reach 3R: S. DITCH****Hydrograph**

Summary for Reach 4R: WASH. CROSS CULVERT

Inflow Area = 2.194 ac, 21.93% Impervious, Inflow Depth = 1.33" for 2-year event
 Inflow = 2.03 cfs @ 12.37 hrs, Volume= 0.242 af
 Outflow = 2.02 cfs @ 12.38 hrs, Volume= 0.242 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.09 fps, Min. Travel Time= 0.3 min

Avg. Velocity= 2.16 fps, Avg. Travel Time= 0.8 min

Peak Storage= 41 cf @ 12.38 hrs

Average Depth at Peak Storage= 0.50'

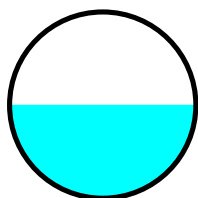
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.99 cfs

12.0" Round Pipe

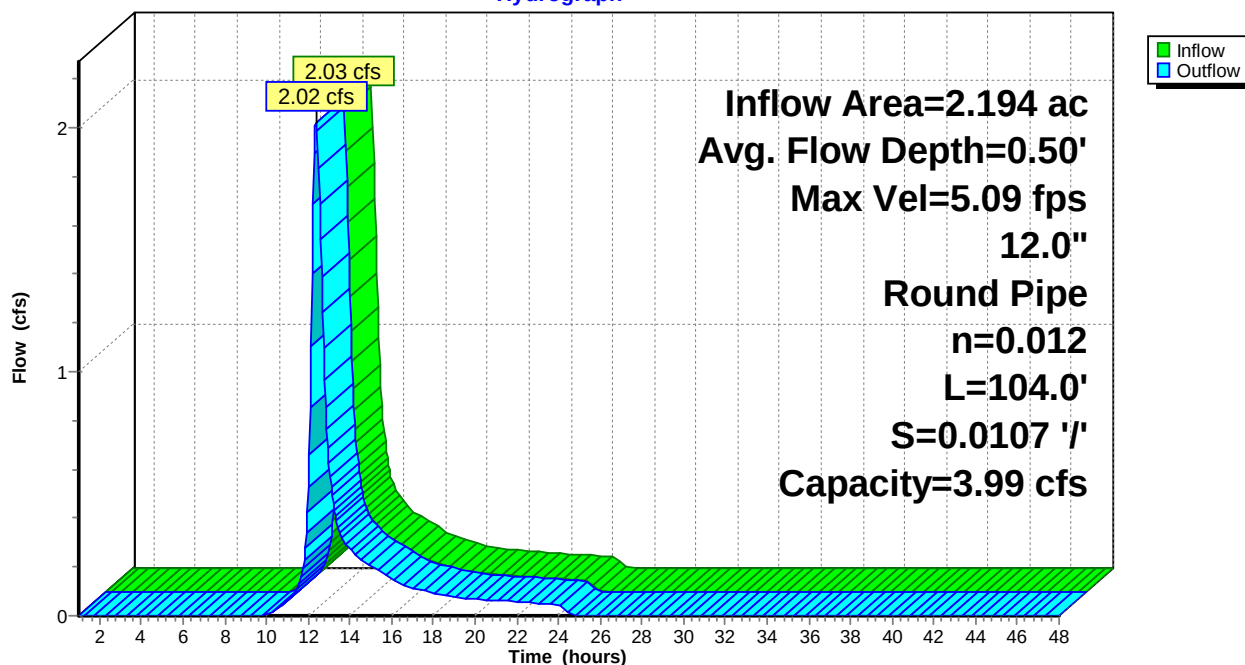
n= 0.012 Corrugated PP, smooth interior

Length= 104.0' Slope= 0.0107 '/'

Inlet Invert= 113.80', Outlet Invert= 112.69'

**Reach 4R: WASH. CROSS CULVERT**

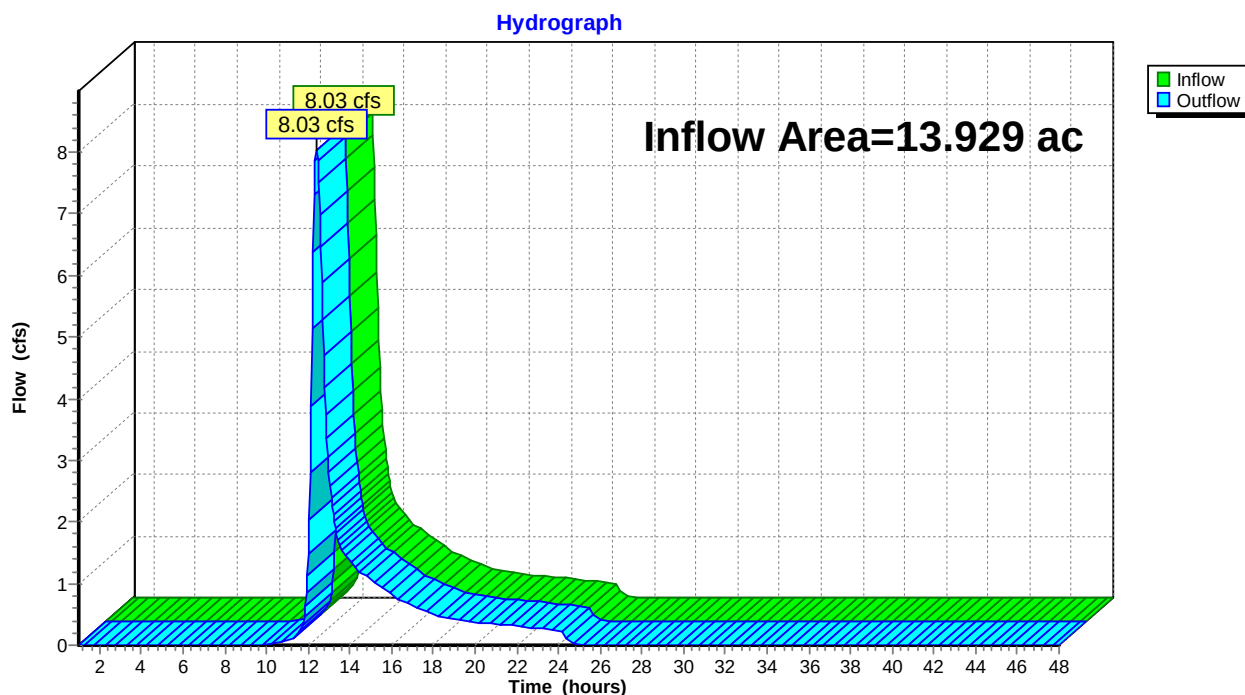
Hydrograph



Summary for Reach POI 2: POI #2 - LAMBERT CROSS CULVERT

Inflow Area = 13.929 ac, 7.79% Impervious, Inflow Depth = 0.93" for 2-year event
Inflow = 8.03 cfs @ 12.40 hrs, Volume= 1.077 af
Outflow = 8.03 cfs @ 12.40 hrs, Volume= 1.077 af, Atten= 0%, Lag= 0.0 min

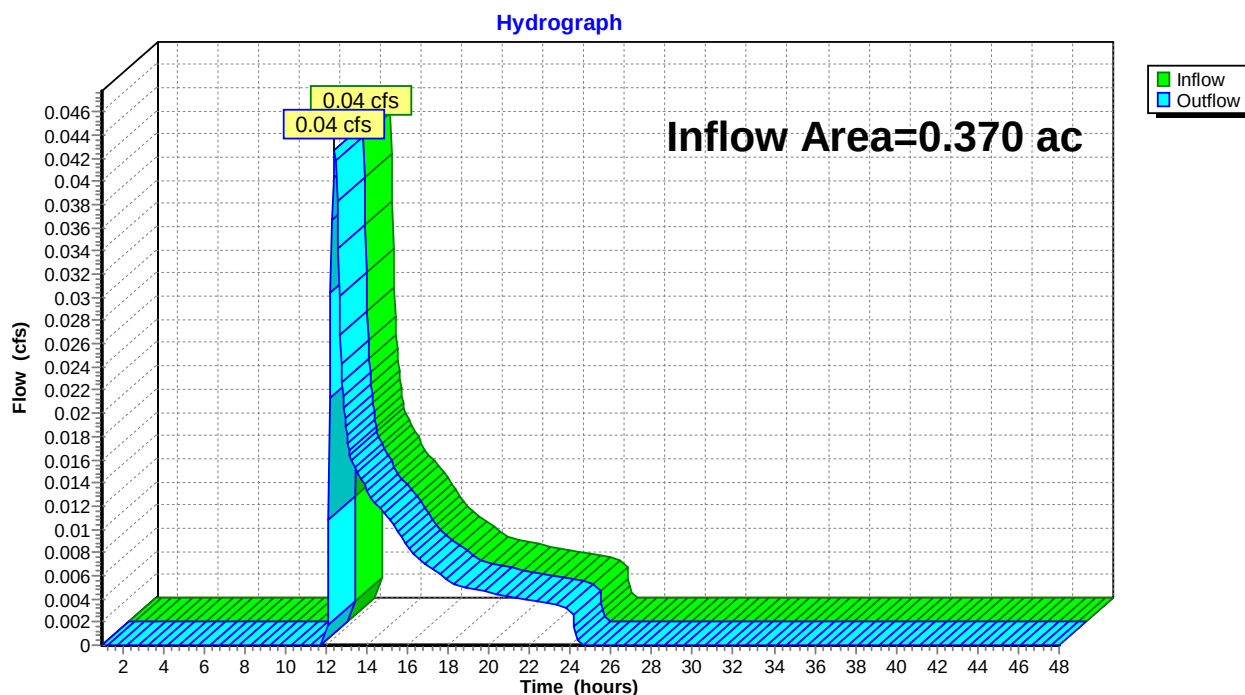
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 2: POI #2 - LAMBERT CROSS CULVERT

Summary for Reach POI 3: POI #3 - FALMOUTH WETLANDS

Inflow Area = 0.370 ac, 0.00% Impervious, Inflow Depth = 0.28" for 2-year event
Inflow = 0.04 cfs @ 12.43 hrs, Volume= 0.009 af
Outflow = 0.04 cfs @ 12.43 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

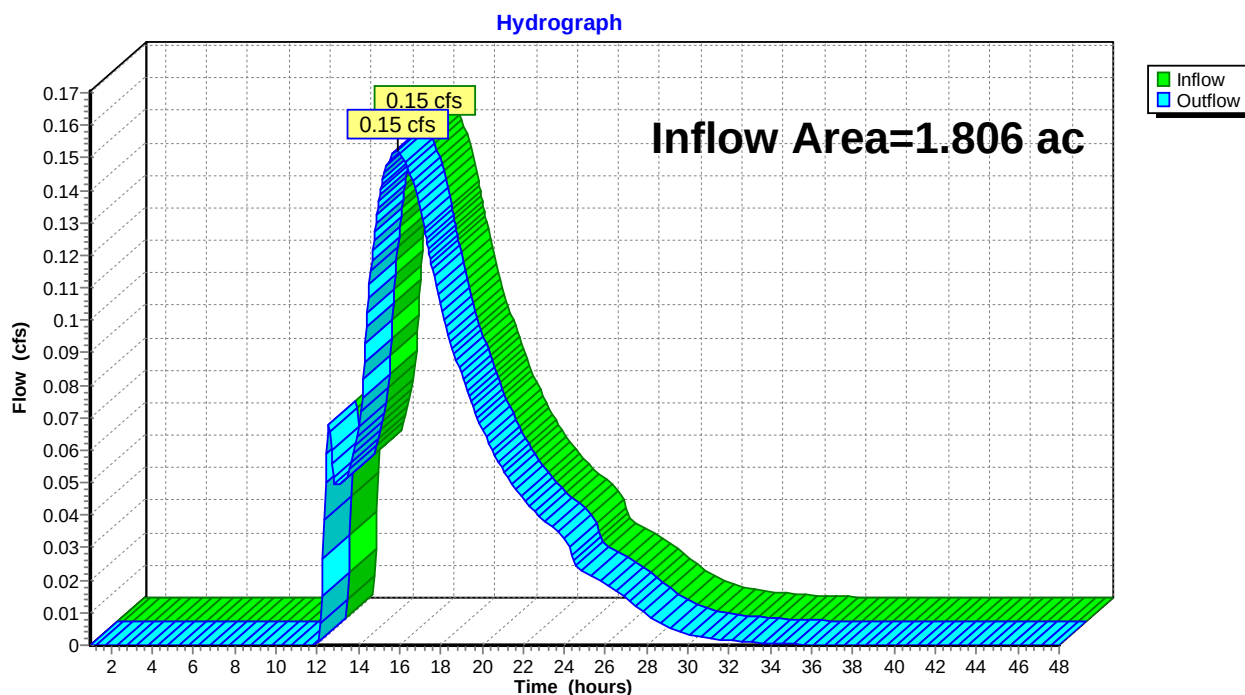
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 3: POI #3 - FALMOUTH WETLANDS

Summary for Reach POI 4: POI #4 - N STREAM

Inflow Area = 1.806 ac, 28.07% Impervious, Inflow Depth = 0.58" for 2-year event
Inflow = 0.15 cfs @ 15.87 hrs, Volume= 0.088 af
Outflow = 0.15 cfs @ 15.87 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 4: POI #4 - N STREAM

Summary for Pond 1P: USSF 1 - StormTech 3500

Inflow Area = 0.992 ac, 61.97% Impervious, Inflow Depth = 1.55" for 2-year event
 Inflow = 1.50 cfs @ 12.09 hrs, Volume= 0.128 af
 Outflow = 0.08 cfs @ 14.74 hrs, Volume= 0.120 af, Atten= 95%, Lag= 159.1 min
 Primary = 0.08 cfs @ 14.74 hrs, Volume= 0.120 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 107.04' @ 14.74 hrs Surf.Area= 4,998 sf Storage= 3,362 cf

Plug-Flow detention time= 507.7 min calculated for 0.120 af (94% of inflow)

Center-of-Mass det. time= 472.9 min (1,241.4 - 768.4)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,714 cf	34.00'W x 49.00'L x 4.75'H Stone 7,914 cf Overall - 3,629 cf Embedded = 4,284 cf x 40.0% Voids
#2	105.50'	3,629 cf	ADS StormTech MC-3500 d +Cap @ 7.50' L x 30 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.50'L = 115.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 30 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
#3	103.50'	125 cf	34.00'W x 49.00'L x 1.50'H Sand 2,499 cf Overall x 5.0% Voids
#4	102.50'	661 cf	34.00'W x 49.00'L x 1.00'H Crushed Stone 1,666 cf Overall - 13 cf Embedded = 1,653 cf x 40.0% Voids
#5	102.75'	13 cf	4.0" Round Underdrain Storage Inside #4 L= 150.0'
		6,142 cf	Total Available Storage

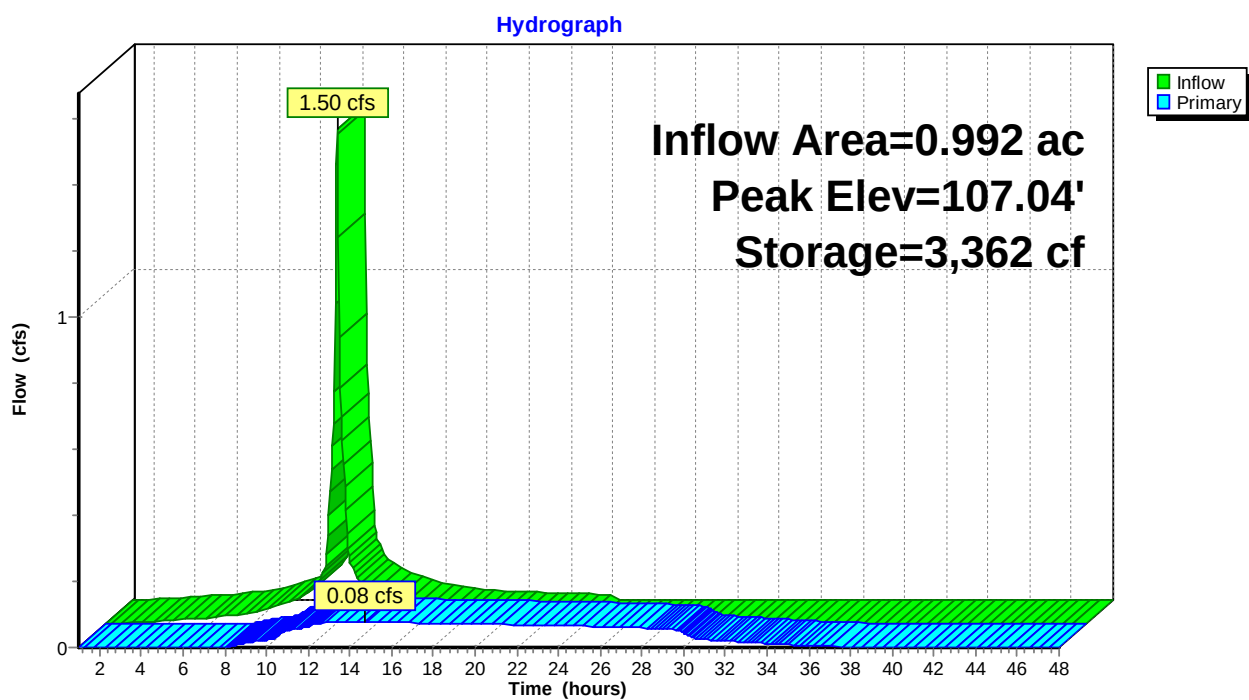
Device	Routing	Invert	Outlet Devices
#1	Primary	103.00'	1.2" Vert. Underdrain/Orifice C= 0.600
#2	Primary	108.27'	6.0" Round Bypass Overflow X 2.00 L= 6.0' Ke= 0.600 Inlet / Outlet Invert= 108.27' / 108.00' S= 0.0450 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.08 cfs @ 14.74 hrs HW=107.04' (Free Discharge)

↑ **1=Underdrain/Orifice** (Orifice Controls 0.08 cfs @ 9.62 fps)

└ **2=Bypass Overflow** (Controls 0.00 cfs)

Pond 1P: USSF 1 - StormTech 3500



Summary for Pond 2P: Pavement Profile/Drainage

Inflow Area = 0.298 ac, 73.29% Impervious, Inflow Depth = 1.46" for 2-year event
 Inflow = 0.07 cfs @ 15.83 hrs, Volume= 0.036 af
 Outflow = 0.07 cfs @ 15.85 hrs, Volume= 0.036 af, Atten= 0%, Lag= 1.2 min
 Primary = 0.07 cfs @ 15.85 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 108.93' @ 15.85 hrs Surf.Area= 140 sf Storage= 28 cf

Plug-Flow detention time= 14.1 min calculated for 0.036 af (99% of inflow)

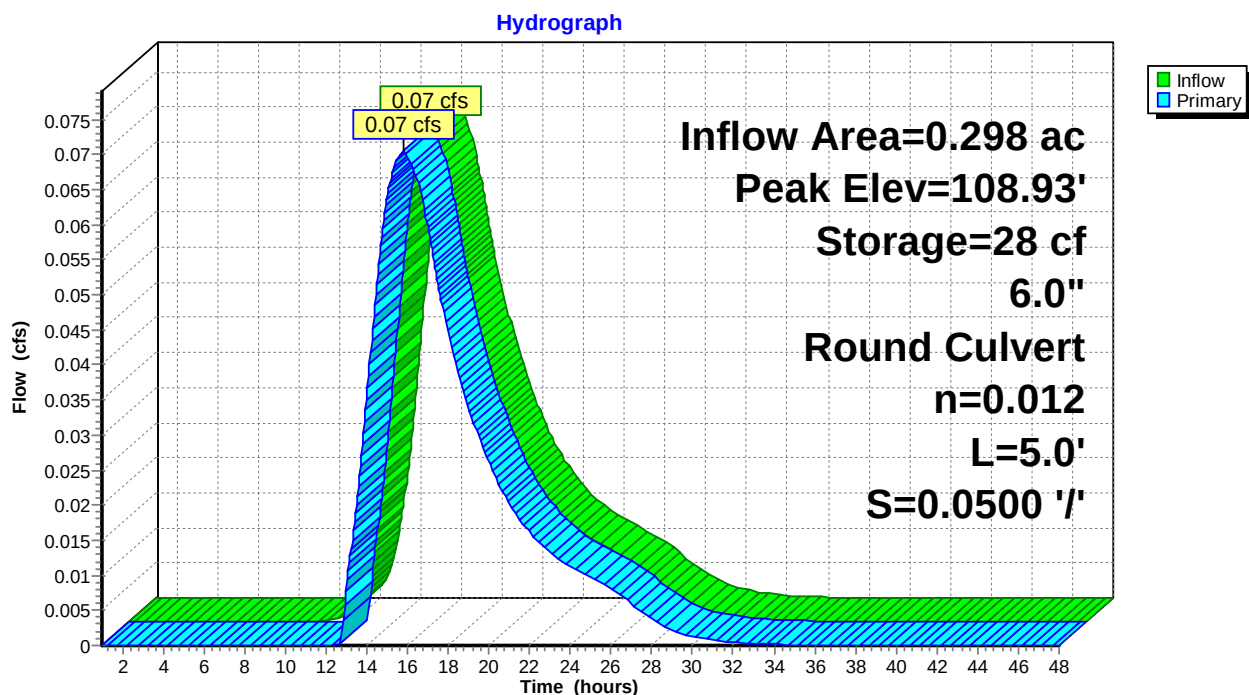
Center-of-Mass det. time= 7.7 min (1,090.5 - 1,082.8)

Volume	Invert	Avail.Storage	Storage Description
#1	108.50'	48 cf	1.33'W x 105.00'L x 1.00'H 6" Trench 140 cf Overall - 21 cf Embedded = 119 cf x 40.0% Voids
#2	109.50'	189 cf	18.00'W x 105.00'L x 0.25'H 3" - 3/4" Stone 473 cf Overall x 40.0% Voids
#3	109.75'	78 cf	18.00'W x 105.00'L x 0.83'H 10" - Filter MDOT Type D 1,569 cf Overall x 5.0% Voids
#4	110.58'	249 cf	18.00'W x 105.00'L x 0.33'H 4" - Choker 1-1/2" 624 cf Overall x 40.0% Voids
#5	110.91'	125 cf	18.00'W x 105.00'L x 0.33'H 4" - OGFC 624 cf Overall x 20.0% Voids
#6	108.75'	21 cf	6.0" Round 6 SD Inside #1 L= 105.0'
710 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	108.75'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 108.75' / 108.50' S= 0.0500 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.07 cfs @ 15.85 hrs HW=108.93' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.07 cfs @ 1.13 fps)

Pond 2P: Pavement Profile/Drainage

Summary for Pond 3P: Pavement Profile/Drainage

Inflow Area = 0.548 ac, 52.64% Impervious, Inflow Depth = 0.77" for 2-year event
 Inflow = 0.06 cfs @ 16.12 hrs, Volume= 0.035 af
 Outflow = 0.06 cfs @ 16.21 hrs, Volume= 0.034 af, Atten= 0%, Lag= 5.4 min
 Primary = 0.06 cfs @ 16.21 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 107.57' @ 16.21 hrs Surf.Area= 557 sf Storage= 107 cf

Plug-Flow detention time= 53.4 min calculated for 0.034 af (96% of inflow)

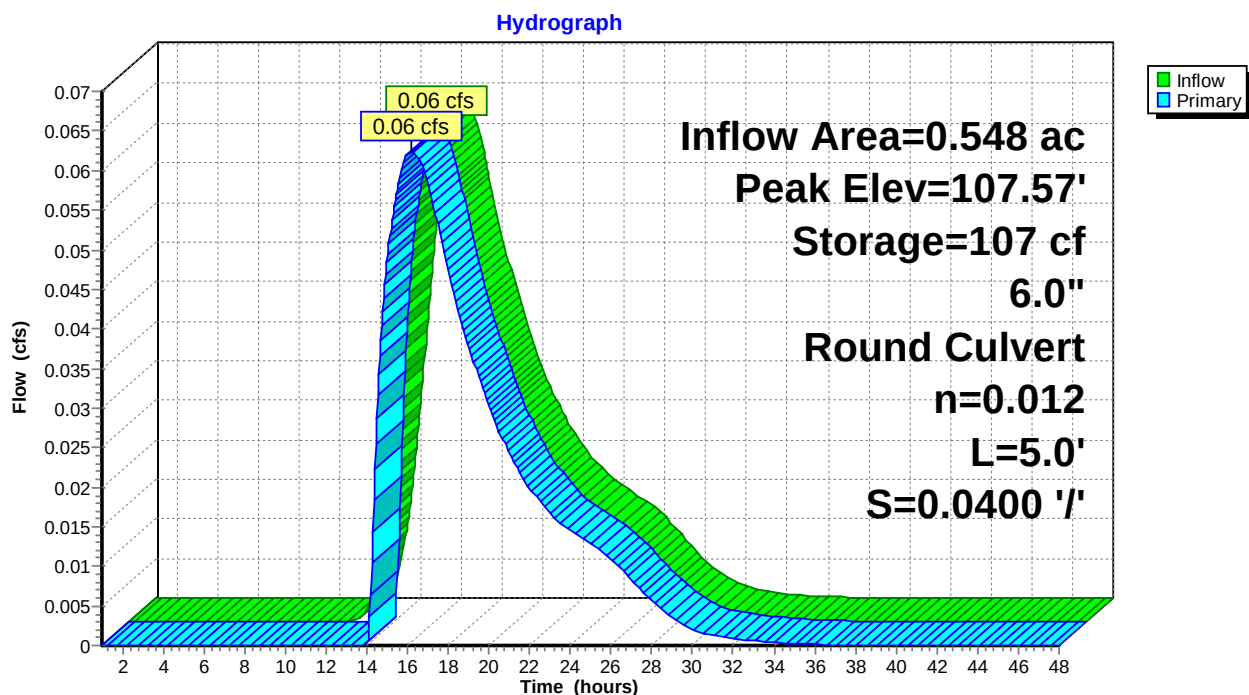
Center-of-Mass det. time= 30.7 min (1,153.9 - 1,123.2)

Volume	Invert	Avail.Storage	Storage Description
#1	107.15'	190 cf	1.33'W x 419.00'L x 1.00'H 6" Trench 557 cf Overall - 82 cf Embedded = 475 cf x 40.0% Voids
#2	108.15'	461 cf	11.00'W x 419.00'L x 0.25'H 3" - 3/4" Stone 1,152 cf Overall x 40.0% Voids
#3	108.40'	191 cf	11.00'W x 419.00'L x 0.83'H 10" - Filter MDOT Type D 3,825 cf Overall x 5.0% Voids
#4	109.23'	608 cf	11.00'W x 419.00'L x 0.33'H 4" - Choker 1-1/2" 1,521 cf Overall x 40.0% Voids
#5	109.56'	304 cf	11.00'W x 419.00'L x 0.33'H 4" - OGFC 1,521 cf Overall x 20.0% Voids
#6	107.40'	82 cf	6.0" Round 6 SD Inside #1 L= 419.0'
		1,837 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	107.40'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 107.40' / 107.20' S= 0.0400 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.06 cfs @ 16.21 hrs HW=107.57' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.06 cfs @ 1.09 fps)

Pond 3P: Pavement Profile/Drainage

Summary for Pond 4P: Pavement Profile/Drainage

Inflow Area = 0.358 ac, 69.20% Impervious, Inflow Depth = 2.26" for 2-year event
 Inflow = 0.13 cfs @ 15.55 hrs, Volume= 0.067 af
 Outflow = 0.13 cfs @ 15.55 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.13 cfs @ 15.55 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 110.25' @ 15.55 hrs Surf.Area= 203 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.067 af (100% of inflow)

Center-of-Mass det. time= 0.0 min (1,043.7 - 1,043.7)

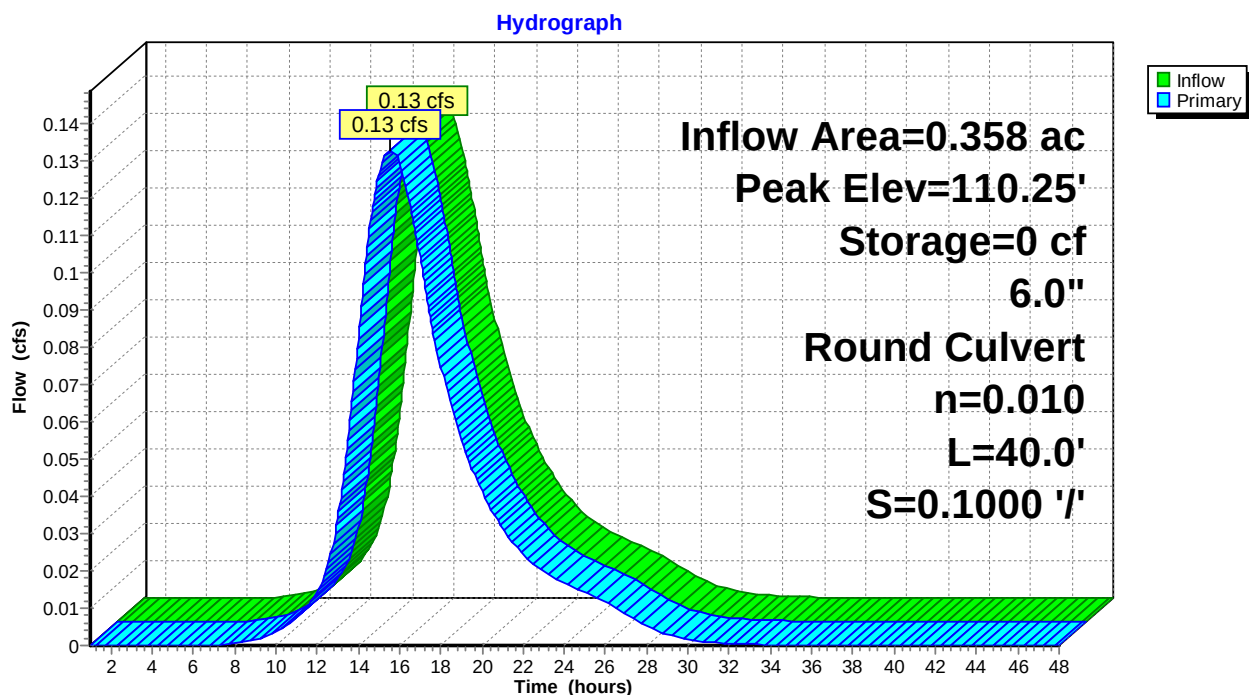
Volume	Invert	Avail.Storage	Storage Description
#1	110.25'	76 cf	1.50'W x 135.00'L x 1.00'H 6" Trench 203 cf Overall - 12 cf Embedded = 191 cf x 40.0% Voids
#2	111.25'	371 cf	11.00'W x 337.00'L x 0.25'H 3" - 3/4" Stone 927 cf Overall x 40.0% Voids
#3	112.08'	62 cf	11.00'W x 135.00'L x 0.83'H 10" - Filter MDOT Type D 1,233 cf Overall x 5.0% Voids
#4	112.41'	196 cf	11.00'W x 135.00'L x 0.33'H 4" - Choker 1-1/2" 490 cf Overall x 40.0% Voids
#5	112.74'	98 cf	11.00'W x 135.00'L x 0.33'H 4" - OGFC 490 cf Overall x 20.0% Voids
#6	110.50'	12 cf	4.0" Round 6 SD Inside #1 L= 135.0'
814 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	108.00'	6.0" Round 6" Pipe L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 108.00' / 104.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.06 cfs @ 15.55 hrs HW=110.25' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 1.06 cfs @ 5.38 fps)

Pond 4P: Pavement Profile/Drainage



Summary for Pond 5P: Pavement Profile/Drainage

Inflow Area = 0.282 ac, 91.32% Impervious, Inflow Depth = 2.35" for 2-year event
 Inflow = 0.11 cfs @ 15.54 hrs, Volume= 0.055 af
 Outflow = 0.11 cfs @ 15.56 hrs, Volume= 0.054 af, Atten= 0%, Lag= 1.2 min
 Primary = 0.11 cfs @ 15.56 hrs, Volume= 0.054 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 104.82' @ 15.56 hrs Surf.Area= 216 sf Storage= 79 cf

Plug-Flow detention time= 30.9 min calculated for 0.054 af (97% of inflow)

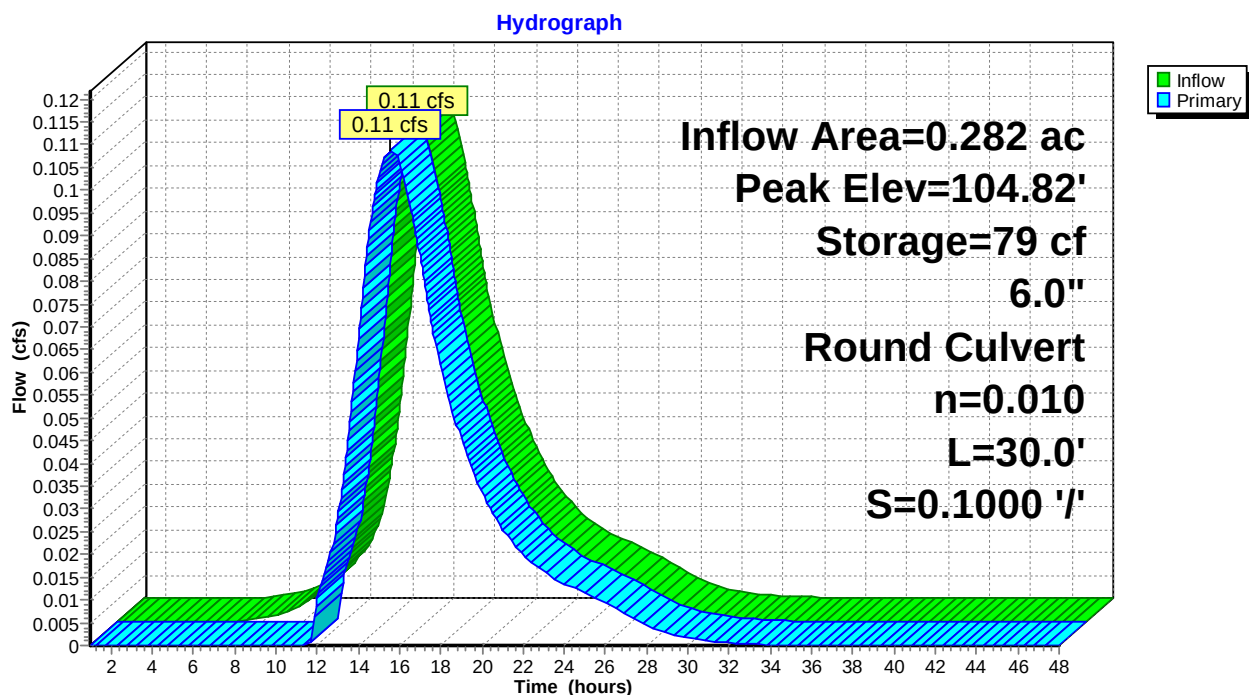
Center-of-Mass det. time= 14.9 min (1,053.4 - 1,038.6)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	81 cf	1.50'W x 144.00'L x 1.00'H 6" Underdrained Trench 216 cf Overall - 13 cf Embedded = 203 cf x 40.0% Voids
#2	105.00'	259 cf	18.00'W x 144.00'L x 0.25'H 3" - 3/4" Stone 648 cf Overall x 40.0% Voids
#3	105.25'	108 cf	18.00'W x 144.00'L x 0.83'H 10" - Filter MDOT Type D 2,151 cf Overall x 5.0% Voids
#4	106.08'	342 cf	18.00'W x 144.00'L x 0.33'H 4" - Choker 1-1/2" 855 cf Overall x 40.0% Voids
#5	106.41'	171 cf	18.00'W x 144.00'L x 0.33'H 4" - OGFC 855 cf Overall x 20.0% Voids
#6	104.25'	13 cf	4.0" Round 4 SD Inside #1 L= 144.0'
974 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	104.60'	6.0" Round 6" Pipe L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 104.60' / 101.60' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.11 cfs @ 15.56 hrs HW=104.82' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.11 cfs @ 1.27 fps)

Pond 5P: Pavement Profile/Drainage

Summary for Pond 6P: USSF 2 - StormTech 3500

Inflow Area = 1.164 ac, 59.23% Impervious, Inflow Depth = 1.85" for 2-year event
 Inflow = 2.10 cfs @ 12.09 hrs, Volume= 0.180 af
 Outflow = 0.44 cfs @ 12.54 hrs, Volume= 0.175 af, Atten= 79%, Lag= 27.1 min
 Primary = 0.44 cfs @ 12.54 hrs, Volume= 0.175 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 102.78' @ 12.54 hrs Surf.Area= 6,091 sf Storage= 2,645 cf

Plug-Flow detention time= 89.2 min calculated for 0.175 af (97% of inflow)

Center-of-Mass det. time= 73.8 min (851.6 - 777.8)

Volume	Invert	Avail.Storage	Storage Description
#1	101.50'	2,418 cf	35.08'W x 57.88'L x 4.75'H Stone 9,645 cf Overall - 3,599 cf Embedded = 6,045 cf x 40.0% Voids
#2	102.00'	3,599 cf	ADS StormTech MC-3500 d +Cap @ 7.50' L x 30 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.50'L = 115.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 30 Chambers in 5 Rows Cap Storage= +14.9 cf x 2 x 5 rows = 149.0 cf
#3	100.00'	152 cf	35.08'W x 57.88'L x 1.50'H Sand 3,046 cf Overall x 5.0% Voids
#4	99.00'	807 cf	35.08'W x 57.88'L x 1.00'H Crushed Stone 2,030 cf Overall - 13 cf Embedded = 2,017 cf x 40.0% Voids
#5	99.33'	13 cf	4.0" Round Underdrain Storage Inside #4 L= 150.0'
6,990 cf			Total Available Storage

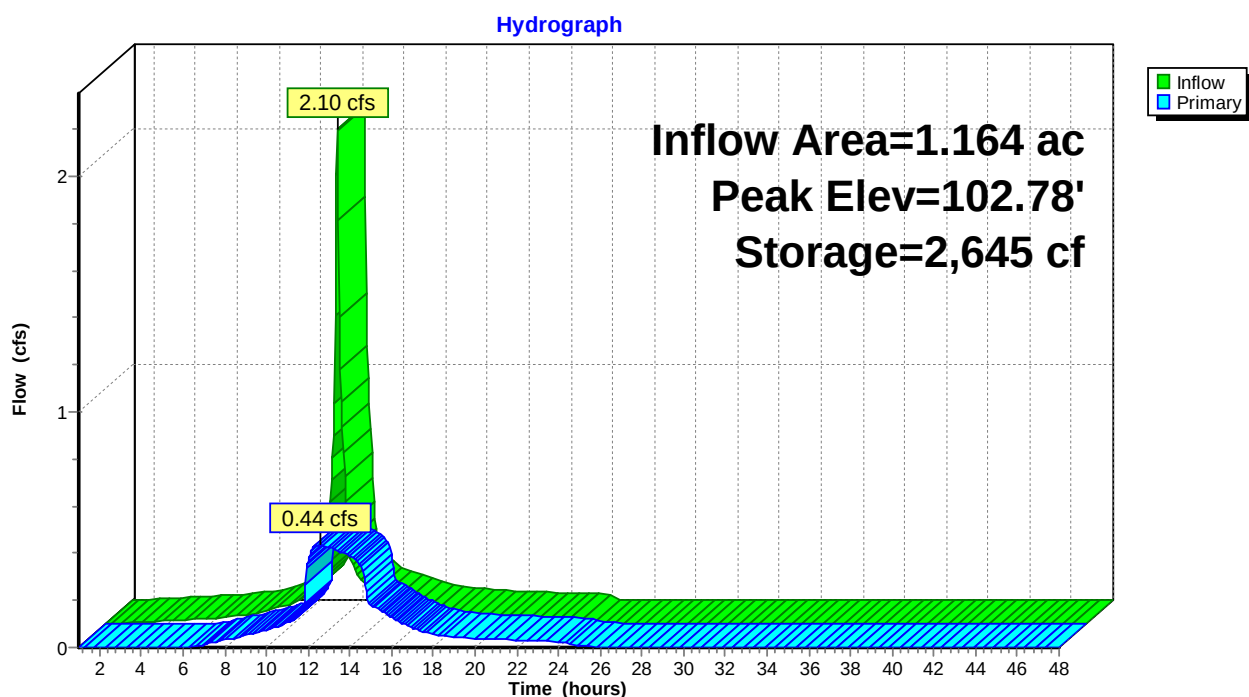
Device	Routing	Invert	Outlet Devices
#1	Primary	99.25'	3.0" Vert. Underdrain/Orifice C= 0.600
#2	Primary	104.77'	6.0" Round Bypass Overflow X 3.00 L= 7.0' Ke= 0.600 Inlet / Outlet Invert= 104.77' / 104.00' S= 0.1100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.44 cfs @ 12.54 hrs HW=102.78' (Free Discharge)

↑ **1=Underdrain/Orifice** (Orifice Controls 0.44 cfs @ 8.89 fps)

— **2=Bypass Overflow** (Controls 0.00 cfs)

Pond 6P: USSF 2 - StormTech 3500



Summary for Pond 7P: 6+00 Rain Garden

Inflow Area = 0.398 ac, 64.38% Impervious, Inflow Depth = 1.63" for 2-year event
 Inflow = 0.72 cfs @ 12.09 hrs, Volume= 0.054 af
 Outflow = 0.13 cfs @ 11.75 hrs, Volume= 0.054 af, Atten= 82%, Lag= 0.0 min
 Primary = 0.13 cfs @ 11.75 hrs, Volume= 0.054 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 109.67' @ 12.57 hrs Surf.Area= 711 sf Storage= 618 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 28.1 min (840.6 - 812.5)

Volume	Invert	Avail.Storage	Storage Description
#1	108.00'	902 cf	Ponding above surface (Prismatic) Listed below (Recalc)
#2	106.50'	31 cf	Soil Filter/Loam Topsoil (Prismatic) Listed below (Recalc)
			314 cf Overall x 10.0% Voids
			933 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
108.00	209	0	0
109.00	374	292	292
110.00	564	469	761
110.25	564	141	902

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	209	0	0
108.00	209	314	314

Device	Routing	Invert	Outlet Devices
#1	Primary	105.50'	12.0" Round Culvert L= 10.0' Ke= 0.600 Inlet / Outlet Invert= 105.50' / 105.35' S= 0.0150 ' / Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	106.50'	0.13 cfs Exfiltration when above 106.50'
#3	Primary	109.75'	12.0" Horiz. Beehive Overflow C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.13 cfs @ 11.75 hrs HW=106.64' (Free Discharge)

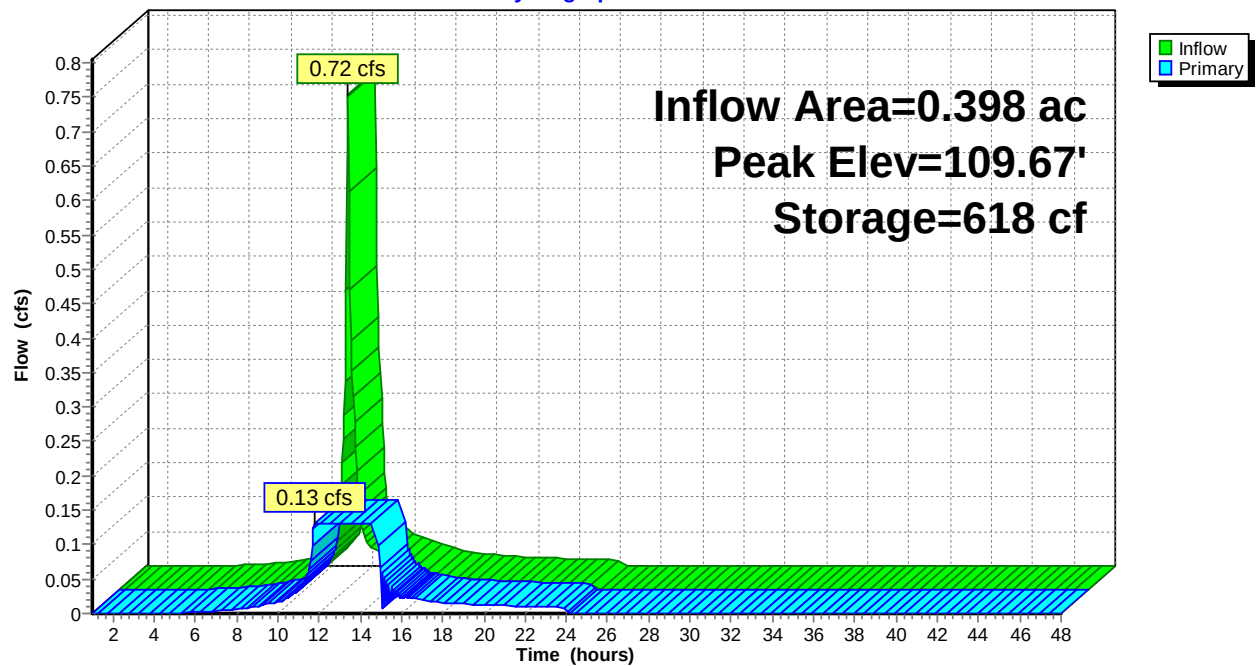
1=Culvert (Passes 0.13 cfs of 2.82 cfs potential flow)

2=Exfiltration (Exfiltration Controls 0.13 cfs)

3=Beehive Overflow (Controls 0.00 cfs)

Pond 7P: 6+00 Rain Garden

Hydrograph



Summary for Pond 8P: Pavement Profile/Drainage

Inflow Area = 0.234 ac, 82.25% Impervious, Inflow Depth = 2.55" for 2-year event
 Inflow = 0.10 cfs @ 15.51 hrs, Volume= 0.050 af
 Outflow = 0.10 cfs @ 15.51 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 15.51 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 111.80' @ 15.51 hrs Surf.Area= 180 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.050 af (100% of inflow)

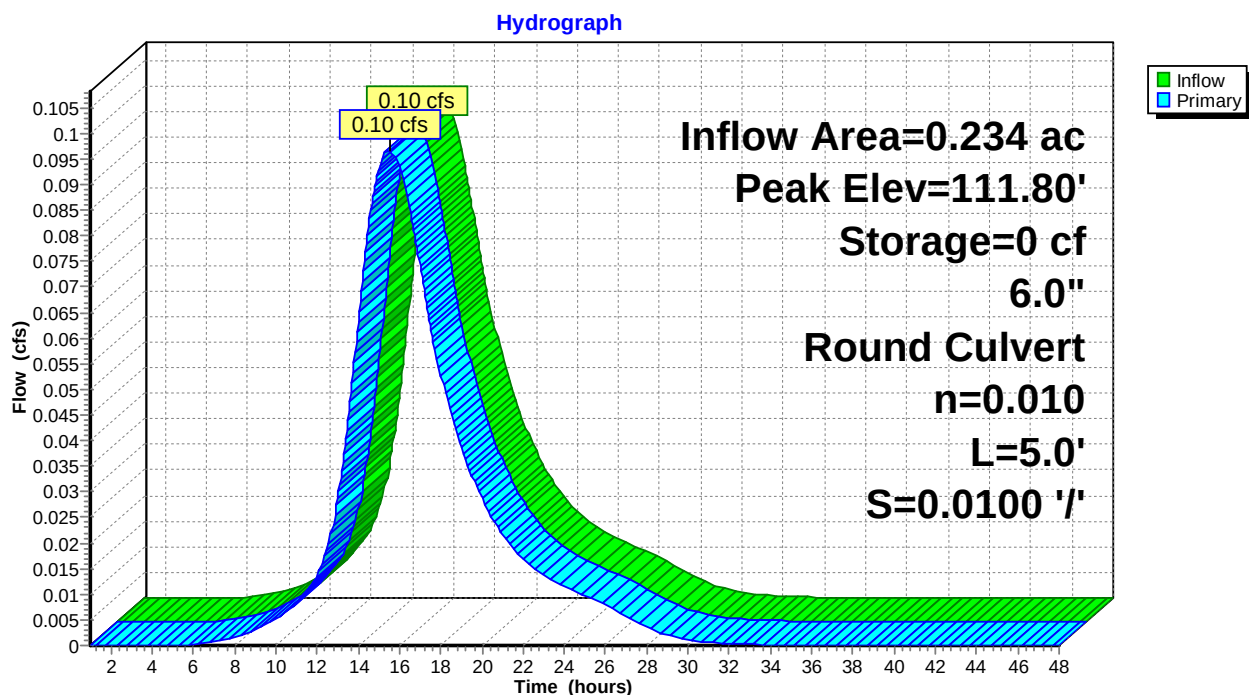
Center-of-Mass det. time= 0.0 min (1,026.7 - 1,026.7)

Volume	Invert	Avail.Storage	Storage Description
#1	111.80'	55 cf	1.33'W x 135.00'L x 0.83'H 4" Trench 149 cf Overall - 12 cf Embedded = 137 cf x 40.0% Voids
#2	112.59'	243 cf	49.30'W x 49.30'L x 0.25'H 3" - 3/4" Stone 608 cf Overall x 40.0% Voids
#3	112.84'	101 cf	49.30'W x 49.30'L x 0.83'H 10" - Filter MDOT Type D 2,017 cf Overall x 5.0% Voids
#4	113.67'	321 cf	49.30'W x 49.30'L x 0.33'H 4" - Choker 1-1/2" 802 cf Overall x 40.0% Voids
#5	114.00'	160 cf	49.30'W x 49.30'L x 0.33'H 4" - OGFC 802 cf Overall x 20.0% Voids
#6	111.80'	12 cf	4.0" Round 4 SD Inside #1 L= 135.0' S= 0.0010 '/'
		892 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	61.65'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 61.65' / 61.60' S= 0.0100 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=5.27 cfs @ 15.51 hrs HW=111.80' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 5.27 cfs @ 26.85 fps)

Pond 8P: Pavement Profile/Drainage

Summary for Pond 9P: 4+25 Rain Garden

Inflow Area = 0.201 ac, 65.94% Impervious, Inflow Depth = 1.26" for 2-year event
 Inflow = 0.29 cfs @ 12.10 hrs, Volume= 0.021 af
 Outflow = 0.28 cfs @ 12.11 hrs, Volume= 0.021 af, Atten= 1%, Lag= 0.8 min
 Primary = 0.28 cfs @ 12.11 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 103.14' @ 12.11 hrs Surf.Area= 192 sf Storage= 74 cf

Plug-Flow detention time= 31.5 min calculated for 0.021 af (99% of inflow)

Center-of-Mass det. time= 27.7 min (875.4 - 847.7)

Volume	Invert	Avail.Storage	Storage Description
#1	102.50'	195 cf	Ponding above surface (Prismatic) Listed below (Recalc)
#2	101.00'	9 cf	Soil Filter (Prismatic) Listed below (Recalc)
			90 cf Overall x 10.0% Voids
			204 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.50	60	0	0
103.00	126	47	47
104.00	170	148	195

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	60	0	0
102.50	60	90	90

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	8.0" Round Culvert L= 78.0' Ke= 0.600 Inlet / Outlet Invert= 99.75' / 99.30' S= 0.0058 ' S= 0.0058 ' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	102.00'	0.01 cfs Exfiltration when above 102.00'
#3	Device 1	103.00'	6.0" Horiz. Beehive Overflow C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.28 cfs @ 12.11 hrs HW=103.14' (Free Discharge)

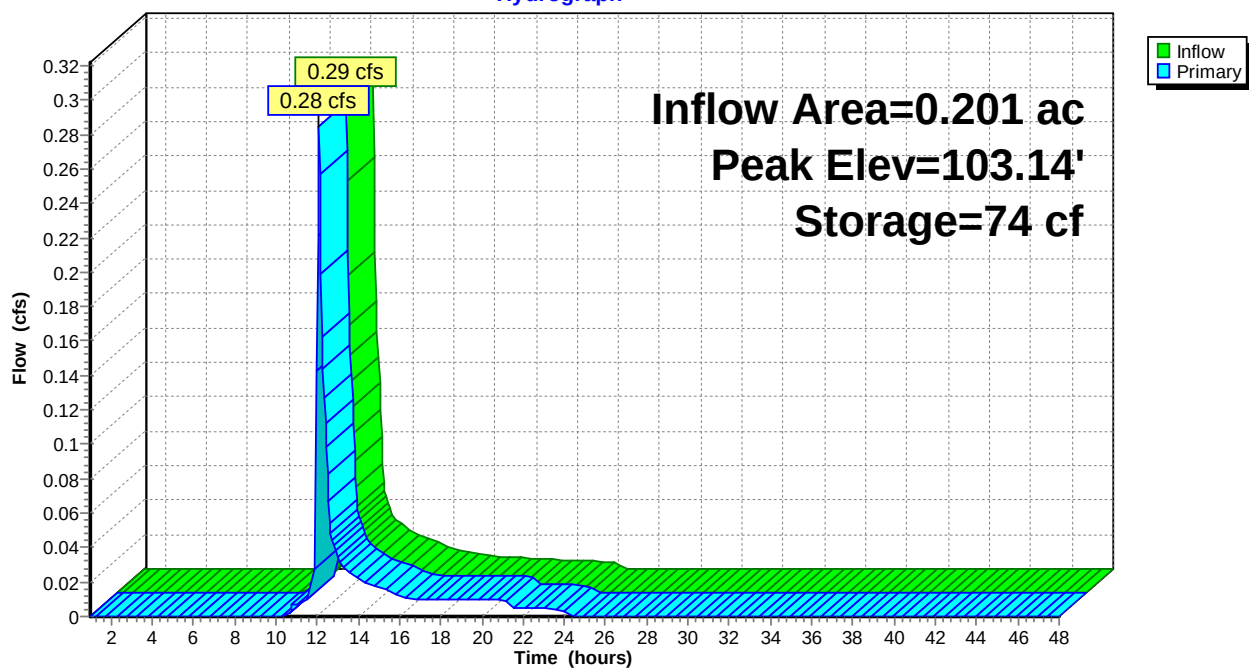
1=Culvert (Passes 0.28 cfs of 2.19 cfs potential flow)

2=Exfiltration (Exfiltration Controls 0.01 cfs)

3=Beehive Overflow (Weir Controls 0.27 cfs @ 1.22 fps)

Pond 9P: 4+25 Rain Garden

Hydrograph



Summary for Subcatchment 1.1N: SC 1.1N

Runoff = 0.00 cfs @ 17.08 hrs, Volume= 0.002 af, Depth= 0.04"

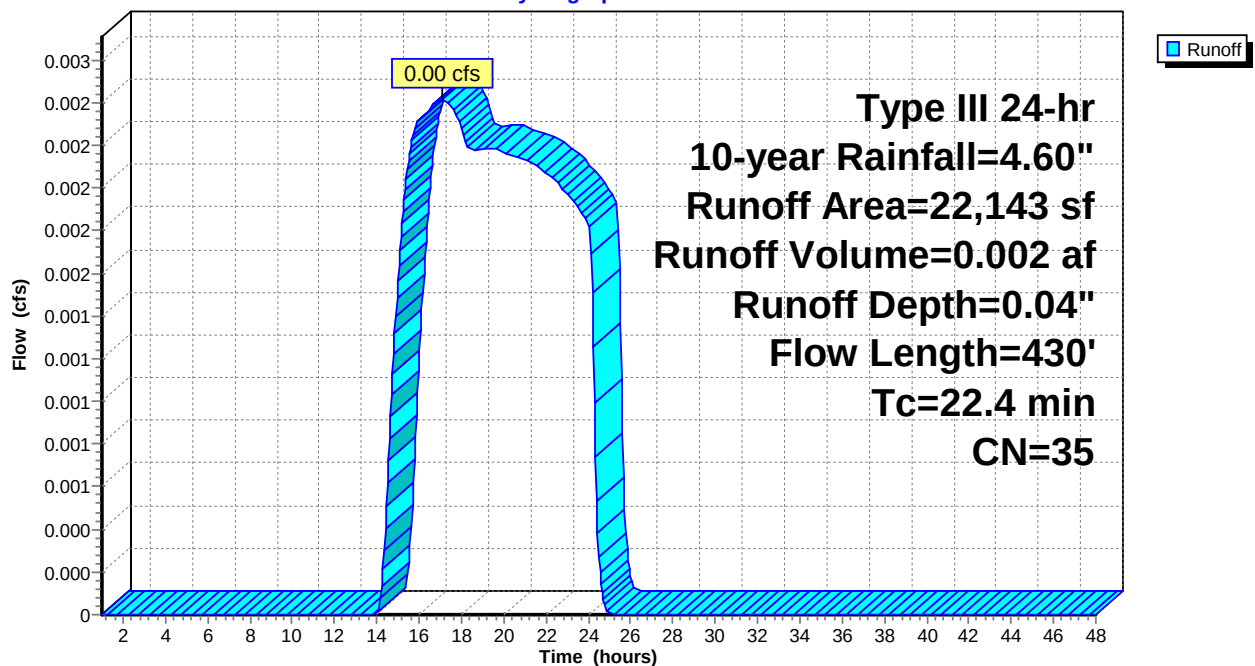
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	7,797	39	Roadside ditch and shrubs, HSG A
	9,907	30	Woods, Good, HSG A
*	1,713	39	Landscaping/open space, HSG A
*	2,726	39	Landscaping/roadside ditch
	22,143	35	Weighted Average
	22,143		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	70	0.0400	0.06		Sheet Flow, SF (A to B)
					Woods: Dense underbrush n= 0.800 P2= 3.27"
0.1	20	0.4000	3.16		Shallow Concentrated Flow, SCF (B to C)
					Woodland Kv= 5.0 fps
1.2	340	0.0310	4.64	17.83	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D)
					Bot.W=2.00' D=0.80' Z= 2.5 & 4.5 ' Top.W=7.60'
					n= 0.035
22.4	430	Total			

Subcatchment 1.1N: SC 1.1N

Hydrograph



Summary for Subcatchment 1.1S: Roofs

Runoff = 2.72 cfs @ 12.09 hrs, Volume= 0.225 af, Depth> 4.36"

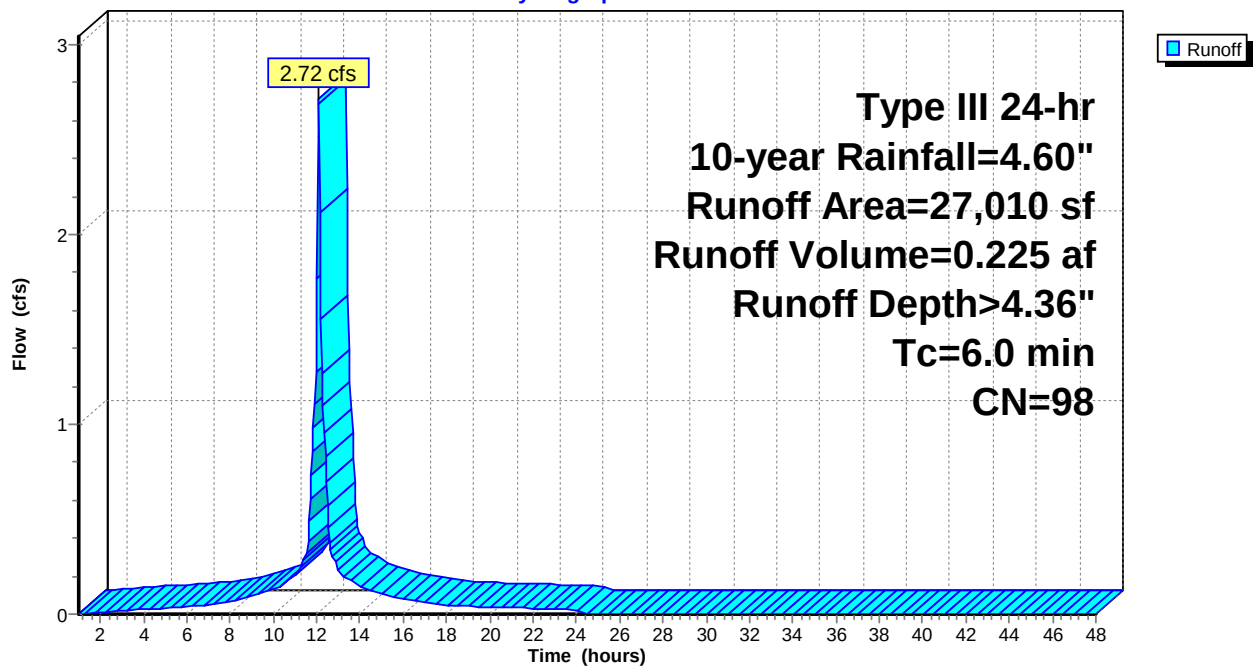
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	27,010	98	Roofs
	27,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.1S: Roofs

Hydrograph



Summary for Subcatchment 1.2N: SC 1.2N

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 0.041 af, Depth= 2.46"

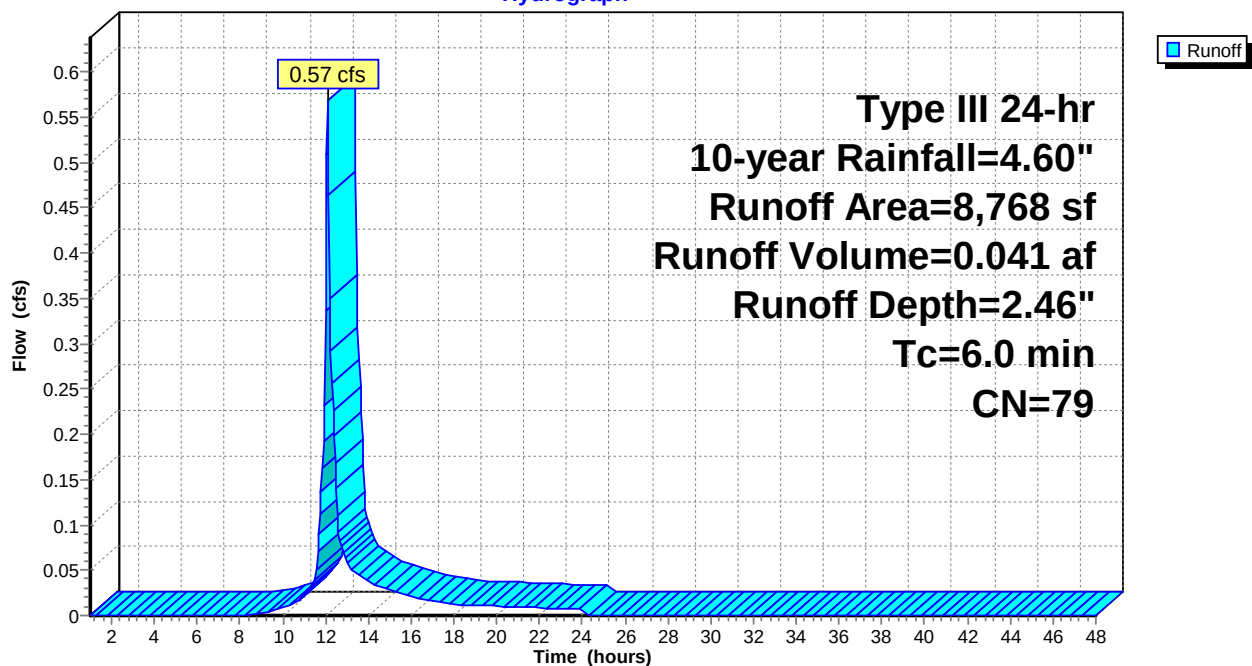
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	3,404	98	Wash Ave
*	360	98	A.2 patios
*	1,978	98	sidewalk
*	40	98	pavers
*	149	80	grass pavers
*	2,837	39	Lawn/landscaping/HSG A
	8,768	79	Weighted Average
	2,986		34.06% Pervious Area
	5,782		65.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.2N: SC 1.2N

Hydrograph



Summary for Subcatchment 1.2S: Property Frontage

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 3.81"

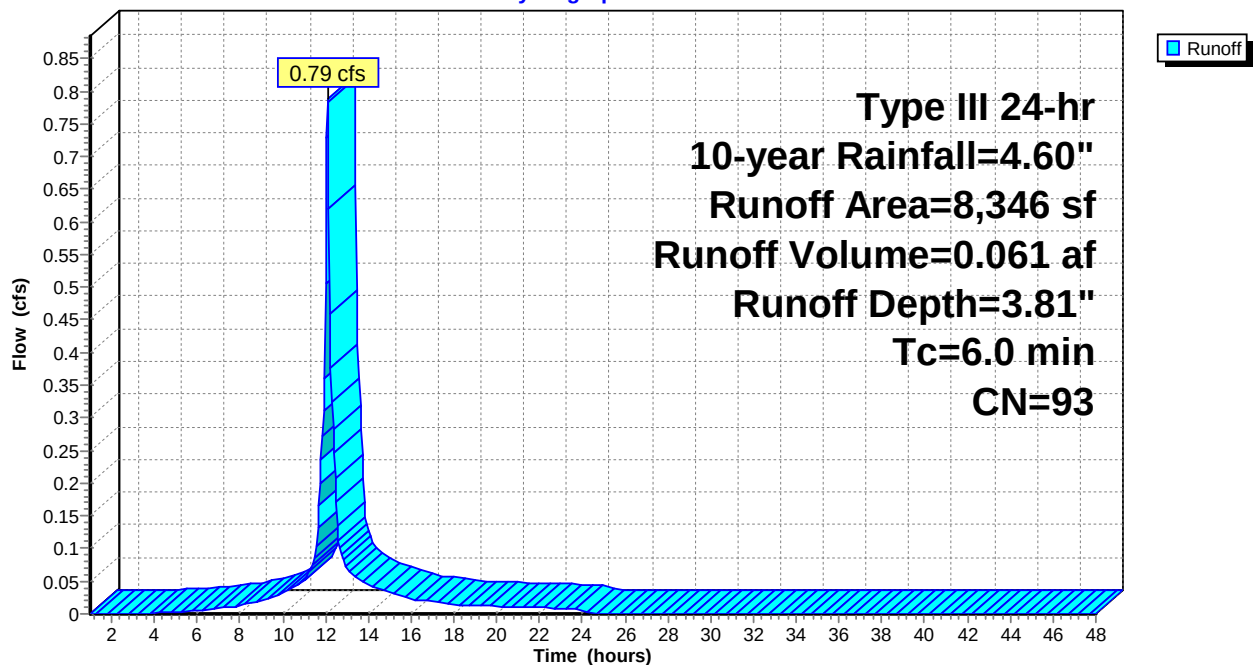
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	3,666	98	Wash. Ave
*	1,206	98	Sidewalk
*	406	98	patio
*	16	98	t pad
*	374	98	driveway
*	518	98	sidewalk
*	48	98	bustop
	2,112	80	>75% Grass cover, Good, HSG D
	8,346	93	Weighted Average
	2,112		25.31% Pervious Area
	6,234		74.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.2S: Property Frontage

Hydrograph



Summary for Subcatchment 1.3N: SC 1.3N

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.033 af, Depth= 2.29"

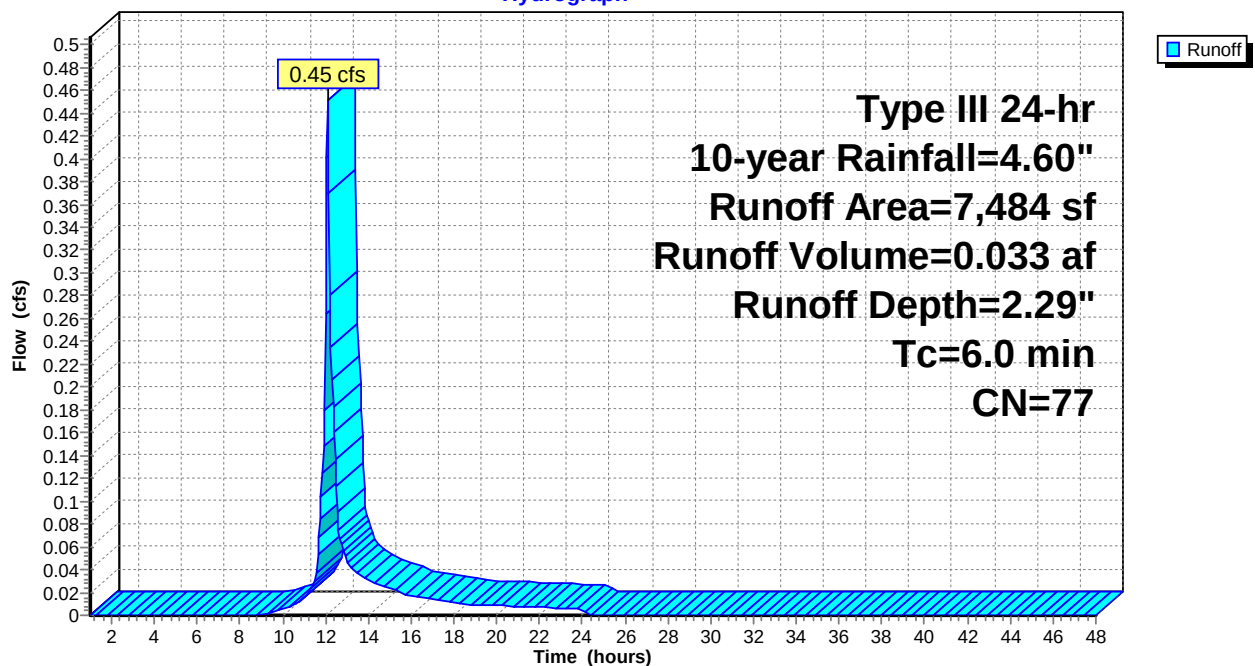
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	3,472	98	Wash Ave
*	230	98	Patios
*	48	98	bus shelter
*	1,130	98	Sidewalk
*	2,604	39	Landscaping/lawn, HSG A
	7,484	77	Weighted Average
	2,604		34.79% Pervious Area
	4,880		65.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.3N: SC 1.3N

Hydrograph



Summary for Subcatchment 1.3S: West Parking Lot

Runoff = 0.17 cfs @ 15.51 hrs, Volume= 0.090 af, Depth= 3.81"

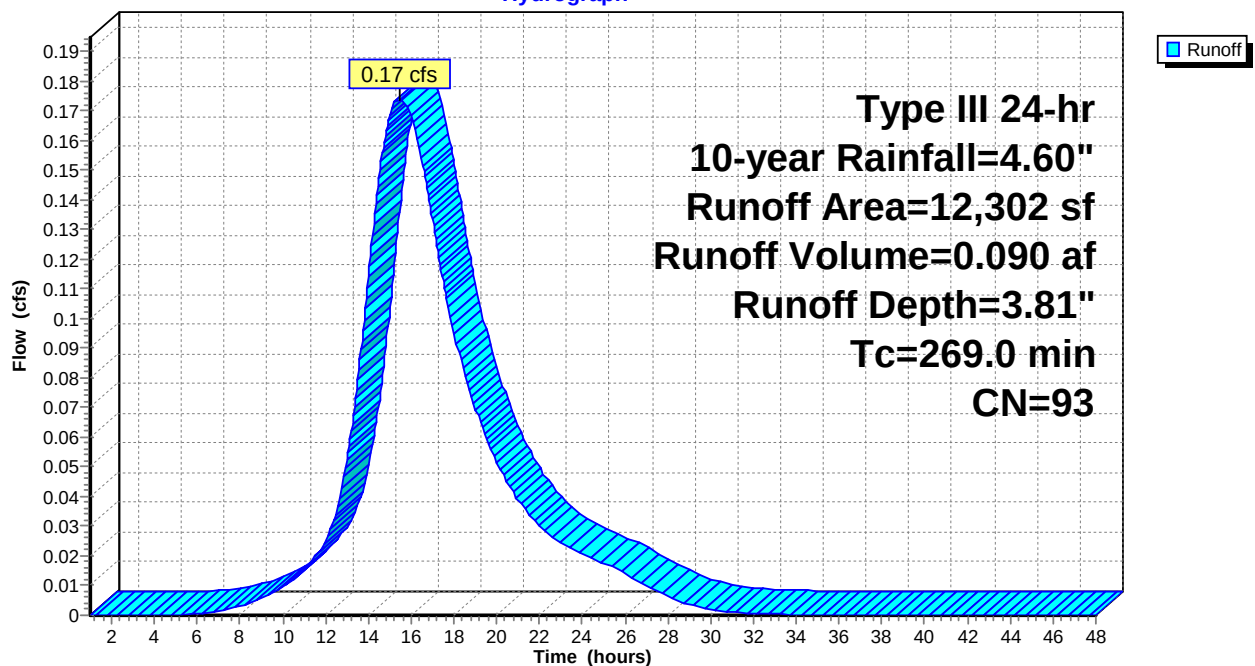
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	2,279	98	porous
*	6,635	98	paved drive aisle
*	1,068	98	walkway
*	1,252	98	patio/covered pav
	1,068	39	>75% Grass cover, Good, HSG A
	12,302	93	Weighted Average
	1,068		8.68% Pervious Area
	11,234		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 1.3S: West Parking Lot

Hydrograph



Summary for Subcatchment 1.4N: SC 1.4N

Runoff = 0.00 cfs @ 12.38 hrs, Volume= 0.001 af, Depth= 0.29"

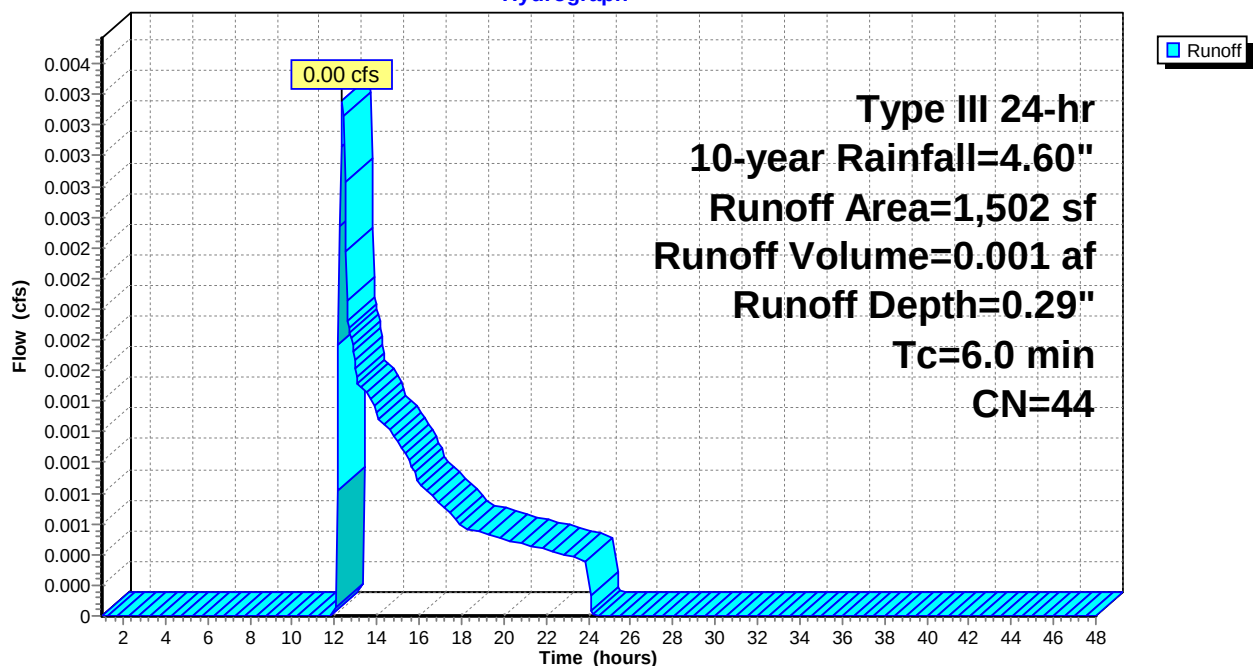
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	131	80	Grass pavers
*	45	98	Paver walkway
*	1,326	39	Landscaping/openspace/rain garden/ HSG A
	1,502	44	Weighted Average
	1,457		97.00% Pervious Area
	45		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.4N: SC 1.4N

Hydrograph



Summary for Subcatchment 1.4S: Common

Runoff = 0.51 cfs @ 12.16 hrs, Volume= 0.046 af, Depth= 1.26"

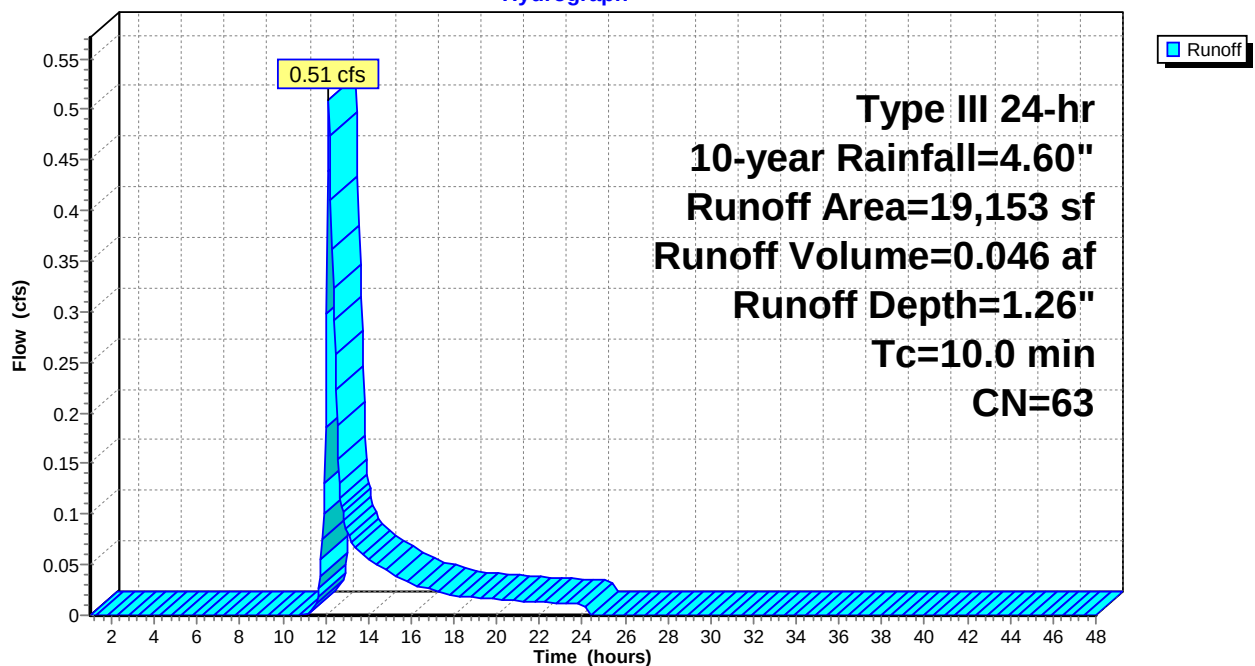
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	1,688	98	paved walkway
*	153	98	Rear Patio
*	112	98	Rear Patio
	8,600	39	>75% Grass cover, Good, HSG A
	8,600	80	>75% Grass cover, Good, HSG D
	19,153	63	Weighted Average
	17,200		89.80% Pervious Area
	1,953		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.4S: Common

Hydrograph



Summary for Subcatchment 1.5N: Roofs

Runoff = 2.24 cfs @ 12.09 hrs, Volume= 0.185 af, Depth> 4.36"

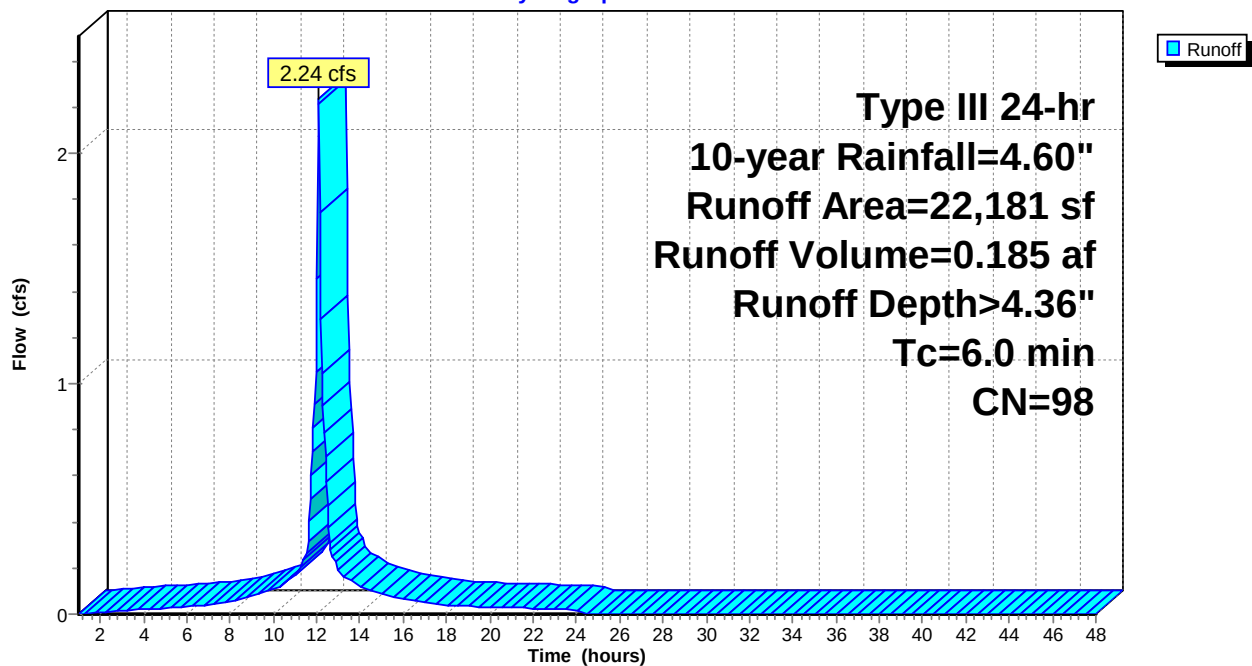
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	22,181	98	IMPERV
	22,181		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.5N: Roofs

Hydrograph



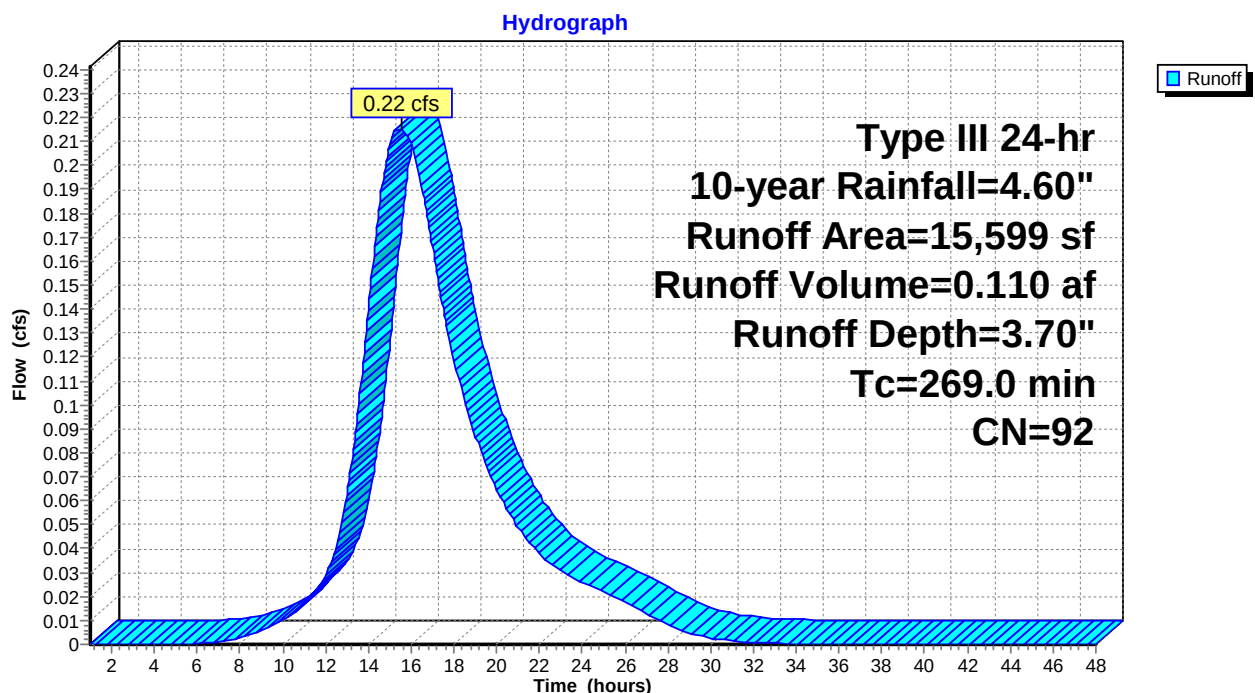
Summary for Subcatchment 1.5S: A.7, A.10, C.3, C.2 Aisle

Runoff = 0.22 cfs @ 15.53 hrs, Volume= 0.110 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	879	98	5' pavers/ s. mews
*	3,722	98	porous
*	442	98	Front Patios
*	759	98	Front Patios
*	1,033	98	Long Patio
*	585	98	Curved Patio
*	536	98	Front Patios
*	592	98	Front Patios
*	1,360	98	Long Patio
*	679	80	Grass Pavers
*	425	98	Patios
*	16	98	Transformer
*	446	98	Sidewalks
*	4,125	80	>75% Grass cover, Good, HSG D
	15,599	92	Weighted Average
	4,804		30.80% Pervious Area
	10,795		69.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 1.5S: A.7, A.10, C.3, C.2 Aisle

Summary for Subcatchment 1.6N: SC 1.6N

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.067 af, Depth> 4.36"

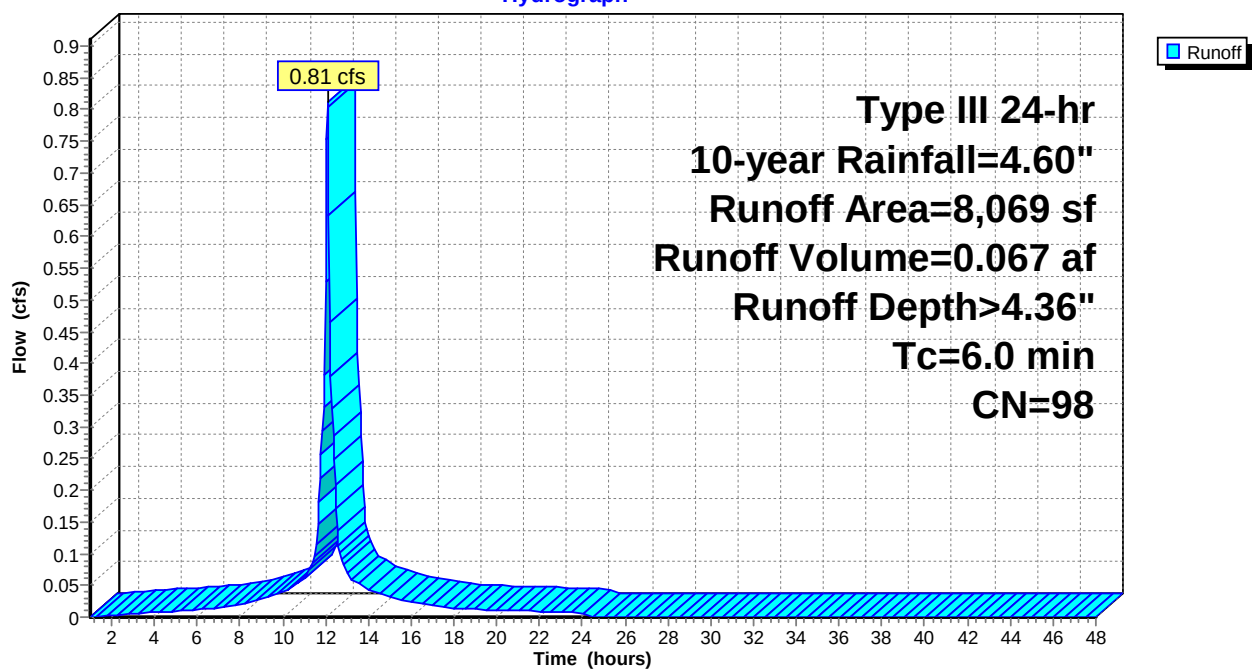
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	8,069	98	Wash Ave
	8,069		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.6N: SC 1.6N

Hydrograph



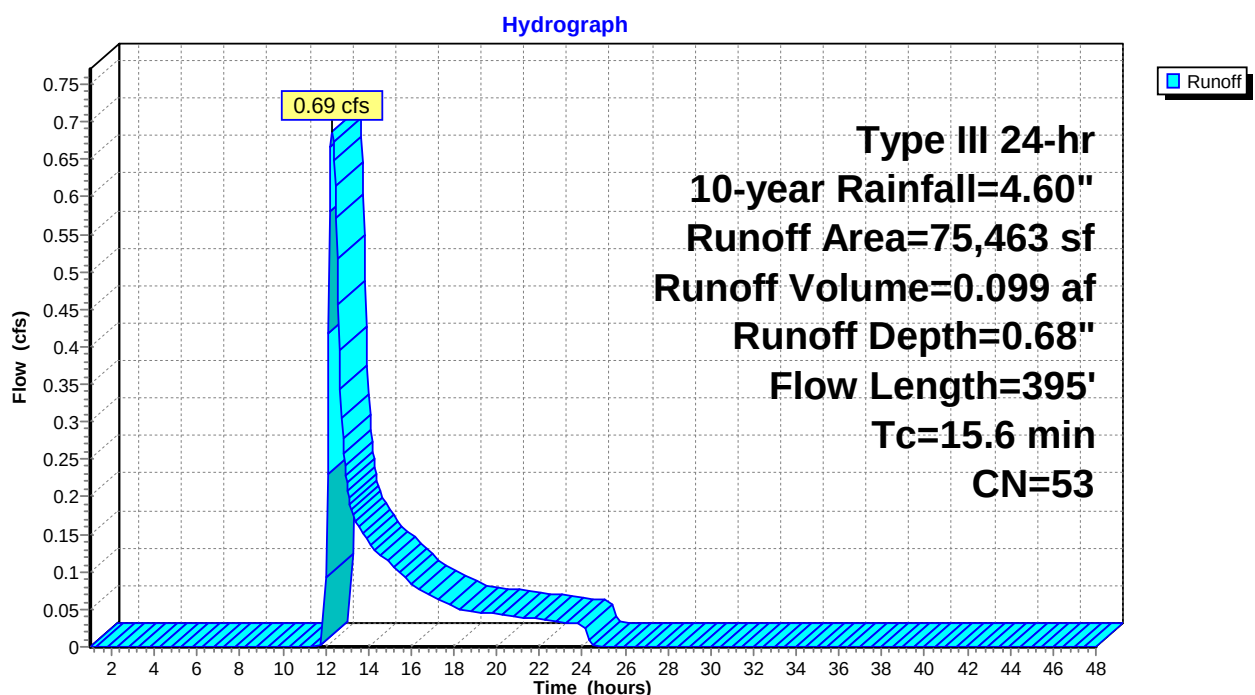
Summary for Subcatchment 1.6S: Developed/Undeveloped area

Runoff = 0.69 cfs @ 12.30 hrs, Volume= 0.099 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
37,858	30	Woods, Good, HSG A
* 5,348	39	Landscaped/open space
1,387	98	Unconnected roofs, HSG A
* 5,781	39	Wash Ave ditch
* 16,824	98	Washington ave, cross walks
* 1,195	98	Patios
* 305	80	Grass pavers
* 6,765	80	Landscaping/ HSG D
75,463	53	Weighted Average
56,057		74.28% Pervious Area
19,406		25.72% Impervious Area
1,387		7.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0500	0.17		Sheet Flow, Sheet flow (A to B) Grass: Dense n= 0.240 P2= 3.27"
5.5	203	0.0600	0.61		Shallow Concentrated Flow, SCF (B to C) Forest w/Heavy Litter Kv= 2.5 fps
0.3	92	0.0400	5.40	17.28	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 ' / ' Top.W=6.00' n= 0.035
15.6	395	Total			

Subcatchment 1.6S: Developed/Undeveloped area

Summary for Subcatchment 1.7N: SC 1.7N

Runoff = 0.00 cfs @ 14.65 hrs, Volume= 0.001 af, Depth= 0.13"

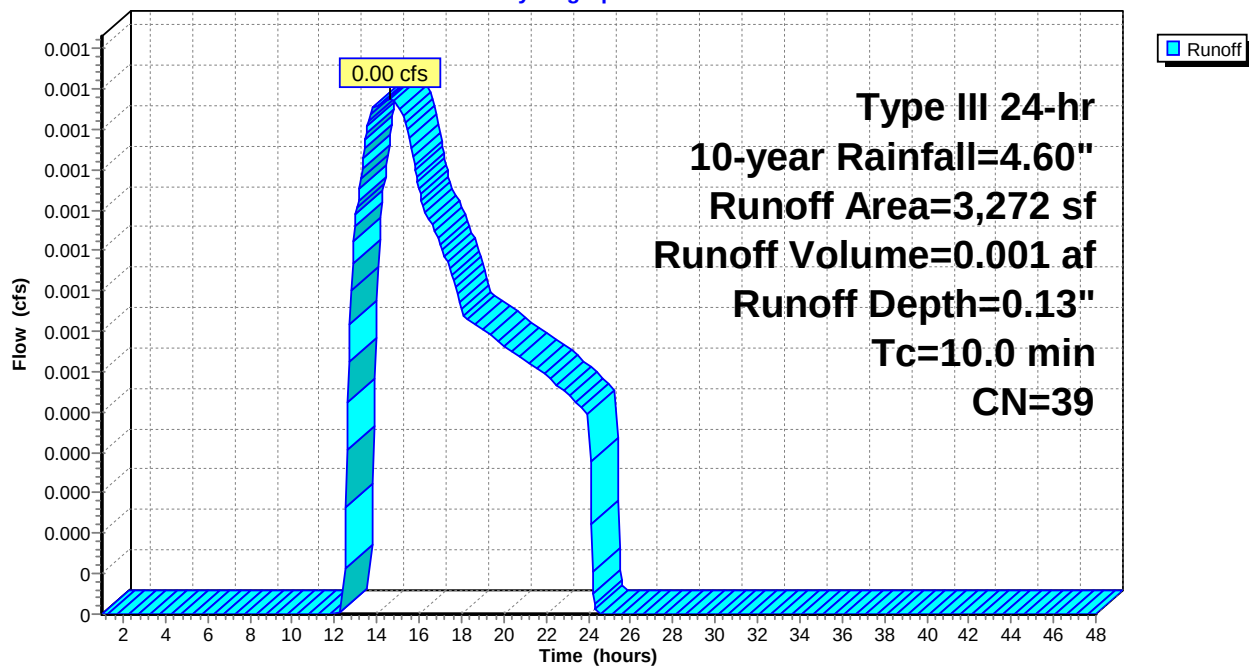
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	3,272	39	Lawn/lanscaping/ditch, HSG A
	3,272		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.7N: SC 1.7N

Hydrograph



Summary for Subcatchment 1.7S: SC 1.7S

Runoff = 0.35 cfs @ 12.09 hrs, Volume= 0.025 af, Depth= 2.91"

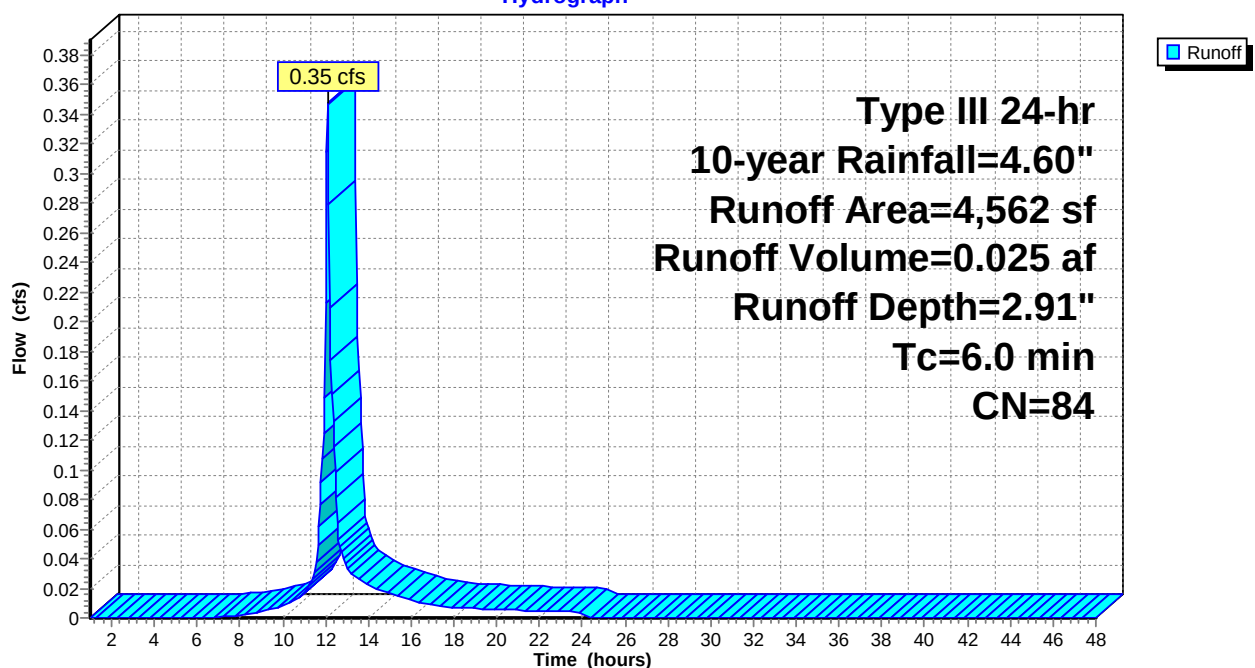
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	724	98	A.9/A.10 rear patios
*	356	98	Walkway
*	3,482	80	Lawn/landscaping, HSG D
	4,562	84	Weighted Average
	3,482		76.33% Pervious Area
	1,080		23.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.7S: SC 1.7S

Hydrograph



Summary for Subcatchment 1.8N: Common

Runoff = 0.21 cfs @ 12.19 hrs, Volume= 0.025 af, Depth= 0.73"

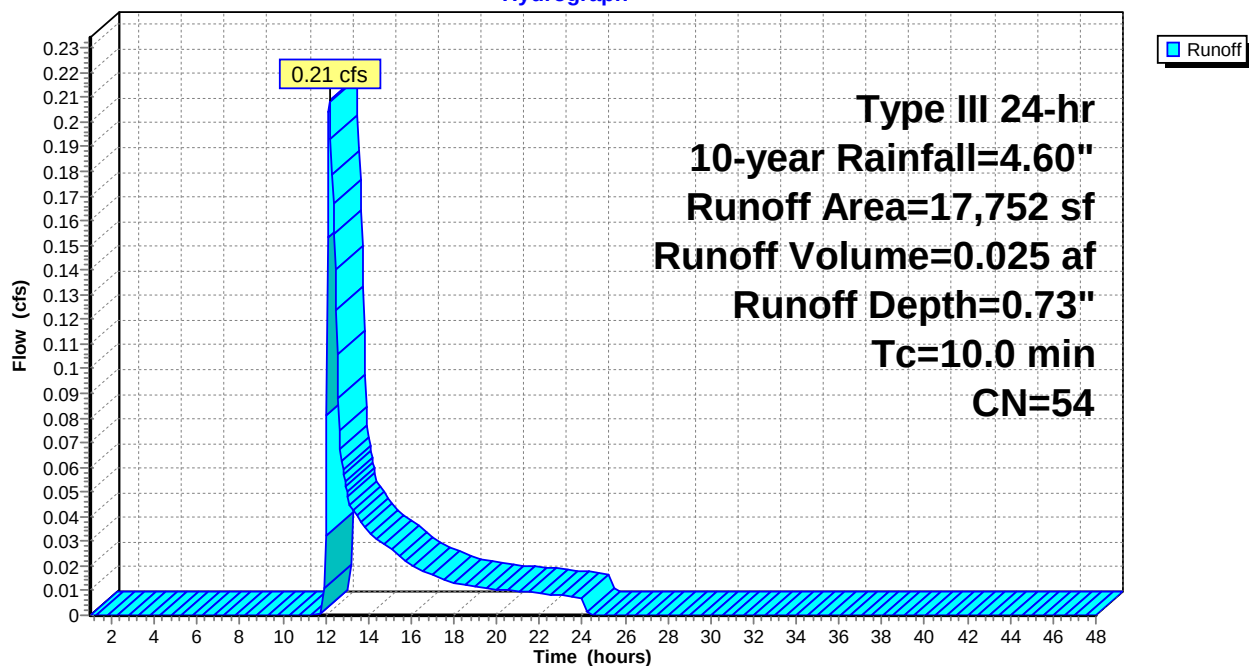
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	2,549	98	Paved walkway
*	1,558	98	Pavers & covered pav
*	472	98	patios
*	16	98	transformer
*	13,157	39	Open space, landscaping, HSG A
	17,752	54	Weighted Average
	13,157		74.12% Pervious Area
	4,595		25.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.8N: Common

Hydrograph



Summary for Subcatchment 1.9N: SC 1.9N

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 3.00"

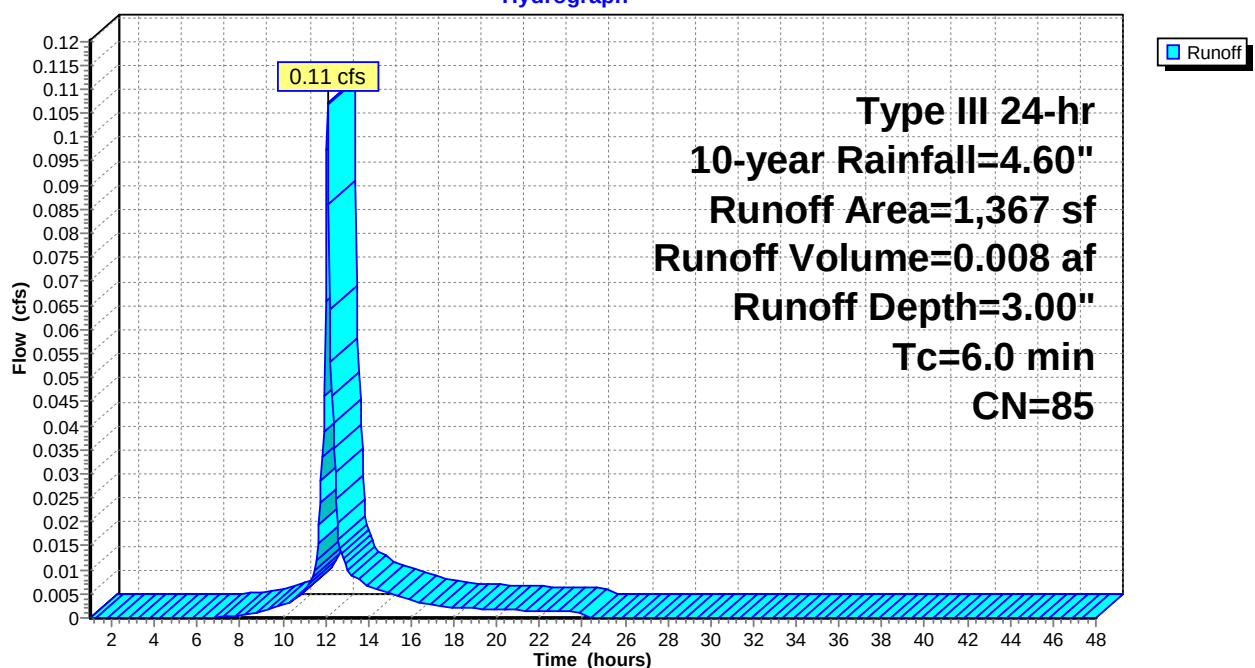
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	719	98	Wash Ave
*	336	98	sidewalk
*	312	39	Landscaping/esplanade
	1,367	85	Weighted Average
	312		22.82% Pervious Area
	1,055		77.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.9N: SC 1.9N

Hydrograph



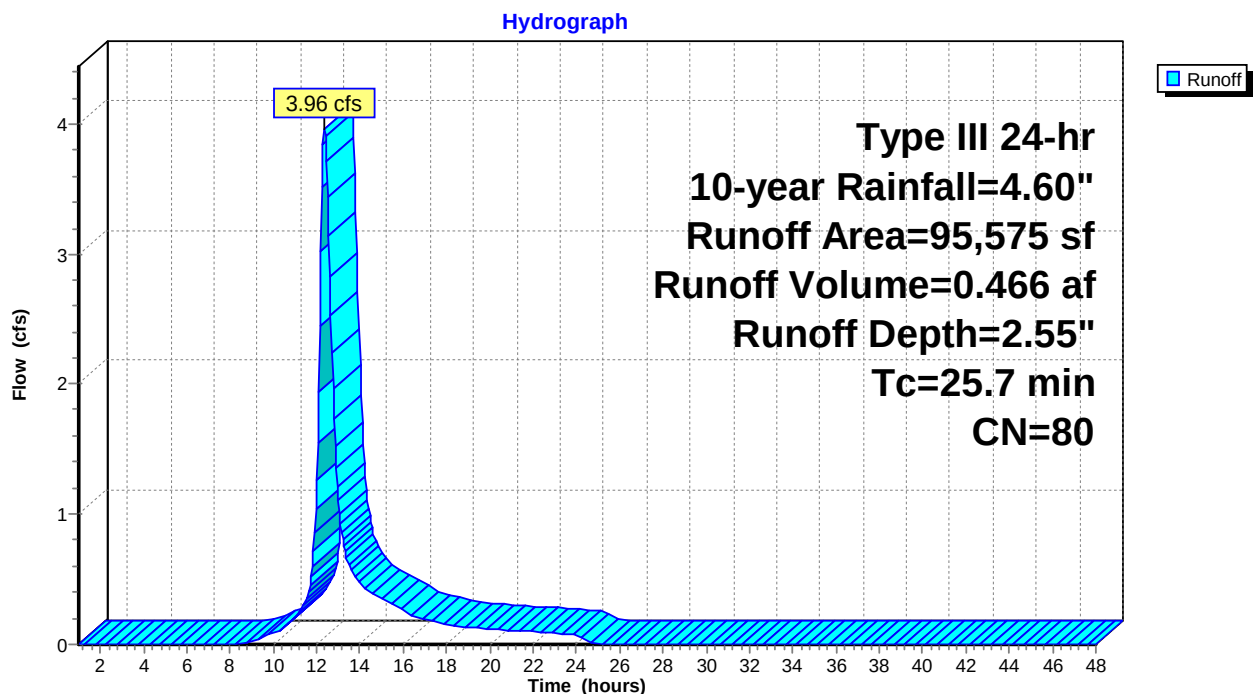
Summary for Subcatchment 2.1N: SC 2.1N

Runoff = 3.96 cfs @ 12.36 hrs, Volume= 0.466 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	7,465	80	Road sideslope
	37,683	77	Woods, Good, HSG D
*	2,842	98	N sidewalk
*	10,913	98	Wash. Ave and S. Conc apron
*	6,794	98	Rooftop and driveway
*	414	98	Rooftop
*	21,315	80	Lawns/landscaping, HSG D
	5,316	30	Woods, Good, HSG A
*	2,833	80	Landscaping/open space
	95,575	80	Weighted Average
	74,612		78.07% Pervious Area
	20,963		21.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7					Direct Entry, Direct input of pre Tc

Subcatchment 2.1N: SC 2.1N

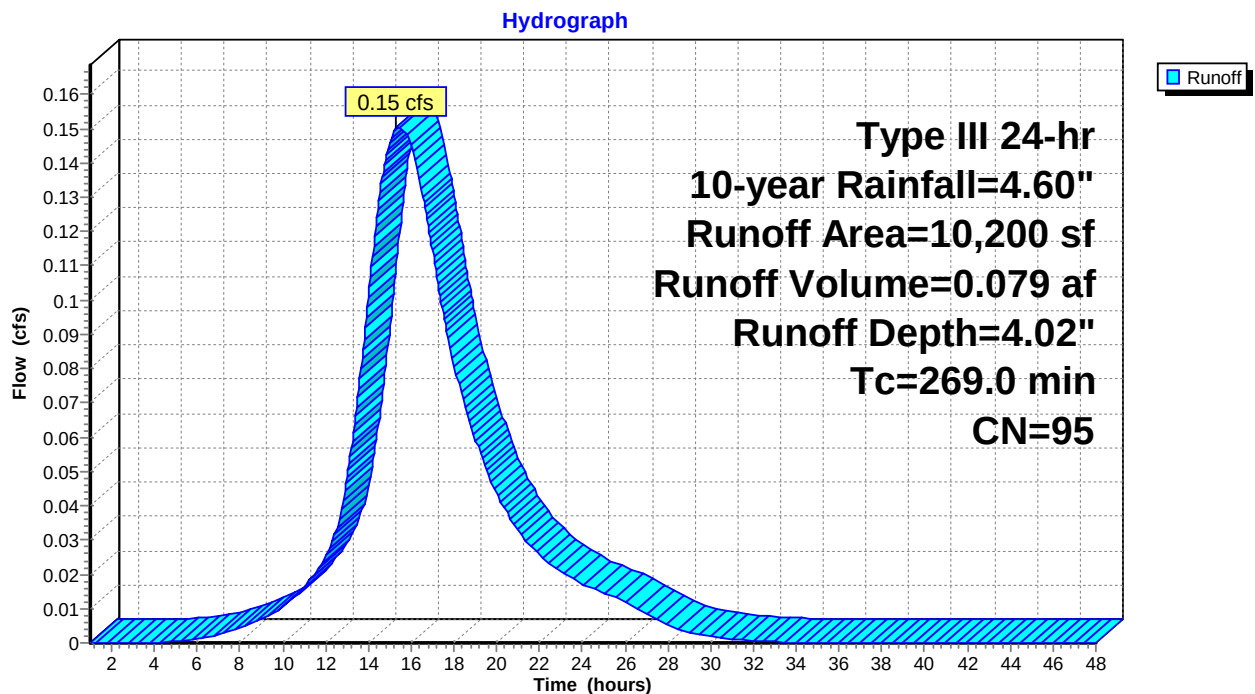
Summary for Subcatchment 2.1S: Eastern Parking Lot

Runoff = 0.15 cfs @ 15.30 hrs, Volume= 0.079 af, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	1,296	98	Porous Horizontal
*	4,187	98	Paved driveaisle
*	857	98	Walkway/patio
*	501	98	Rear walkway/patio
*	180	98	dumpster pad
*	1,134	98	Porous Vertical
*	234	98	Curbing
	1,811	80	>75% Grass cover, Good, HSG D
	10,200	95	Weighted Average
	1,811		17.75% Pervious Area
	8,389		82.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 2.1S: Eastern Parking Lot

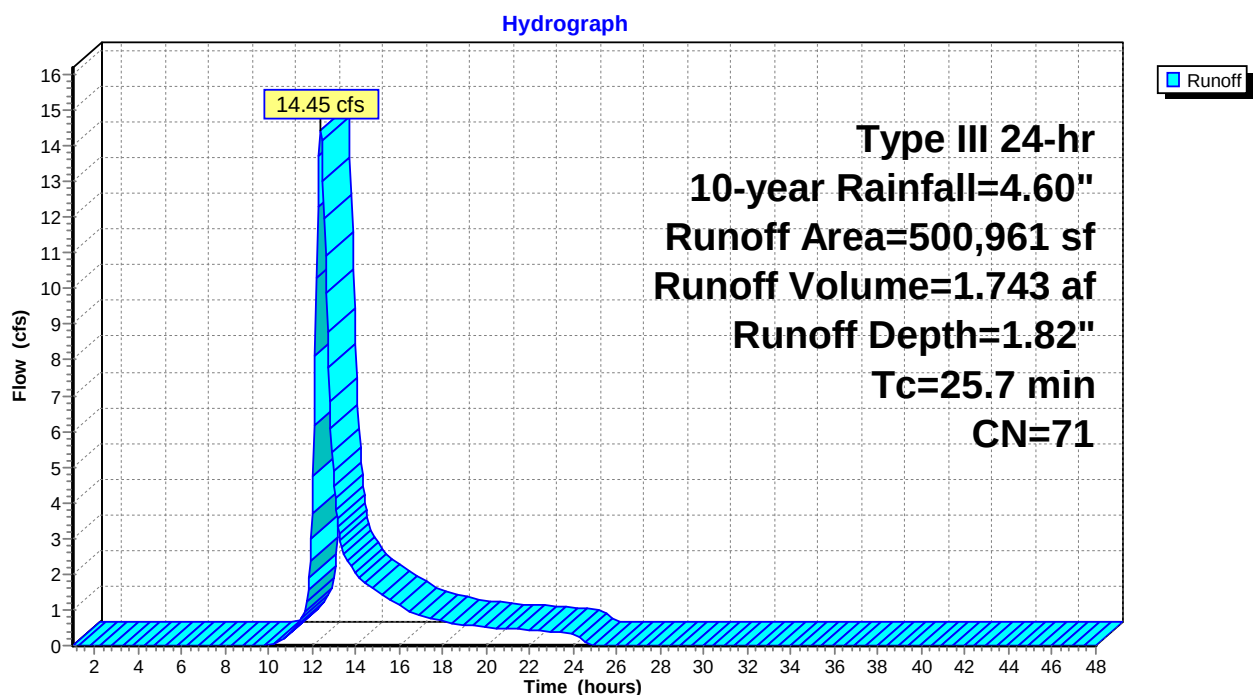
Summary for Subcatchment 2.2S: Developed/nondeveloped area

Runoff = 14.45 cfs @ 12.38 hrs, Volume= 1.743 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	4,589	39	Slope behind patios, HSG A
*	30,826	39	>75% Grass cover, Good, HSG A
*	3,896	98	Roofs/driveways/patios (HSG A)
	24,173	55	Woods, Good, HSG B
	6,557	70	Woods, Good, HSG C
	146,595	70	Woods, Good, HSG C
	240,888	77	Woods, Good, HSG D
*	10,866	80	>75% Grass cover, Good, HSG D
*	3,503	98	Roofs/driveways/patios (HSG D)
*	4,921	98	Wash Ave
*	4,026	98	Sidewalk
*	8,474	80	Roadside ditch/slope
*	1,546	98	Auburn St
*	820	80	Landscaping Auburn St
	9,281	39	>75% Grass cover, Good, HSG A
	500,961	71	Weighted Average
	483,069		96.43% Pervious Area
	17,892		3.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7					Direct Entry, copy from pre

Subcatchment 2.2S: Developed/nondeveloped area

Summary for Subcatchment 3.1N: SC 3.1N

Runoff = 0.23 cfs @ 12.24 hrs, Volume= 0.028 af, Depth= 0.90"

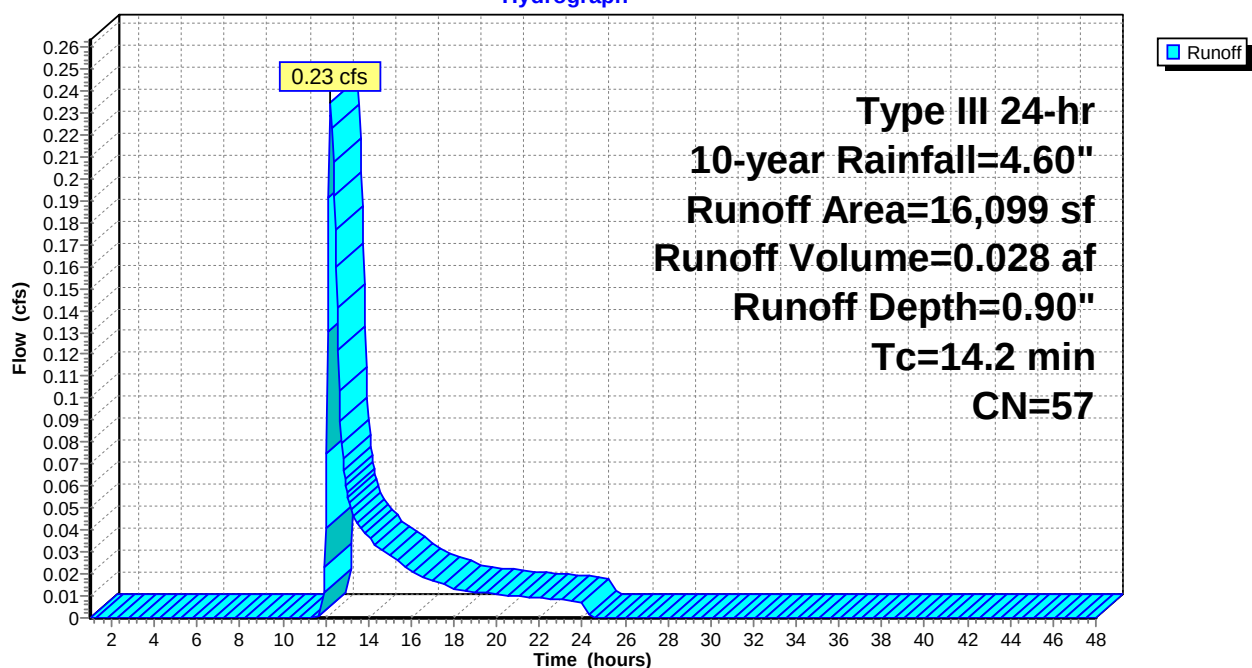
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
	4,070	30	Woods, Good, HSG A
*	3,619	39	Landscaping/swale, HSG A
	5,115	77	Woods, Good, HSG D
*	3,295	80	Landscaping/slope, HSG D
	16,099	57	Weighted Average
	16,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2					Direct Entry, Direct input of pre Tc

Subcatchment 3.1N: SC 3.1N

Hydrograph



Summary for Subcatchment 4.1N: 4.1N

Runoff = 0.15 cfs @ 15.85 hrs, Volume= 0.080 af, Depth= 1.74"

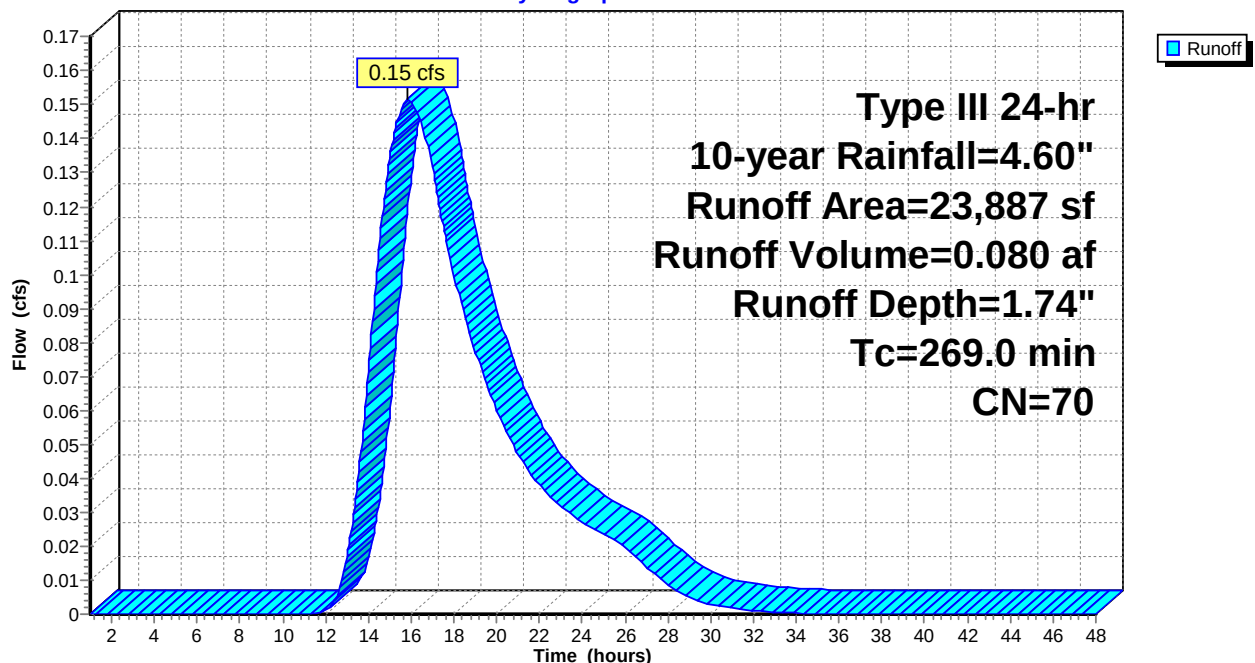
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	1,940	98	Curb & Pavement
*	5,213	98	Porous Pavement
*	2,866	98	Patios
*	612	98	Patios
*	16	98	transformer pad
*	185	98	Paved Walkway
*	394	98	Paved Walkway
*	408	98	Patios
*	655	98	Patios
*	128	98	Solid Waste Location
*	112	98	Patios
*	46	98	Paved Walkway
*	11,312	39	Lawn/landscaping, HSG A
	23,887	70	Weighted Average
	11,312		47.36% Pervious Area
	12,575		52.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 4.1N: 4.1N

Hydrograph



Summary for Subcatchment 4.2N: Eastern Parking Lot

Runoff = 0.13 cfs @ 15.79 hrs, Volume= 0.068 af, Depth= 2.72"

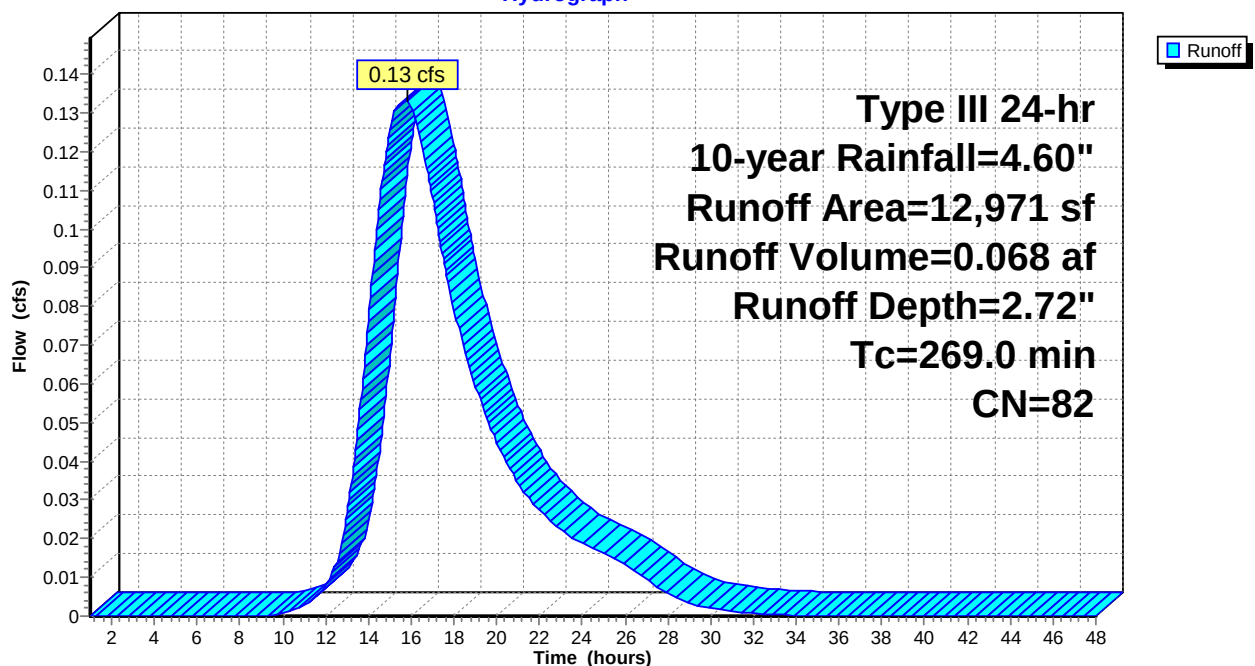
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	569	98	Sidewalk
*	2,420	98	Porous pavement
*	6,517	98	Parking lot
*	3,465	39	Landscaping/open space, HSG A
	12,971	82	Weighted Average
	3,465		26.71% Pervious Area
	9,506		73.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 4.2N: Eastern Parking Lot

Hydrograph



Summary for Subcatchment 4.3N: SC 4.3N

Runoff = 0.44 cfs @ 12.37 hrs, Volume= 0.063 af, Depth= 0.79"

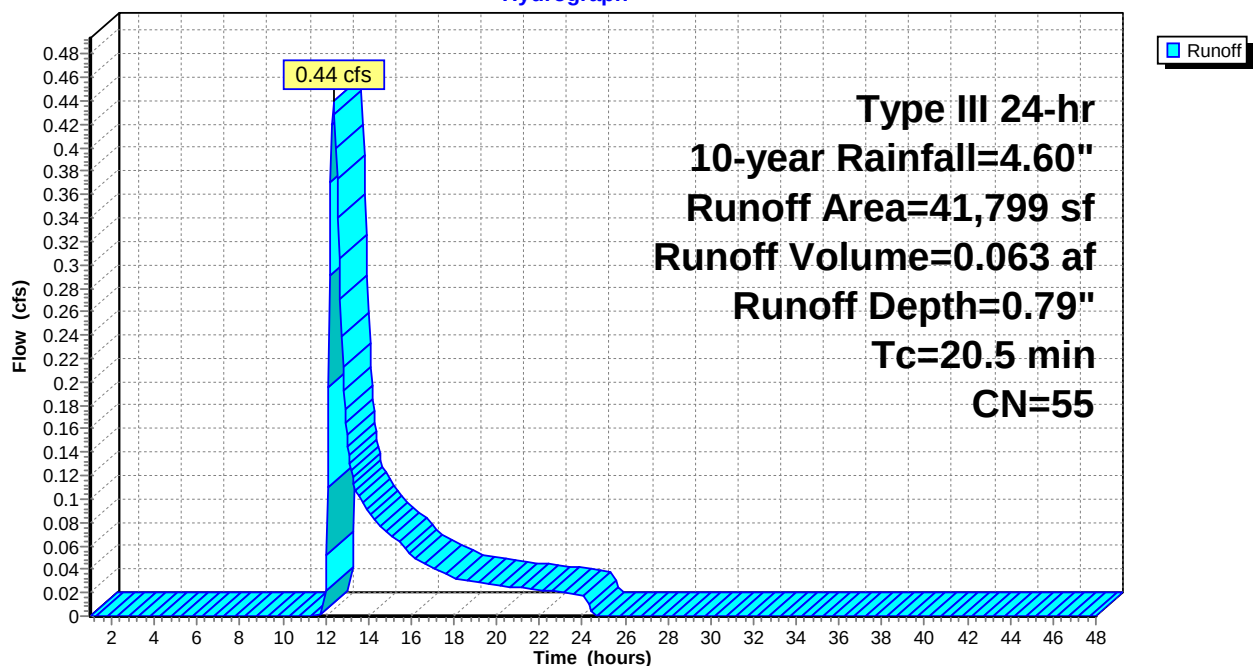
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
4,033	80	>75% Grass cover, Good, HSG D
6,717	77	Woods, Good, HSG D
18,402	30	Woods, Good, HSG A
* 1,998	39	Landscaping/slope, HSG A
* 10,649	77	Woods, Good, HSG D
41,799	55	Weighted Average
41,799		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5					Direct Entry, copy from pre

Subcatchment 4.3N: SC 4.3N

Hydrograph



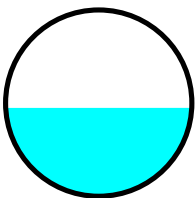
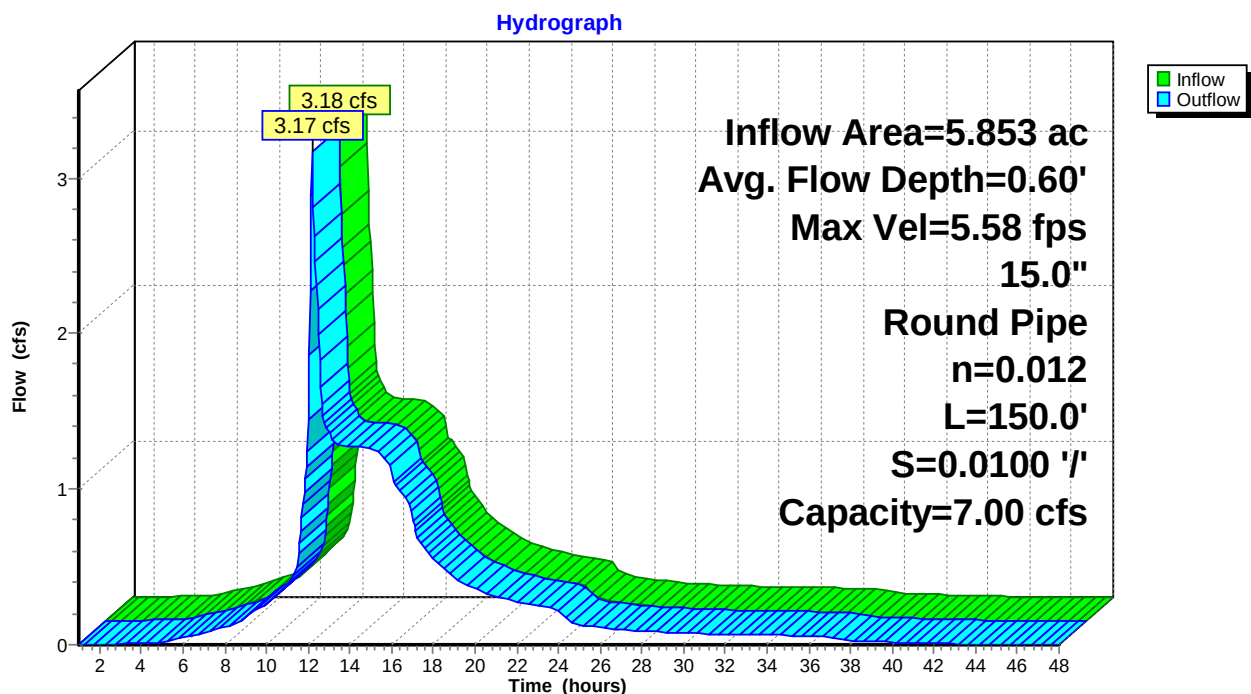
Summary for Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

Inflow Area = 5.853 ac, 48.76% Impervious, Inflow Depth > 2.06" for 10-year event
 Inflow = 3.18 cfs @ 12.18 hrs, Volume= 1.005 af
 Outflow = 3.17 cfs @ 12.20 hrs, Volume= 1.005 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.58 fps, Min. Travel Time= 0.4 min
 Avg. Velocity= 2.08 fps, Avg. Travel Time= 1.2 min

Peak Storage= 86 cf @ 12.19 hrs
 Average Depth at Peak Storage= 0.60'
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.00 cfs

15.0" Round Pipe
 n= 0.012 Concrete pipe, finished
 Length= 150.0' Slope= 0.0100 '/'
 Inlet Invert= 87.18', Outlet Invert= 85.68'

**Reach 1: POI #1 - LAMBERT/WASH INTERSECTION**

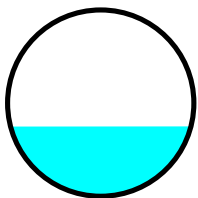
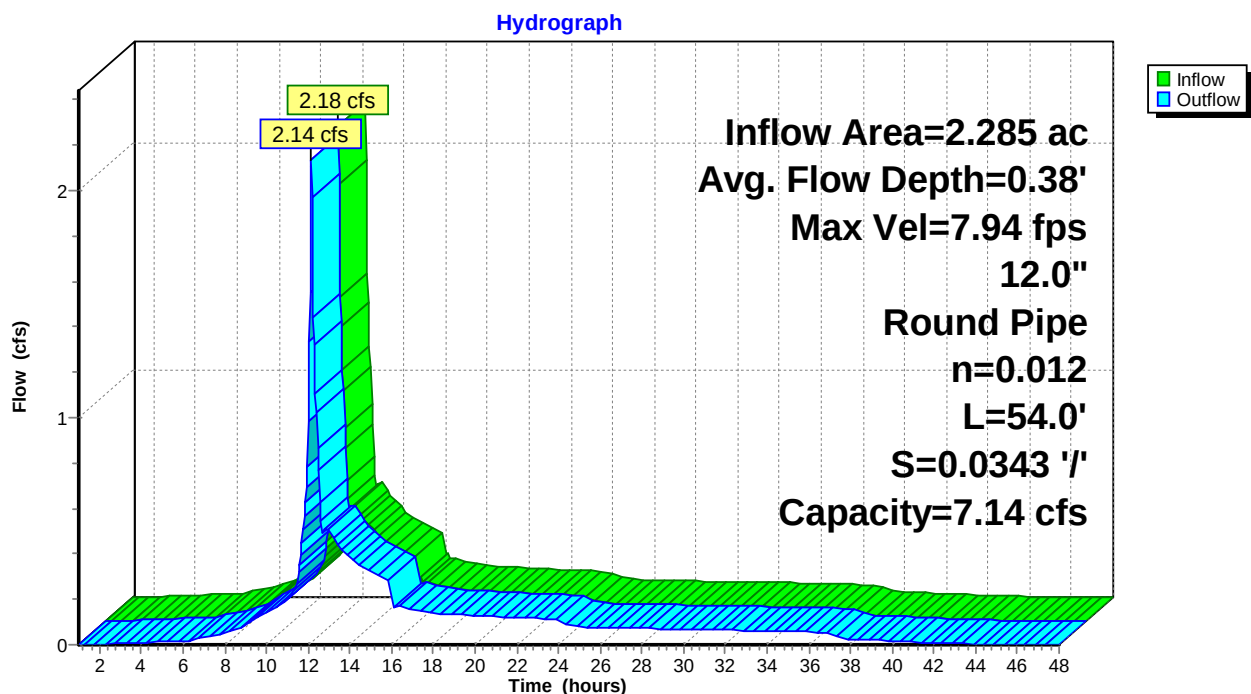
Summary for Reach 1R: N. DITCH CB OUTLET

Inflow Area = 2.285 ac, 52.04% Impervious, Inflow Depth > 2.14" for 10-year event
 Inflow = 2.18 cfs @ 12.16 hrs, Volume= 0.408 af
 Outflow = 2.14 cfs @ 12.17 hrs, Volume= 0.408 af, Atten= 2%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.94 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 2.73 fps, Avg. Travel Time= 0.3 min

Peak Storage= 15 cf @ 12.16 hrs
 Average Depth at Peak Storage= 0.38'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.14 cfs

12.0" Round Pipe
 n= 0.012
 Length= 54.0' Slope= 0.0343 '/'
 Inlet Invert= 87.63', Outlet Invert= 85.78'

**Reach 1R: N. DITCH CB OUTLET**

Summary for Reach 2R: N. DITCH

Inflow Area = 2.285 ac, 52.04% Impervious, Inflow Depth > 2.14" for 10-year event
 Inflow = 2.26 cfs @ 12.16 hrs, Volume= 0.408 af
 Outflow = 2.18 cfs @ 12.16 hrs, Volume= 0.408 af, Atten= 3%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Max. Velocity= 2.90 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 0.96 fps, Avg. Travel Time= 0.5 min

Peak Storage= 23 cf @ 12.16 hrs

Average Depth at Peak Storage= 0.29'

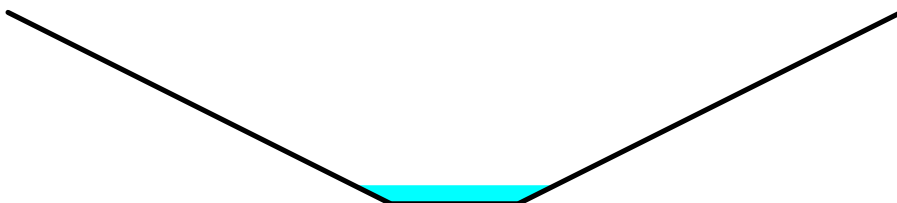
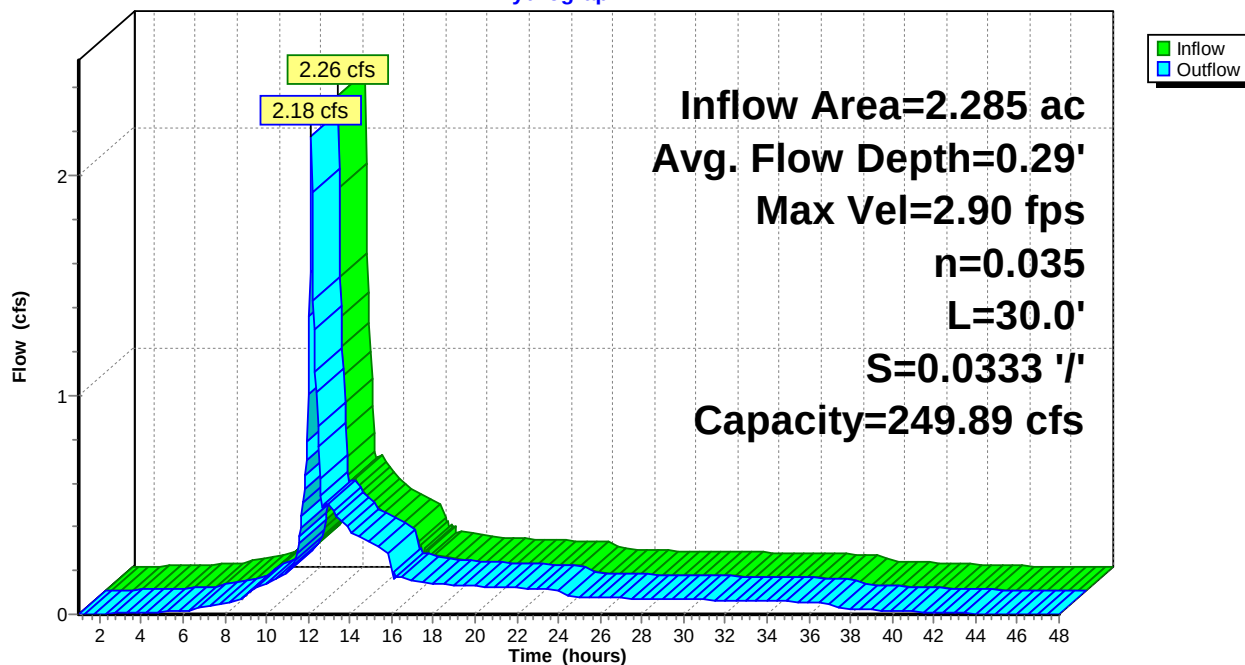
Bank-Full Depth= 3.00' Flow Area= 24.0 sf, Capacity= 249.89 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds

Side Slope Z-value= 2.0 ' Top Width= 14.00'

Length= 30.0' Slope= 0.0333 '/'

Inlet Invert= 94.00', Outlet Invert= 93.00'

**Reach 2R: N. DITCH****Hydrograph**

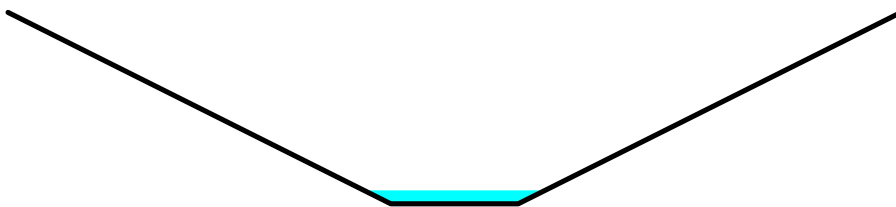
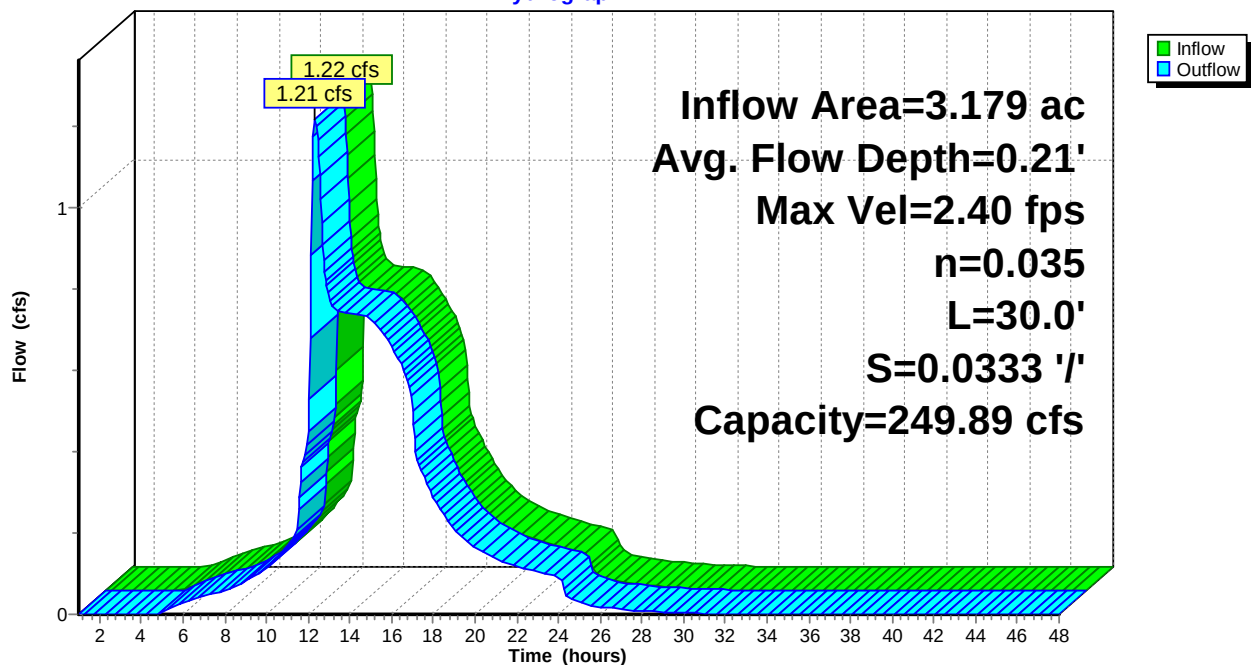
Summary for Reach 3R: S. DITCH

Inflow Area = 3.179 ac, 43.82% Impervious, Inflow Depth = 1.81" for 10-year event
 Inflow = 1.22 cfs @ 12.32 hrs, Volume= 0.479 af
 Outflow = 1.21 cfs @ 12.32 hrs, Volume= 0.479 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.40 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.5 min

Peak Storage= 15 cf @ 12.32 hrs
 Average Depth at Peak Storage= 0.21'
 Bank-Full Depth= 3.00' Flow Area= 24.0 sf, Capacity= 249.89 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
 Side Slope Z-value= 2.0 ' / ' Top Width= 14.00'
 Length= 30.0' Slope= 0.0333 ' / '
 Inlet Invert= 94.00', Outlet Invert= 93.00'

**Reach 3R: S. DITCH****Hydrograph**

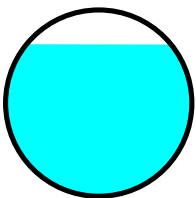
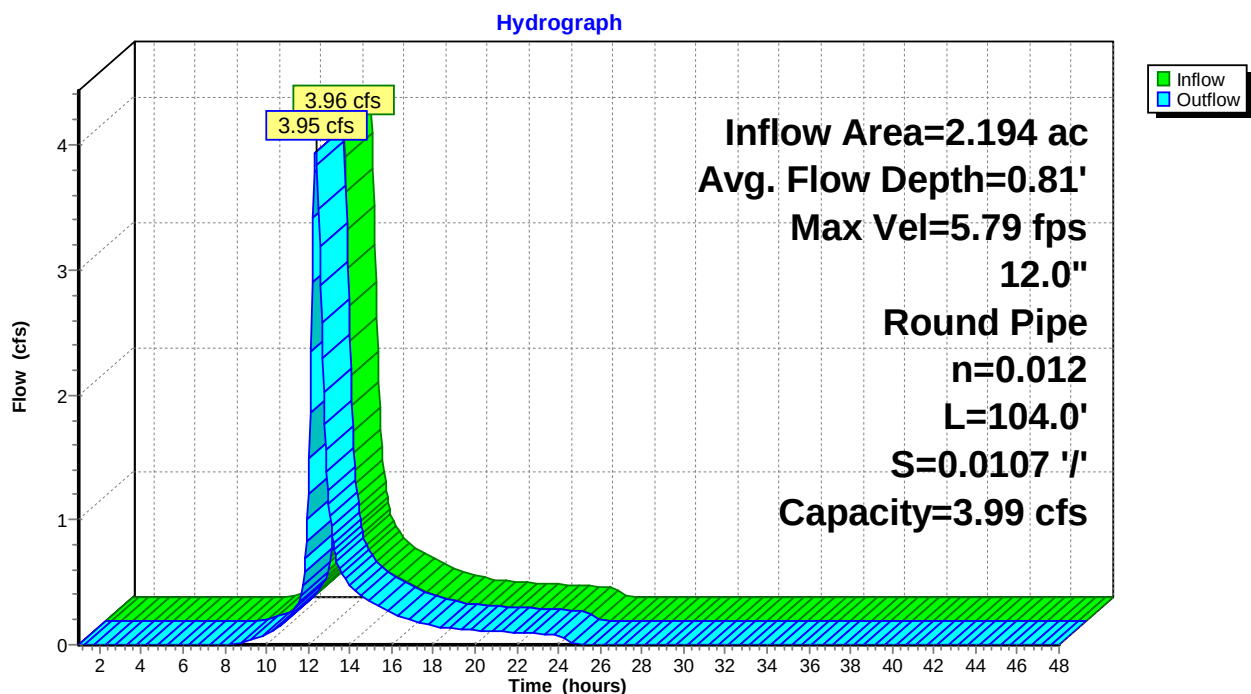
Summary for Reach 4R: WASH. CROSS CULVERT

Inflow Area = 2.194 ac, 21.93% Impervious, Inflow Depth = 2.55" for 10-year event
 Inflow = 3.96 cfs @ 12.36 hrs, Volume= 0.466 af
 Outflow = 3.95 cfs @ 12.37 hrs, Volume= 0.466 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 5.79 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.50 fps, Avg. Travel Time= 0.7 min

Peak Storage= 71 cf @ 12.36 hrs
 Average Depth at Peak Storage= 0.81'
 Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.99 cfs

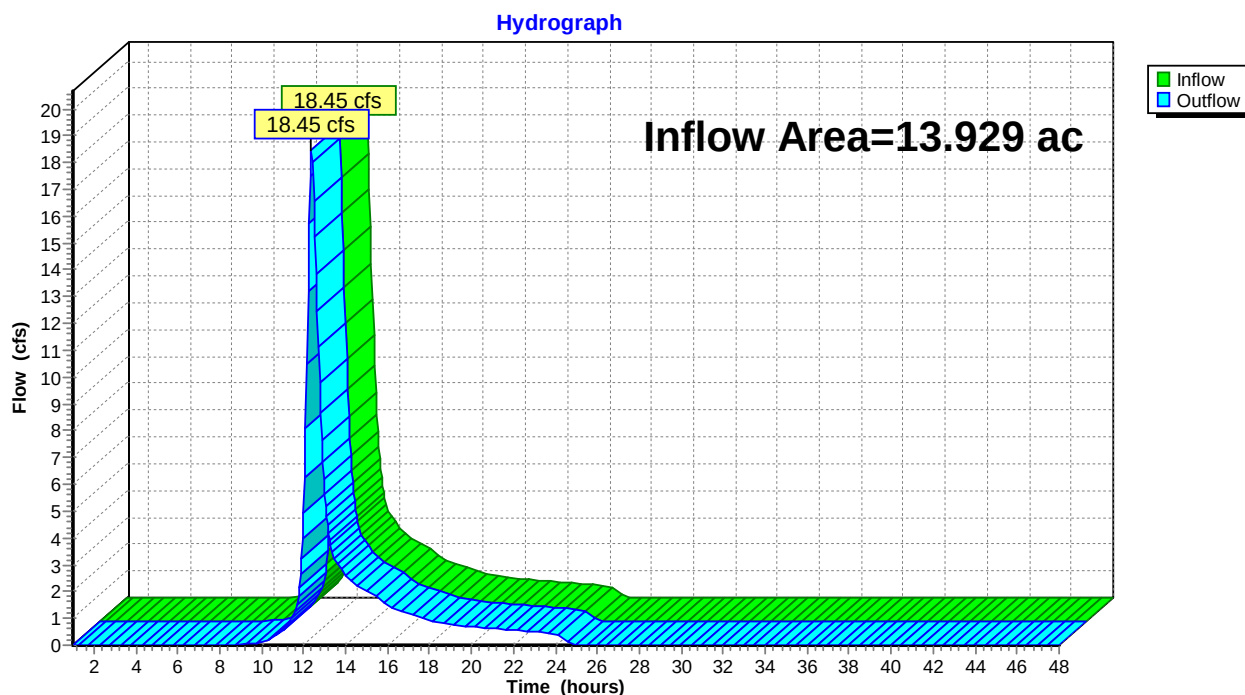
12.0" Round Pipe
 n= 0.012 Corrugated PP, smooth interior
 Length= 104.0' Slope= 0.0107 '/'
 Inlet Invert= 113.80', Outlet Invert= 112.69'

**Reach 4R: WASH. CROSS CULVERT**

Summary for Reach POI 2: POI #2 - LAMBERT CROSS CULVERT

Inflow Area = 13.929 ac, 7.79% Impervious, Inflow Depth = 1.97" for 10-year event
Inflow = 18.45 cfs @ 12.37 hrs, Volume= 2.288 af
Outflow = 18.45 cfs @ 12.37 hrs, Volume= 2.288 af, Atten= 0%, Lag= 0.0 min

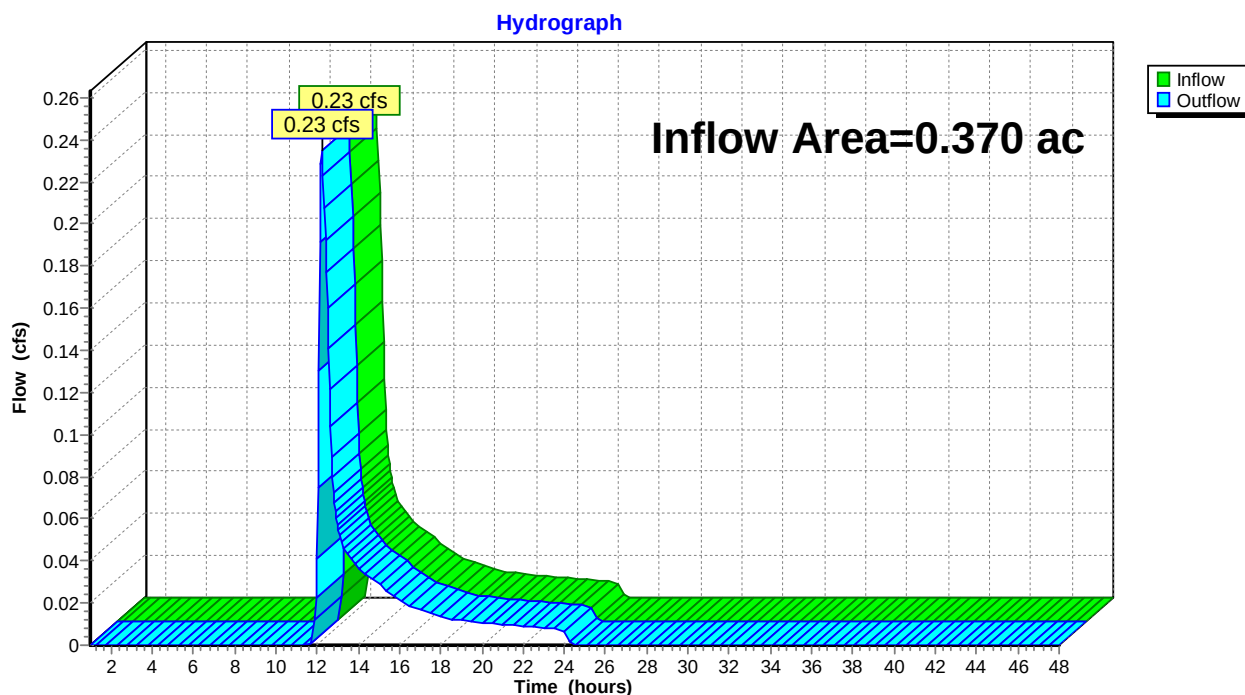
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 2: POI #2 - LAMBERT CROSS CULVERT

Summary for Reach POI 3: POI #3 - FALMOUTH WETLANDS

Inflow Area = 0.370 ac, 0.00% Impervious, Inflow Depth = 0.90" for 10-year event
Inflow = 0.23 cfs @ 12.24 hrs, Volume= 0.028 af
Outflow = 0.23 cfs @ 12.24 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 3: POI #3 - FALMOUTH WETLANDS

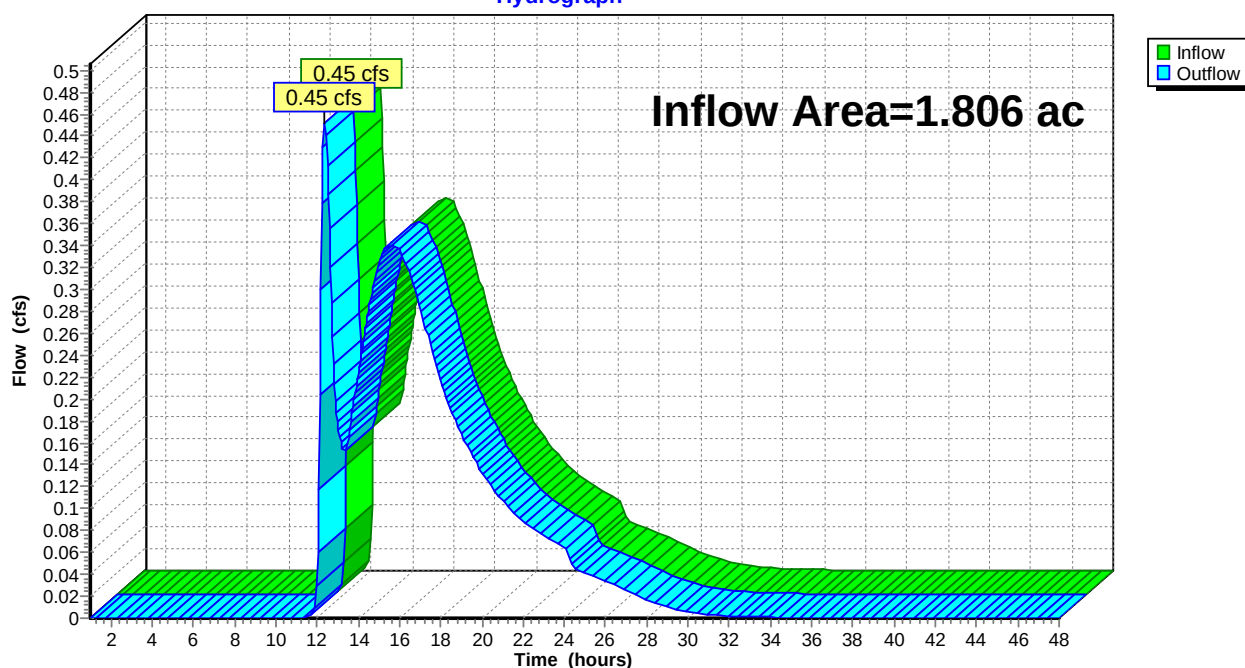
Summary for Reach POI 4: POI #4 - N STREAM

Inflow Area = 1.806 ac, 28.07% Impervious, Inflow Depth = 1.39" for 10-year event
Inflow = 0.45 cfs @ 12.37 hrs, Volume= 0.209 af
Outflow = 0.45 cfs @ 12.37 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 4: POI #4 - N STREAM

Hydrograph



Summary for Pond 1P: USSF 1 - StormTech 3500

Inflow Area = 0.992 ac, 61.97% Impervious, Inflow Depth > 2.55" for 10-year event
 Inflow = 2.37 cfs @ 12.09 hrs, Volume= 0.211 af
 Outflow = 0.24 cfs @ 13.01 hrs, Volume= 0.203 af, Atten= 90%, Lag= 54.9 min
 Primary = 0.24 cfs @ 13.01 hrs, Volume= 0.203 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 108.44' @ 13.01 hrs Surf.Area= 4,998 sf Storage= 5,108 cf

Plug-Flow detention time= 582.7 min calculated for 0.203 af (96% of inflow)

Center-of-Mass det. time= 560.6 min (1,330.1 - 769.5)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,714 cf	34.00'W x 49.00'L x 4.75'H Stone 7,914 cf Overall - 3,629 cf Embedded = 4,284 cf x 40.0% Voids
#2	105.50'	3,629 cf	ADS StormTech MC-3500 d +Cap @ 7.50' L x 30 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.50'L = 115.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 30 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
#3	103.50'	125 cf	34.00'W x 49.00'L x 1.50'H Sand 2,499 cf Overall x 5.0% Voids
#4	102.50'	661 cf	34.00'W x 49.00'L x 1.00'H Crushed Stone 1,666 cf Overall - 13 cf Embedded = 1,653 cf x 40.0% Voids
#5	102.75'	13 cf	4.0" Round Underdrain Storage Inside #4 L= 150.0'
		6,142 cf	Total Available Storage

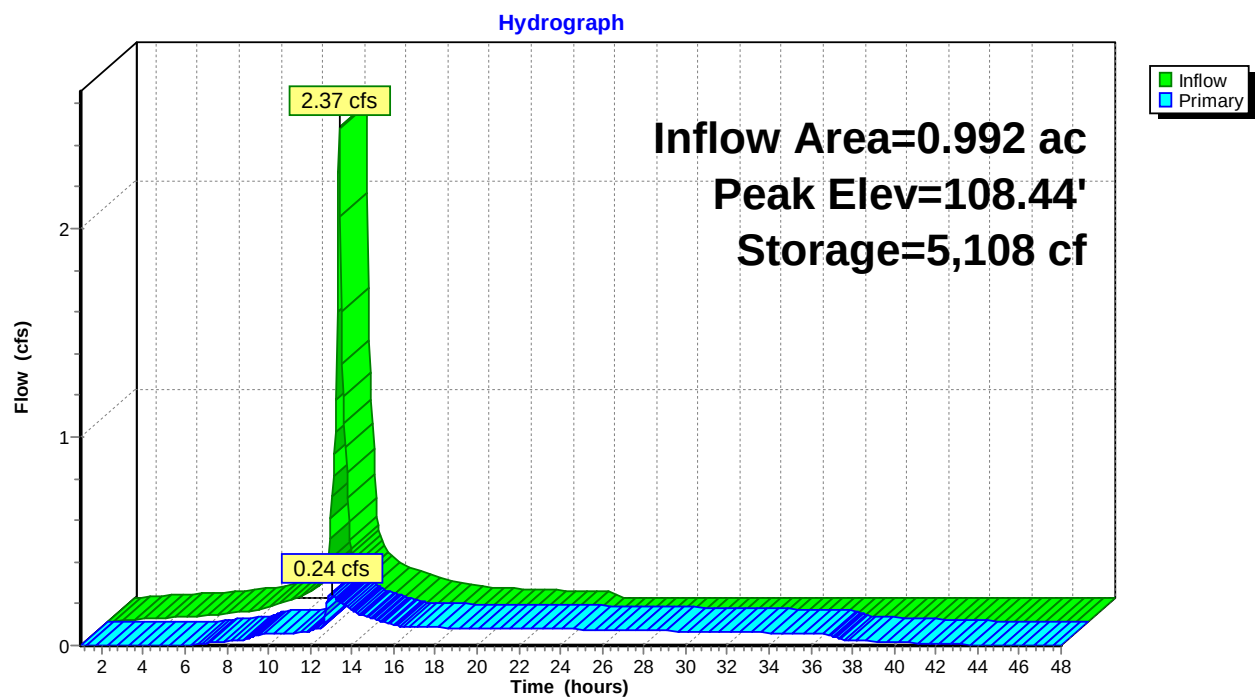
Device	Routing	Invert	Outlet Devices
#1	Primary	103.00'	1.2" Vert. Underdrain/Orifice C= 0.600
#2	Primary	108.27'	6.0" Round Bypass Overflow X 2.00 L= 6.0' Ke= 0.600 Inlet / Outlet Invert= 108.27' / 108.00' S= 0.0450 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.24 cfs @ 13.01 hrs HW=108.44' (Free Discharge)

↑ **1=Underdrain/Orifice** (Orifice Controls 0.09 cfs @ 11.18 fps)

└ **2=Bypass Overflow** (Inlet Controls 0.15 cfs @ 1.31 fps)

Pond 1P: USSF 1 - StormTech 3500



Summary for Pond 2P: Pavement Profile/Drainage

Inflow Area = 0.298 ac, 73.29% Impervious, Inflow Depth = 2.72" for 10-year event
 Inflow = 0.13 cfs @ 15.79 hrs, Volume= 0.068 af
 Outflow = 0.13 cfs @ 15.80 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.7 min
 Primary = 0.13 cfs @ 15.80 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 109.00' @ 15.80 hrs Surf.Area= 140 sf Storage= 34 cf

Plug-Flow detention time= 9.7 min calculated for 0.067 af (100% of inflow)

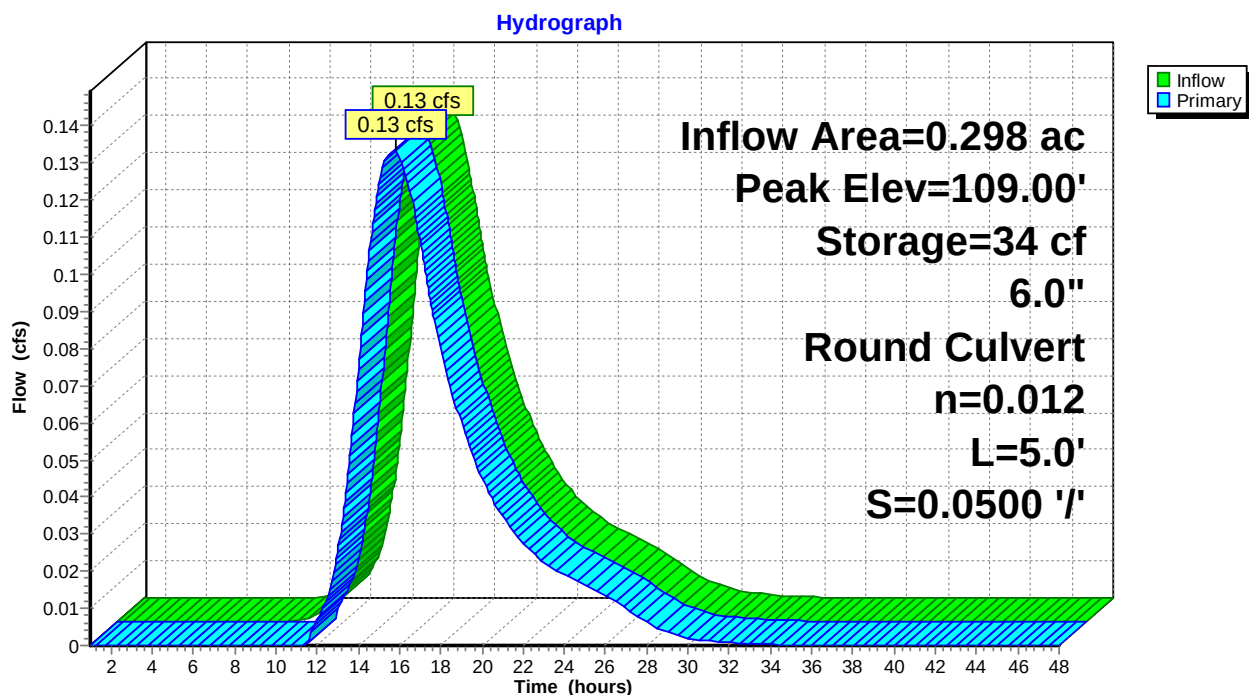
Center-of-Mass det. time= 5.6 min (1,070.3 - 1,064.7)

Volume	Invert	Avail.Storage	Storage Description
#1	108.50'	48 cf	1.33'W x 105.00'L x 1.00'H 6" Trench 140 cf Overall - 21 cf Embedded = 119 cf x 40.0% Voids
#2	109.50'	189 cf	18.00'W x 105.00'L x 0.25'H 3" - 3/4" Stone 473 cf Overall x 40.0% Voids
#3	109.75'	78 cf	18.00'W x 105.00'L x 0.83'H 10" - Filter MDOT Type D 1,569 cf Overall x 5.0% Voids
#4	110.58'	249 cf	18.00'W x 105.00'L x 0.33'H 4" - Choker 1-1/2" 624 cf Overall x 40.0% Voids
#5	110.91'	125 cf	18.00'W x 105.00'L x 0.33'H 4" - OGFC 624 cf Overall x 20.0% Voids
#6	108.75'	21 cf	6.0" Round 6 SD Inside #1 L= 105.0'
710 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	108.75'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 108.75' / 108.50' S= 0.0500 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.13 cfs @ 15.80 hrs HW=109.00' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.13 cfs @ 1.35 fps)

Pond 2P: Pavement Profile/Drainage

Summary for Pond 3P: Pavement Profile/Drainage

Inflow Area = 0.548 ac, 52.64% Impervious, Inflow Depth = 1.74" for 10-year event
 Inflow = 0.15 cfs @ 15.85 hrs, Volume= 0.080 af
 Outflow = 0.15 cfs @ 15.94 hrs, Volume= 0.078 af, Atten= 0%, Lag= 5.5 min
 Primary = 0.15 cfs @ 15.94 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 107.67' @ 15.94 hrs Surf.Area= 557 sf Storage= 143 cf

Plug-Flow detention time= 30.2 min calculated for 0.078 af (98% of inflow)

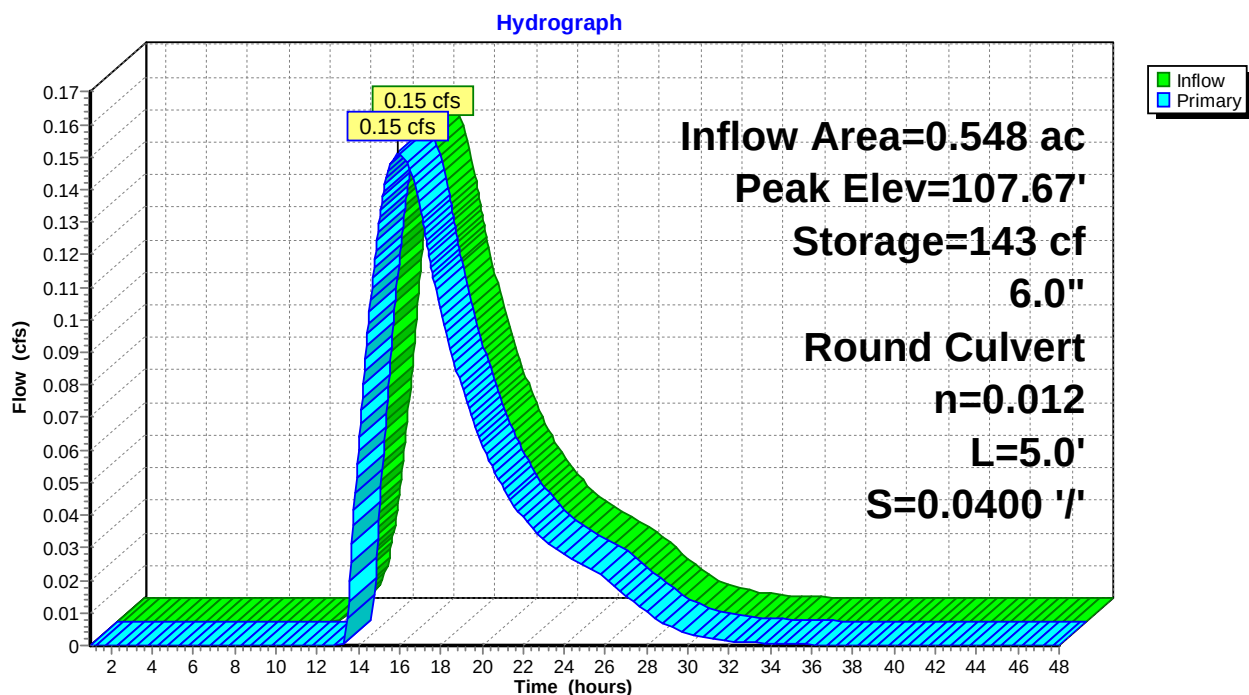
Center-of-Mass det. time= 18.7 min (1,116.0 - 1,097.3)

Volume	Invert	Avail.Storage	Storage Description
#1	107.15'	190 cf	1.33'W x 419.00'L x 1.00'H 6" Trench 557 cf Overall - 82 cf Embedded = 475 cf x 40.0% Voids
#2	108.15'	461 cf	11.00'W x 419.00'L x 0.25'H 3" - 3/4" Stone 1,152 cf Overall x 40.0% Voids
#3	108.40'	191 cf	11.00'W x 419.00'L x 0.83'H 10" - Filter MDOT Type D 3,825 cf Overall x 5.0% Voids
#4	109.23'	608 cf	11.00'W x 419.00'L x 0.33'H 4" - Choker 1-1/2" 1,521 cf Overall x 40.0% Voids
#5	109.56'	304 cf	11.00'W x 419.00'L x 0.33'H 4" - OGFC 1,521 cf Overall x 20.0% Voids
#6	107.40'	82 cf	6.0" Round 6 SD Inside #1 L= 419.0'
		1,837 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	107.40'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 107.40' / 107.20' S= 0.0400 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.15 cfs @ 15.94 hrs HW=107.67' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.15 cfs @ 1.40 fps)

Pond 3P: Pavement Profile/Drainage

Summary for Pond 4P: Pavement Profile/Drainage

Inflow Area = 0.358 ac, 69.20% Impervious, Inflow Depth = 3.70" for 10-year event
 Inflow = 0.22 cfs @ 15.53 hrs, Volume= 0.110 af
 Outflow = 0.22 cfs @ 15.52 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.22 cfs @ 15.52 hrs, Volume= 0.110 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 110.26' @ 15.52 hrs Surf.Area= 203 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.110 af (100% of inflow)

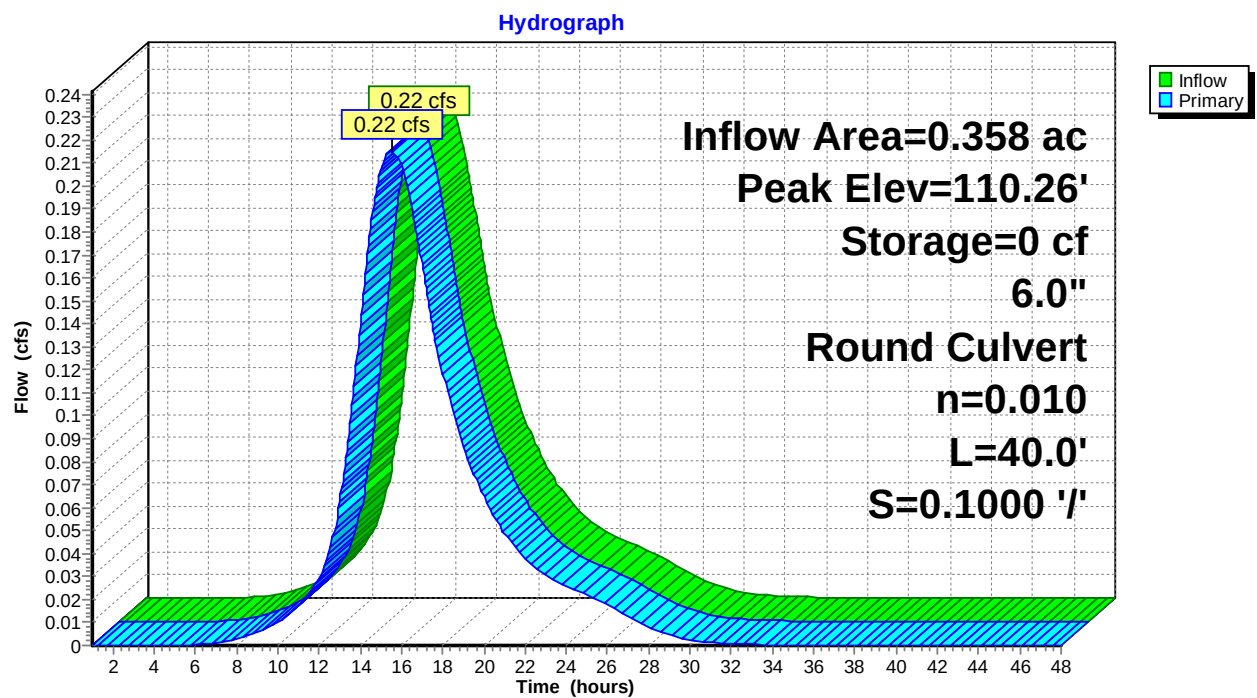
Center-of-Mass det. time= 0.0 min (1,030.2 - 1,030.1)

Volume	Invert	Avail.Storage	Storage Description
#1	110.25'	76 cf	1.50'W x 135.00'L x 1.00'H 6" Trench 203 cf Overall - 12 cf Embedded = 191 cf x 40.0% Voids
#2	111.25'	371 cf	11.00'W x 337.00'L x 0.25'H 3" - 3/4" Stone 927 cf Overall x 40.0% Voids
#3	112.08'	62 cf	11.00'W x 135.00'L x 0.83'H 10" - Filter MDOT Type D 1,233 cf Overall x 5.0% Voids
#4	112.41'	196 cf	11.00'W x 135.00'L x 0.33'H 4" - Choker 1-1/2" 490 cf Overall x 40.0% Voids
#5	112.74'	98 cf	11.00'W x 135.00'L x 0.33'H 4" - OGFC 490 cf Overall x 20.0% Voids
#6	110.50'	12 cf	4.0" Round 6 SD Inside #1 L= 135.0'
814 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	108.00'	6.0" Round 6" Pipe L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 108.00' / 104.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.06 cfs @ 15.52 hrs HW=110.26' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 1.06 cfs @ 5.38 fps)

Pond 4P: Pavement Profile/Drainage

Summary for Pond 5P: Pavement Profile/Drainage

Inflow Area = 0.282 ac, 91.32% Impervious, Inflow Depth = 3.81" for 10-year event
 Inflow = 0.17 cfs @ 15.51 hrs, Volume= 0.090 af
 Outflow = 0.17 cfs @ 15.53 hrs, Volume= 0.088 af, Atten= 0%, Lag= 1.3 min
 Primary = 0.17 cfs @ 15.53 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 104.89' @ 15.53 hrs Surf.Area= 216 sf Storage= 85 cf

Plug-Flow detention time= 22.7 min calculated for 0.088 af (98% of inflow)

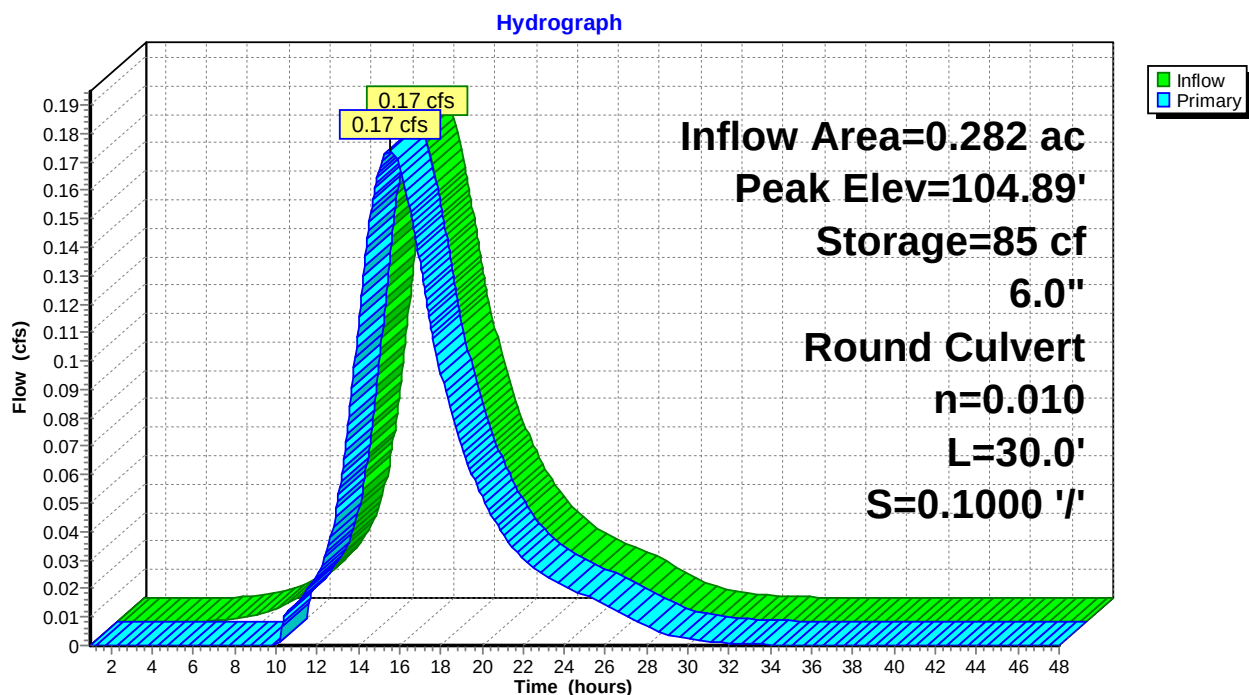
Center-of-Mass det. time= 11.4 min (1,036.9 - 1,025.6)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	81 cf	1.50'W x 144.00'L x 1.00'H 6" Underdrained Trench 216 cf Overall - 13 cf Embedded = 203 cf x 40.0% Voids
#2	105.00'	259 cf	18.00'W x 144.00'L x 0.25'H 3" - 3/4" Stone 648 cf Overall x 40.0% Voids
#3	105.25'	108 cf	18.00'W x 144.00'L x 0.83'H 10" - Filter MDOT Type D 2,151 cf Overall x 5.0% Voids
#4	106.08'	342 cf	18.00'W x 144.00'L x 0.33'H 4" - Choker 1-1/2" 855 cf Overall x 40.0% Voids
#5	106.41'	171 cf	18.00'W x 144.00'L x 0.33'H 4" - OGFC 855 cf Overall x 20.0% Voids
#6	104.25'	13 cf	4.0" Round 4 SD Inside #1 L= 144.0'
974 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	104.60'	6.0" Round 6" Pipe L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 104.60' / 101.60' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.17 cfs @ 15.53 hrs HW=104.89' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.17 cfs @ 1.45 fps)

Pond 5P: Pavement Profile/Drainage

Summary for Pond 6P: USSF 2 - StormTech 3500

Inflow Area = 1.164 ac, 59.23% Impervious, Inflow Depth > 3.06" for 10-year event
 Inflow = 3.49 cfs @ 12.09 hrs, Volume= 0.297 af
 Outflow = 0.52 cfs @ 12.65 hrs, Volume= 0.292 af, Atten= 85%, Lag= 33.5 min
 Primary = 0.52 cfs @ 12.65 hrs, Volume= 0.292 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 104.21' @ 12.65 hrs Surf.Area= 6,091 sf Storage= 4,798 cf

Plug-Flow detention time= 105.2 min calculated for 0.292 af (98% of inflow)

Center-of-Mass det. time= 95.6 min (870.2 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1	101.50'	2,418 cf	35.08'W x 57.88'L x 4.75'H Stone 9,645 cf Overall - 3,599 cf Embedded = 6,045 cf x 40.0% Voids
#2	102.00'	3,599 cf	ADS StormTech MC-3500 d +Cap @ 7.50' L x 30 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.50'L = 115.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 30 Chambers in 5 Rows Cap Storage= +14.9 cf x 2 x 5 rows = 149.0 cf
#3	100.00'	152 cf	35.08'W x 57.88'L x 1.50'H Sand 3,046 cf Overall x 5.0% Voids
#4	99.00'	807 cf	35.08'W x 57.88'L x 1.00'H Crushed Stone 2,030 cf Overall - 13 cf Embedded = 2,017 cf x 40.0% Voids
#5	99.33'	13 cf	4.0" Round Underdrain Storage Inside #4 L= 150.0'
6,990 cf			Total Available Storage

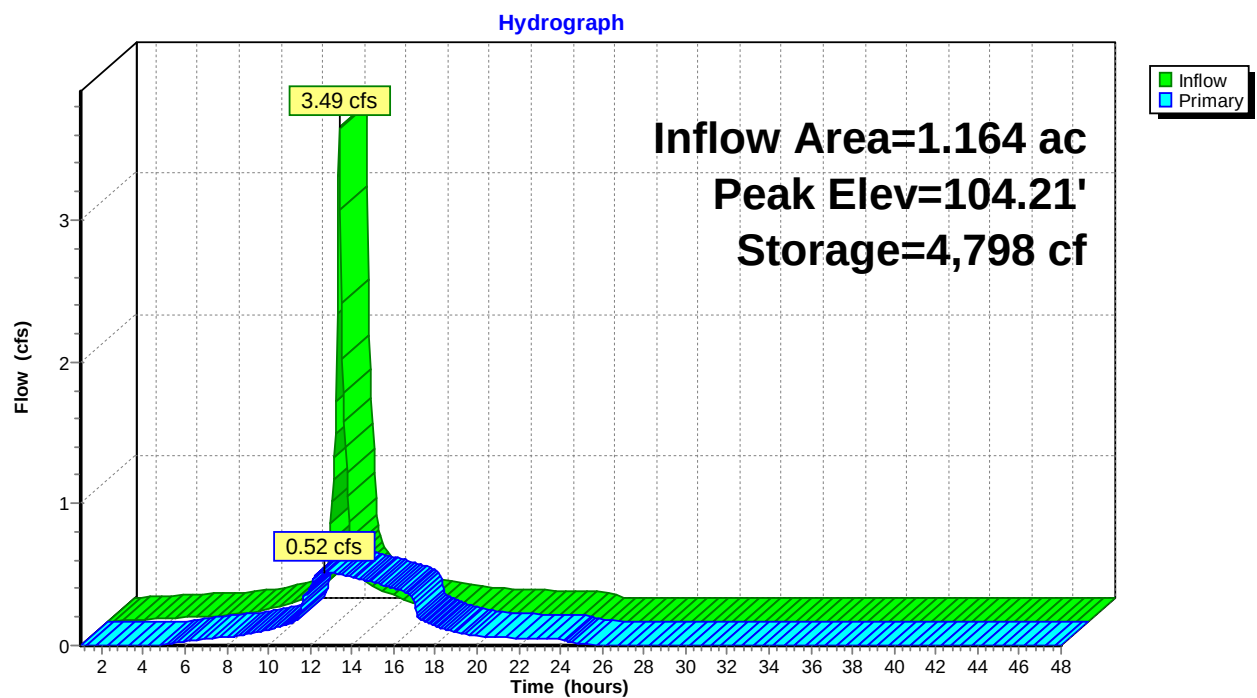
Device	Routing	Invert	Outlet Devices
#1	Primary	99.25'	3.0" Vert. Underdrain/Orifice C= 0.600
#2	Primary	104.77'	6.0" Round Bypass Overflow X 3.00 L= 7.0' Ke= 0.600 Inlet / Outlet Invert= 104.77' / 104.00' S= 0.1100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.52 cfs @ 12.65 hrs HW=104.21' (Free Discharge)

↑ **1=Underdrain/Orifice** (Orifice Controls 0.52 cfs @ 10.59 fps)

— **2=Bypass Overflow** (Controls 0.00 cfs)

Pond 6P: USSF 2 - StormTech 3500



Summary for Pond 7P: 6+00 Rain Garden

Inflow Area = 0.398 ac, 64.38% Impervious, Inflow Depth = 2.85" for 10-year event
 Inflow = 1.24 cfs @ 12.09 hrs, Volume= 0.094 af
 Outflow = 1.08 cfs @ 12.17 hrs, Volume= 0.094 af, Atten= 13%, Lag= 4.6 min
 Primary = 1.08 cfs @ 12.17 hrs, Volume= 0.094 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 109.96' @ 12.17 hrs Surf.Area= 765 sf Storage= 769 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 27.8 min (828.6 - 800.8)

Volume	Invert	Avail.Storage	Storage Description
#1	108.00'	902 cf	Ponding above surface (Prismatic) Listed below (Recalc)
#2	106.50'	31 cf	Soil Filter/Loam Topsoil (Prismatic) Listed below (Recalc)
			314 cf Overall x 10.0% Voids
			933 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
108.00	209	0	0
109.00	374	292	292
110.00	564	469	761
110.25	564	141	902

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	209	0	0
108.00	209	314	314

Device	Routing	Invert	Outlet Devices
#1	Primary	105.50'	12.0" Round Culvert L= 10.0' Ke= 0.600 Inlet / Outlet Invert= 105.50' / 105.35' S= 0.0150 ' / Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	106.50'	0.13 cfs Exfiltration when above 106.50'
#3	Primary	109.75'	12.0" Horiz. Beehive Overflow C= 0.600 Limited to weir flow at low heads

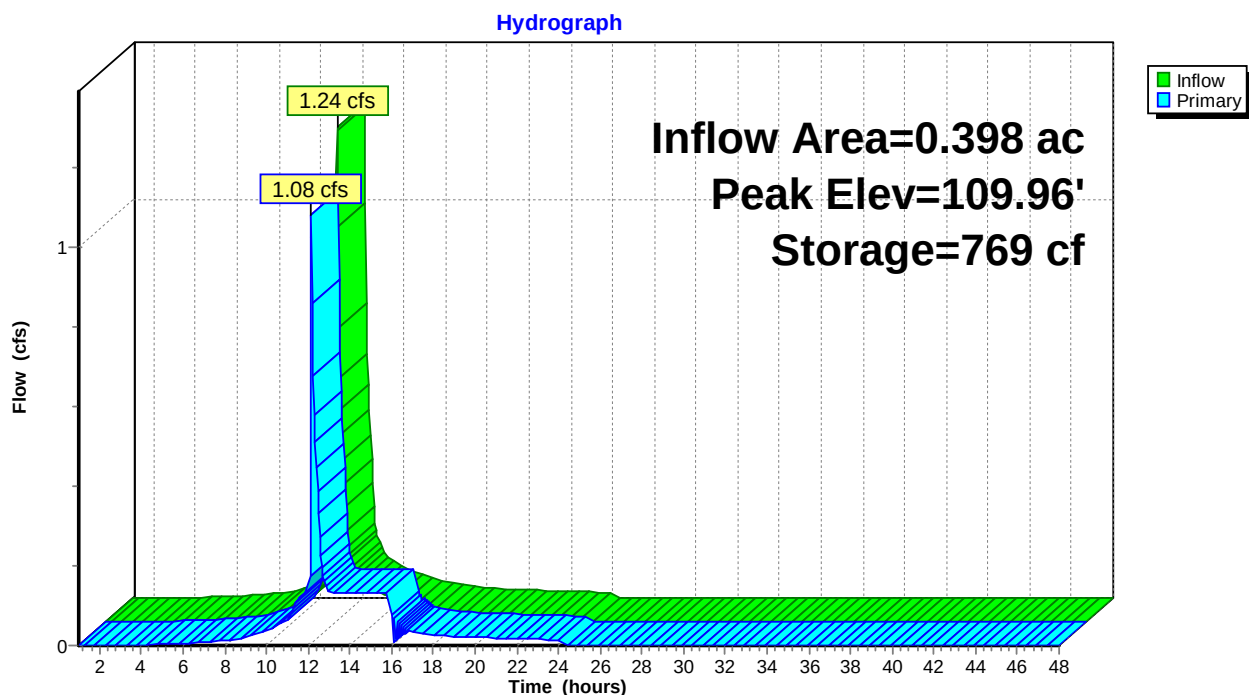
Primary OutFlow Max=0.96 cfs @ 12.17 hrs HW=109.94' (Free Discharge)

1=Culvert (Passes 0.13 cfs of 7.04 cfs potential flow)

2=Exfiltration (Exfiltration Controls 0.13 cfs)

3=Beehive Overflow (Weir Controls 0.83 cfs @ 1.42 fps)

Pond 7P: 6+00 Rain Garden



Summary for Pond 8P: Pavement Profile/Drainage

Inflow Area = 0.234 ac, 82.25% Impervious, Inflow Depth = 4.02" for 10-year event
 Inflow = 0.15 cfs @ 15.30 hrs, Volume= 0.079 af
 Outflow = 0.15 cfs @ 15.30 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.15 cfs @ 15.30 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 111.80' @ 15.30 hrs Surf.Area= 180 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.078 af (100% of inflow)

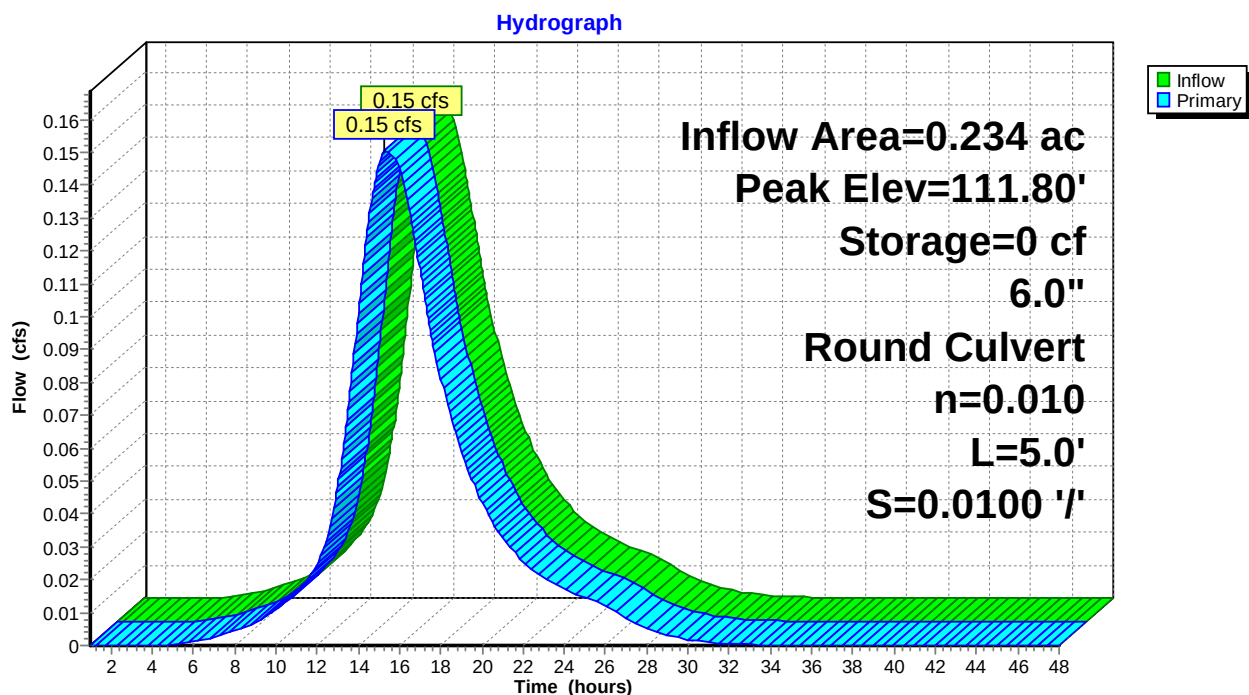
Center-of-Mass det. time= 0.0 min (1,015.2 - 1,015.2)

Volume	Invert	Avail.Storage	Storage Description
#1	111.80'	55 cf	1.33'W x 135.00'L x 0.83'H 4" Trench 149 cf Overall - 12 cf Embedded = 137 cf x 40.0% Voids
#2	112.59'	243 cf	49.30'W x 49.30'L x 0.25'H 3" - 3/4" Stone 608 cf Overall x 40.0% Voids
#3	112.84'	101 cf	49.30'W x 49.30'L x 0.83'H 10" - Filter MDOT Type D 2,017 cf Overall x 5.0% Voids
#4	113.67'	321 cf	49.30'W x 49.30'L x 0.33'H 4" - Choker 1-1/2" 802 cf Overall x 40.0% Voids
#5	114.00'	160 cf	49.30'W x 49.30'L x 0.33'H 4" - OGFC 802 cf Overall x 20.0% Voids
#6	111.80'	12 cf	4.0" Round 4 SD Inside #1 L= 135.0' S= 0.0010 '/'
		892 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	61.65'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 61.65' / 61.60' S= 0.0100 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=5.27 cfs @ 15.30 hrs HW=111.80' (Free Discharge)

↑**1=6" Pipe** (Inlet Controls 5.27 cfs @ 26.85 fps)

Pond 8P: Pavement Profile/Drainage

Summary for Pond 9P: 4+25 Rain Garden

Inflow Area = 0.201 ac, 65.94% Impervious, Inflow Depth = 2.46" for 10-year event
 Inflow = 0.57 cfs @ 12.09 hrs, Volume= 0.041 af
 Outflow = 0.53 cfs @ 12.12 hrs, Volume= 0.041 af, Atten= 8%, Lag= 1.9 min
 Primary = 0.53 cfs @ 12.12 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 103.30' @ 12.12 hrs Surf.Area= 199 sf Storage= 95 cf

Plug-Flow detention time= 25.0 min calculated for 0.041 af (100% of inflow)

Center-of-Mass det. time= 23.2 min (851.4 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1	102.50'	195 cf	Ponding above surface (Prismatic) Listed below (Recalc)
#2	101.00'	9 cf	Soil Filter (Prismatic) Listed below (Recalc)
			90 cf Overall x 10.0% Voids
			204 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.50	60	0	0
103.00	126	47	47
104.00	170	148	195

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	60	0	0
102.50	60	90	90

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	8.0" Round Culvert L= 78.0' Ke= 0.600 Inlet / Outlet Invert= 99.75' / 99.30' S= 0.0058 ' / Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	102.00'	0.01 cfs Exfiltration when above 102.00'
#3	Device 1	103.00'	6.0" Horiz. Beehive Overflow C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.52 cfs @ 12.12 hrs HW=103.29' (Free Discharge)

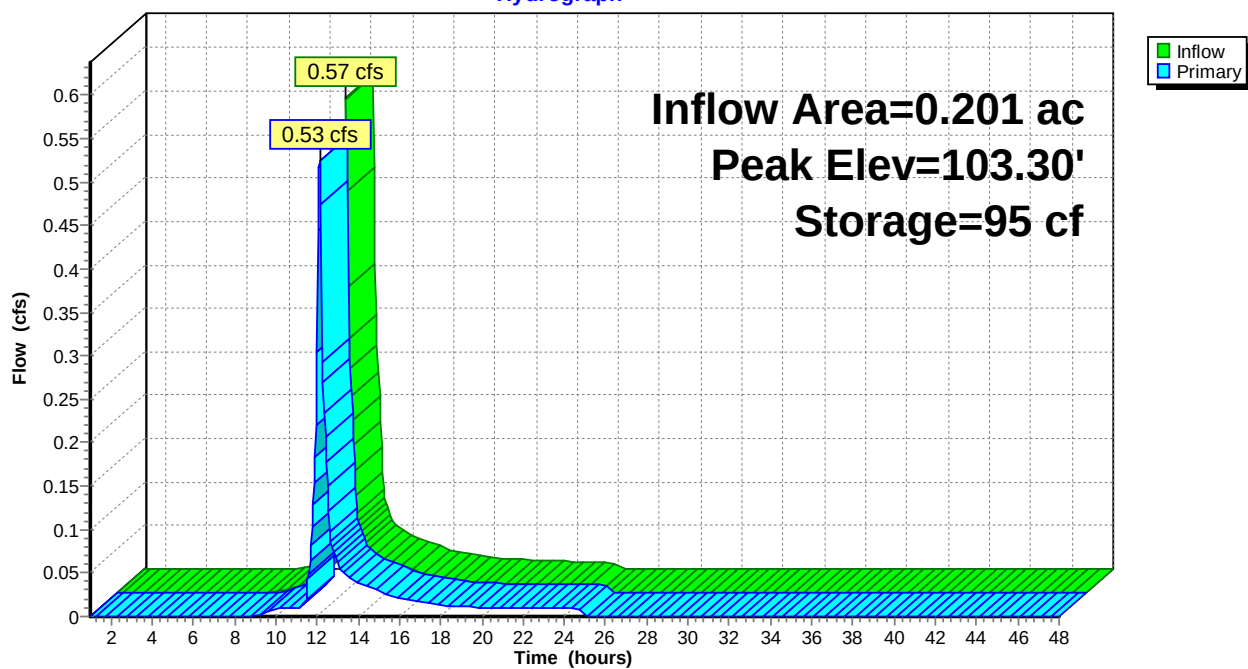
1=Culvert (Passes 0.52 cfs of 2.24 cfs potential flow)

2=Exfiltration (Exfiltration Controls 0.01 cfs)

3=Beehive Overflow (Orifice Controls 0.51 cfs @ 2.58 fps)

Pond 9P: 4+25 Rain Garden

Hydrograph



Summary for Subcatchment 1.1N: SC 1.1N

Runoff = 0.02 cfs @ 13.85 hrs, Volume= 0.009 af, Depth= 0.21"

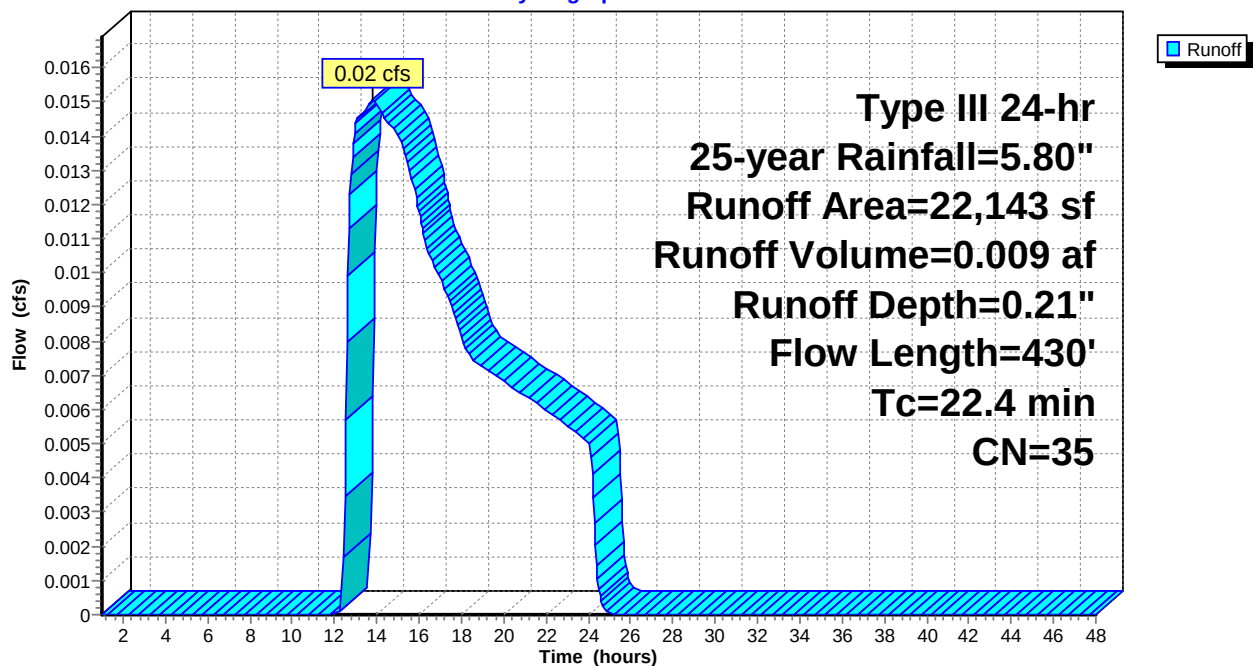
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	7,797	39	Roadside ditch and shrubs, HSG A
	9,907	30	Woods, Good, HSG A
*	1,713	39	Landscaping/open space, HSG A
*	2,726	39	Landscaping/roadside ditch
	22,143	35	Weighted Average
	22,143		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	70	0.0400	0.06		Sheet Flow, SF (A to B) Woods: Dense underbrush n= 0.800 P2= 3.27"
0.1	20	0.4000	3.16		Shallow Concentrated Flow, SCF (B to C) Woodland Kv= 5.0 fps
1.2	340	0.0310	4.64	17.83	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 & 4.5 ' Top.W=7.60' n= 0.035
22.4	430	Total			

Subcatchment 1.1N: SC 1.1N

Hydrograph



Summary for Subcatchment 1.1S: Roofs

Runoff = 3.44 cfs @ 12.09 hrs, Volume= 0.287 af, Depth> 5.56"

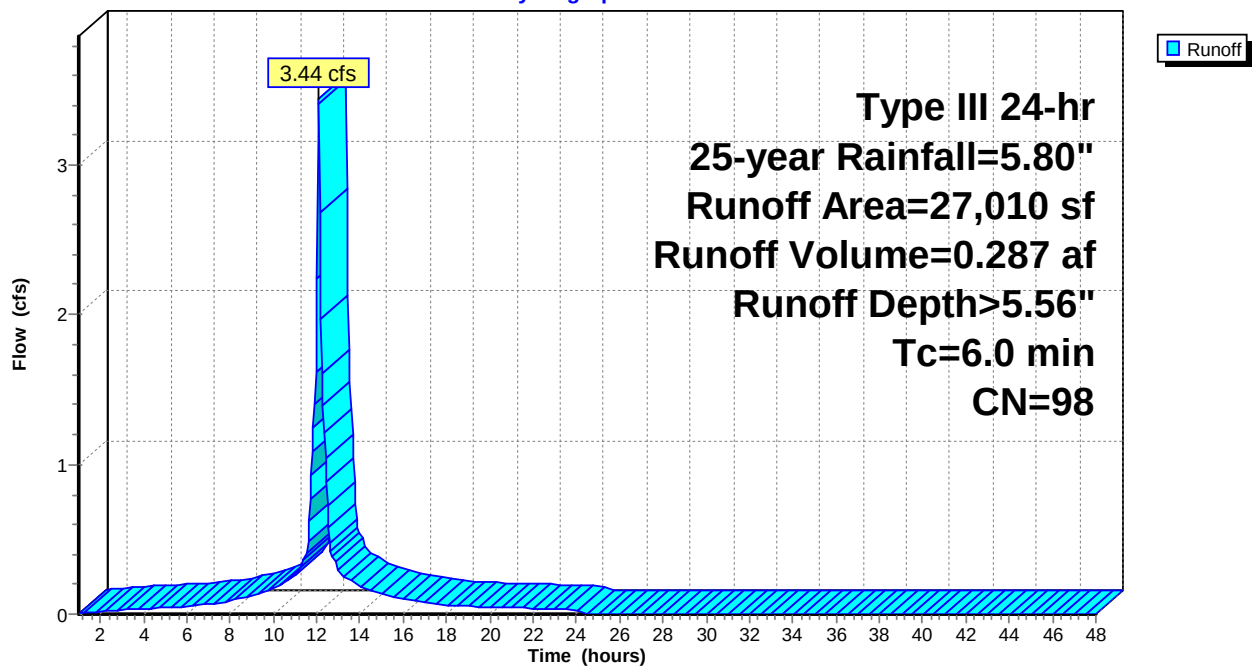
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	27,010	98	Roofs
	27,010		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.1S: Roofs

Hydrograph



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Type III 24-hr 25-year Rainfall=5.80"

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Summary for Subcatchment 1.2N: SC 1.2N

Runoff = 0.81 cfs @ 12.09 hrs, Volume= 0.059 af, Depth= 3.50"

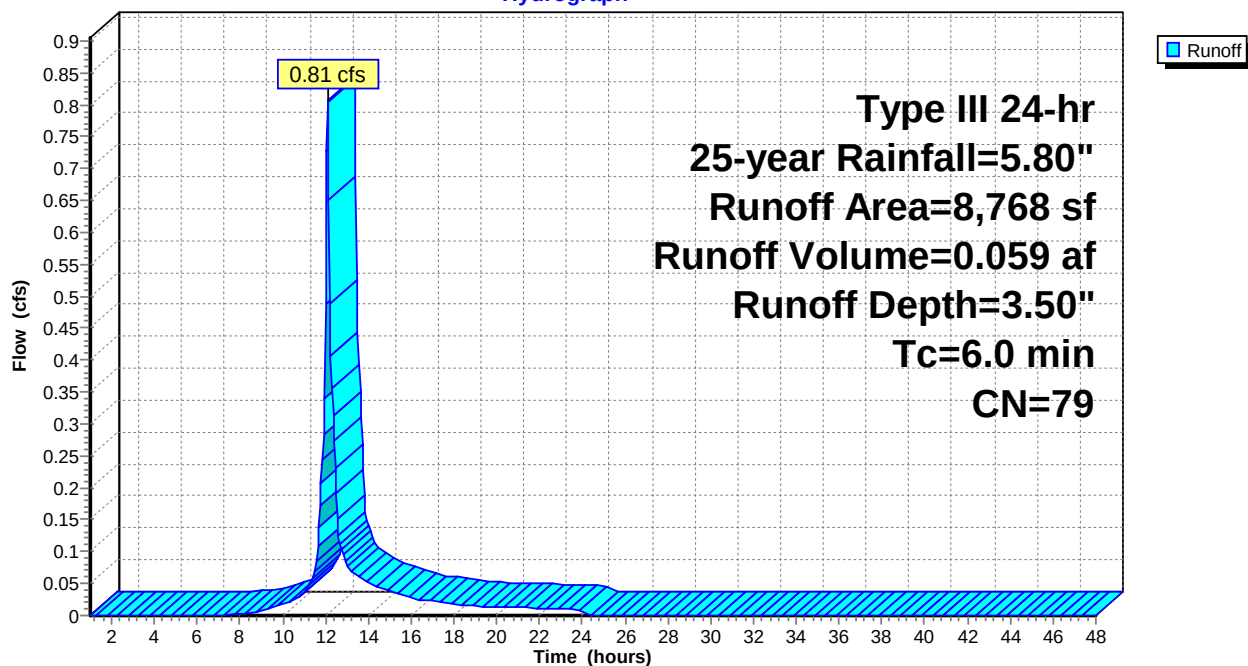
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	3,404	98	Wash Ave
*	360	98	A.2 patios
*	1,978	98	sidewalk
*	40	98	pavers
*	149	80	grass pavers
*	2,837	39	Lawn/landscaping/HSG A
	8,768	79	Weighted Average
	2,986		34.06% Pervious Area
	5,782		65.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.2N: SC 1.2N

Hydrograph



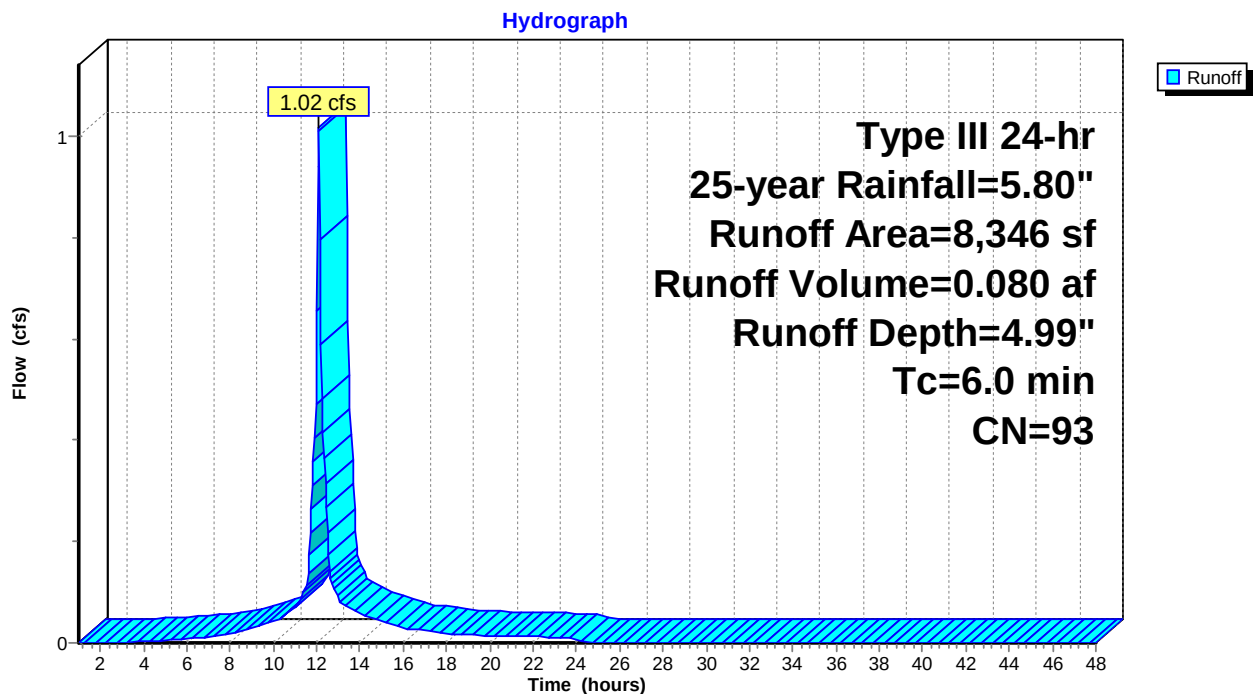
Summary for Subcatchment 1.2S: Property Frontage

Runoff = 1.02 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	3,666	98	Wash. Ave
*	1,206	98	Sidewalk
*	406	98	patio
*	16	98	t pad
*	374	98	driveway
*	518	98	sidewalk
*	48	98	bustop
	2,112	80	>75% Grass cover, Good, HSG D
	8,346	93	Weighted Average
	2,112		25.31% Pervious Area
	6,234		74.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.2S: Property Frontage

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Type III 24-hr 25-year Rainfall=5.80"

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Summary for Subcatchment 1.3N: SC 1.3N

Runoff = 0.65 cfs @ 12.09 hrs, Volume= 0.047 af, Depth= 3.31"

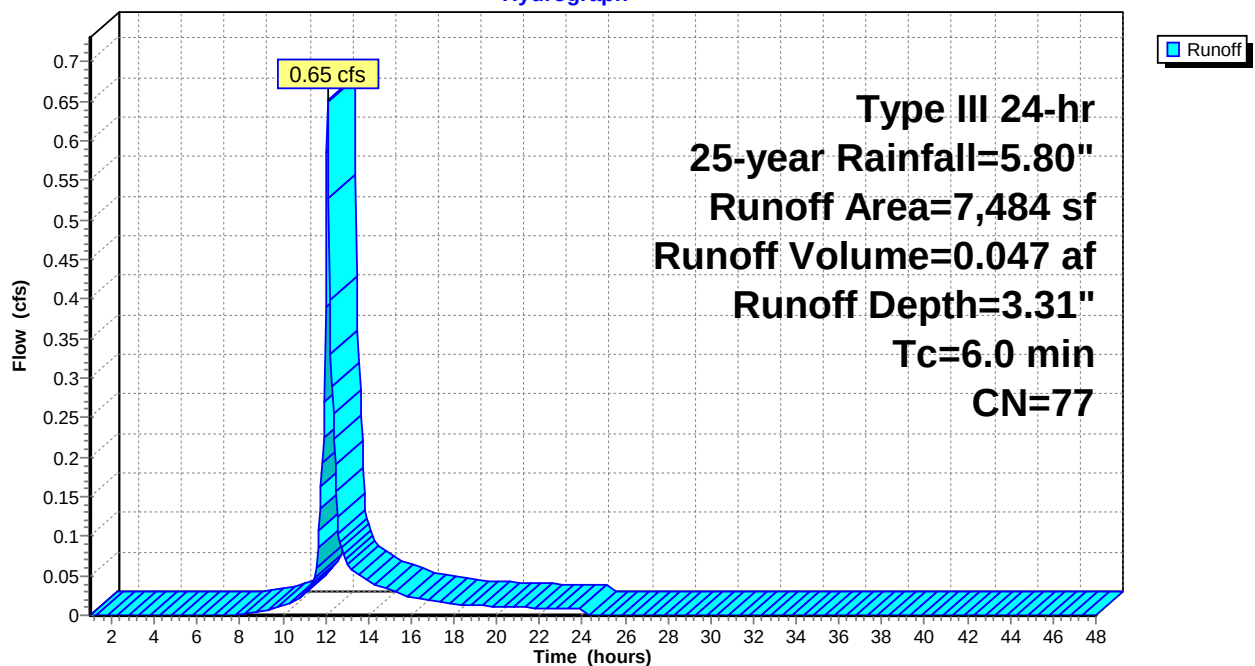
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	3,472	98	Wash Ave
*	230	98	Patios
*	48	98	bus shelter
*	1,130	98	Sidewalk
*	2,604	39	Landscaping/lawn, HSG A
	7,484	77	Weighted Average
	2,604		34.79% Pervious Area
	4,880		65.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.3N: SC 1.3N

Hydrograph



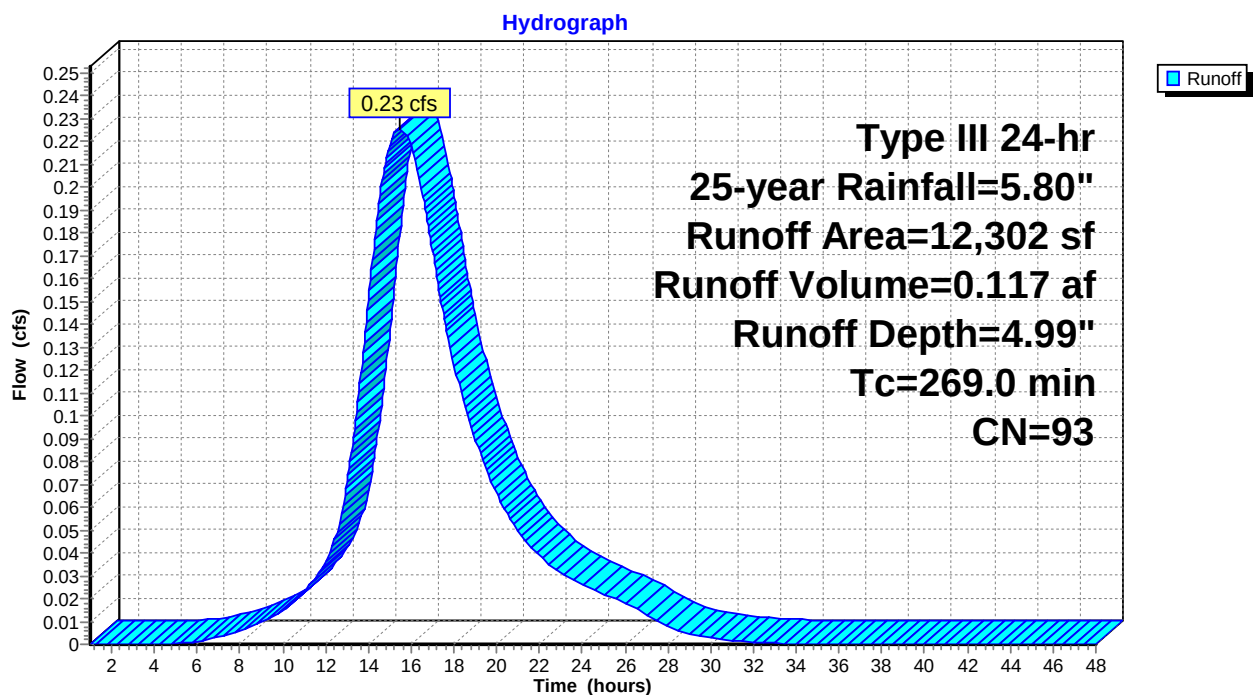
Summary for Subcatchment 1.3S: West Parking Lot

Runoff = 0.23 cfs @ 15.50 hrs, Volume= 0.117 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	2,279	98	porous
*	6,635	98	paved drive aisle
*	1,068	98	walkway
*	1,252	98	patio/covered pav
	1,068	39	>75% Grass cover, Good, HSG A
	12,302	93	Weighted Average
	1,068		8.68% Pervious Area
	11,234		91.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 1.3S: West Parking Lot

Summary for Subcatchment 1.4N: SC 1.4N

Runoff = 0.01 cfs @ 12.16 hrs, Volume= 0.002 af, Depth= 0.66"

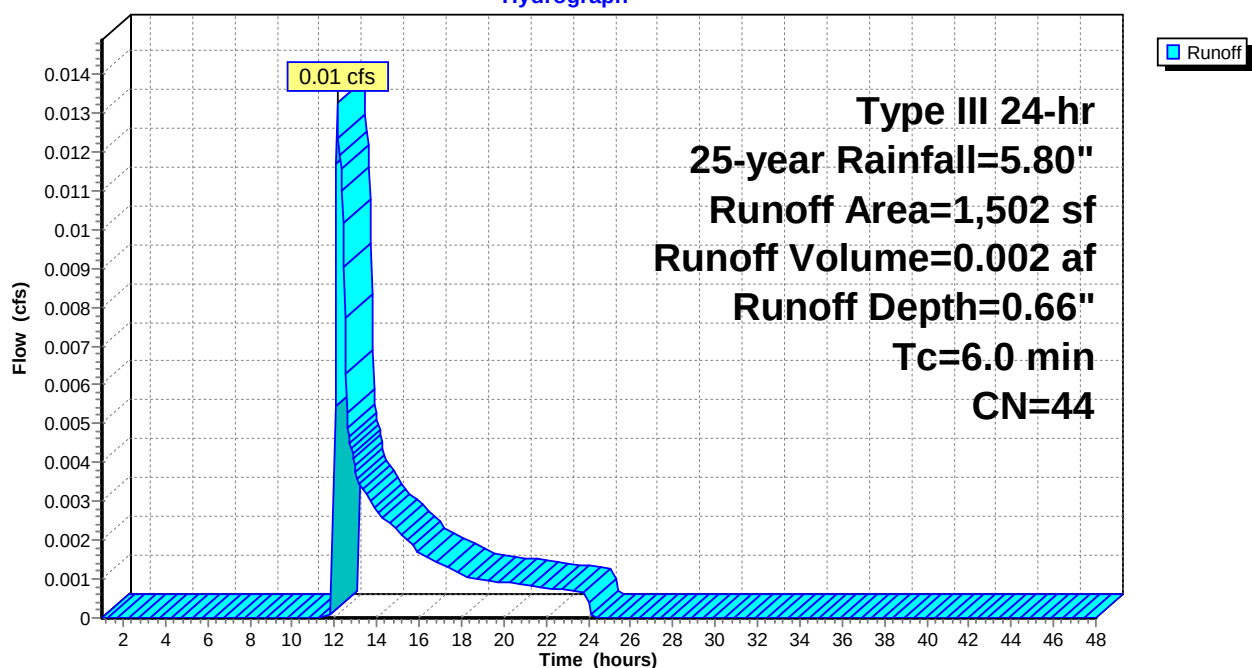
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	131	80	Grass pavers
*	45	98	Paver walkway
*	1,326	39	Landscaping/openspace/rain garden/ HSG A
	1,502	44	Weighted Average
	1,457		97.00% Pervious Area
	45		3.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.4N: SC 1.4N

Hydrograph



Summary for Subcatchment 1.4S: Common

Runoff = 0.87 cfs @ 12.15 hrs, Volume= 0.075 af, Depth= 2.04"

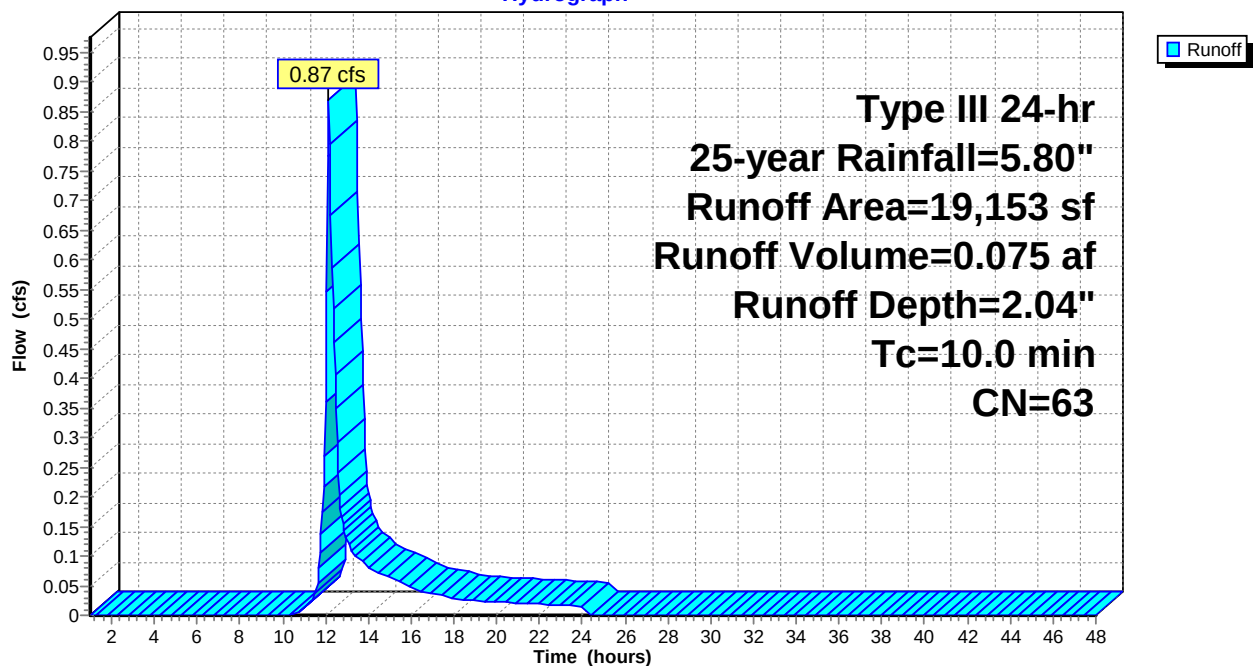
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	1,688	98	paved walkway
*	153	98	Rear Patio
*	112	98	Rear Patio
	8,600	39	>75% Grass cover, Good, HSG A
	8,600	80	>75% Grass cover, Good, HSG D
	19,153	63	Weighted Average
	17,200		89.80% Pervious Area
	1,953		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.4S: Common

Hydrograph



Summary for Subcatchment 1.5N: Roofs

Runoff = 2.83 cfs @ 12.09 hrs, Volume= 0.236 af, Depth> 5.56"

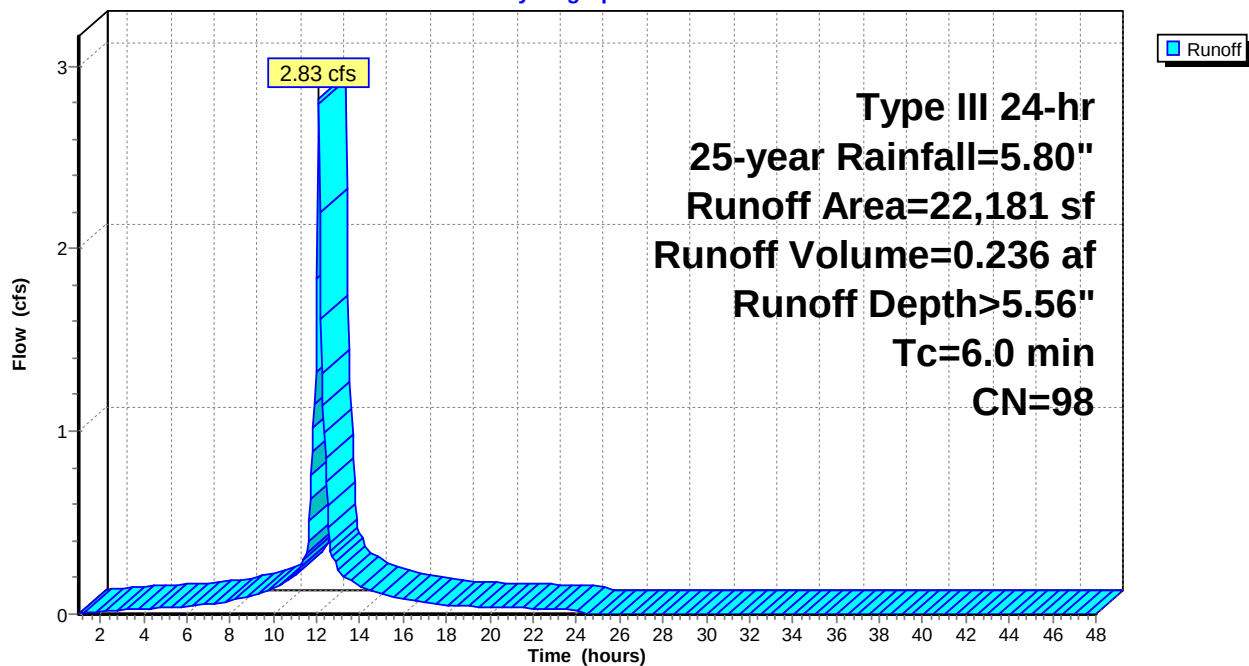
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	22,181	98	IMPERV
	22,181		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.5N: Roofs

Hydrograph



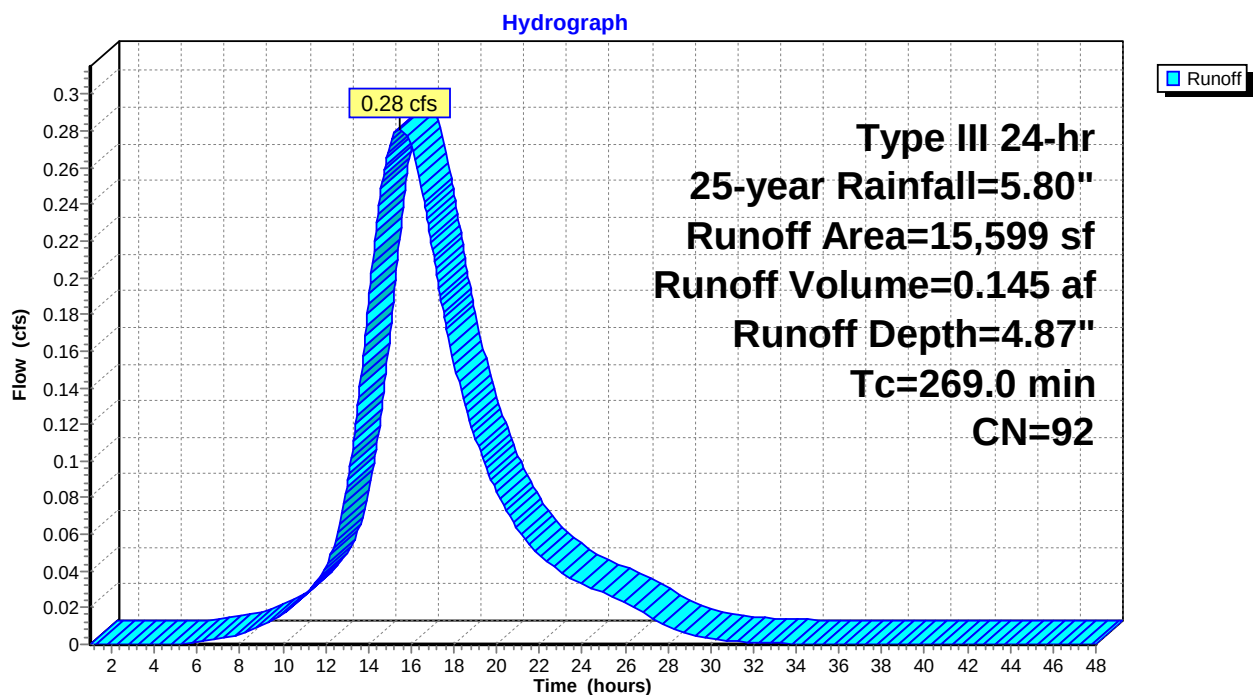
Summary for Subcatchment 1.5S: A.7, A.10, C.3, C.2 Aisle

Runoff = 0.28 cfs @ 15.49 hrs, Volume= 0.145 af, Depth= 4.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	879	98	5' pavers/ s. mews
*	3,722	98	porous
*	442	98	Front Patios
*	759	98	Front Patios
*	1,033	98	Long Patio
*	585	98	Curved Patio
*	536	98	Front Patios
*	592	98	Front Patios
*	1,360	98	Long Patio
*	679	80	Grass Pavers
*	425	98	Patios
*	16	98	Transformer
*	446	98	Sidewalks
*	4,125	80	>75% Grass cover, Good, HSG D
	15,599	92	Weighted Average
	4,804		30.80% Pervious Area
	10,795		69.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 1.5S: A.7, A.10, C.3, C.2 Aisle

Summary for Subcatchment 1.6N: SC 1.6N

Runoff = 1.03 cfs @ 12.09 hrs, Volume= 0.086 af, Depth> 5.56"

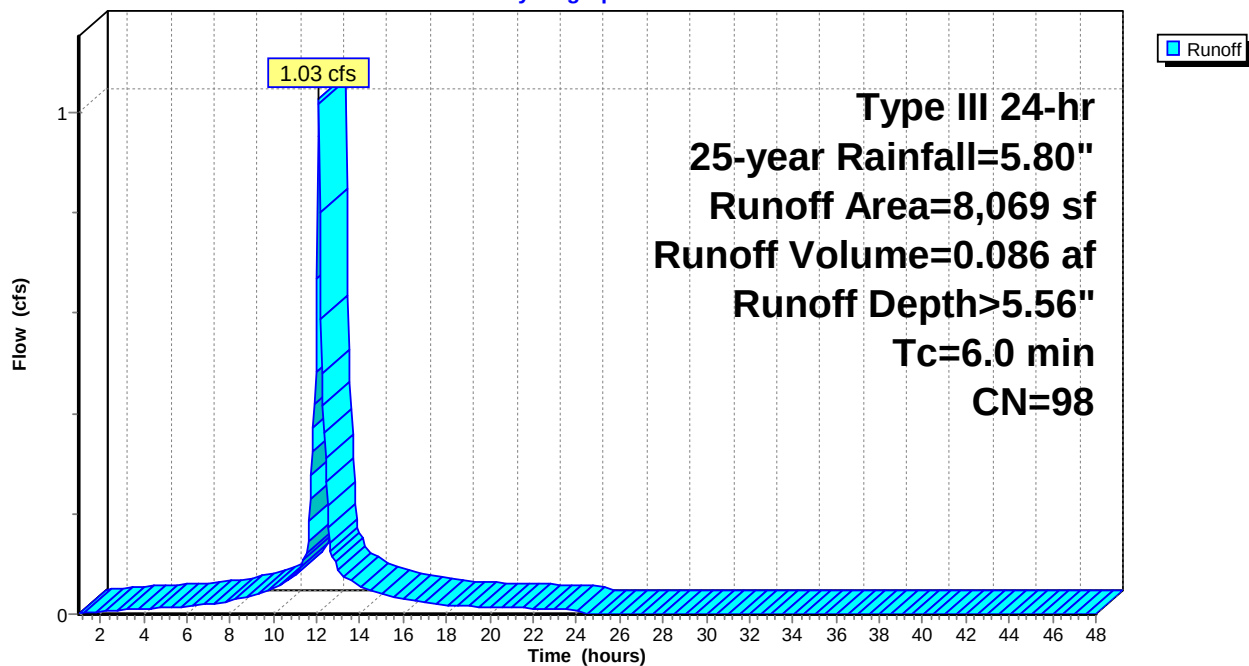
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
* 8,069	98	Wash Ave
8,069		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.6N: SC 1.6N

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Type III 24-hr 25-year Rainfall=5.80"

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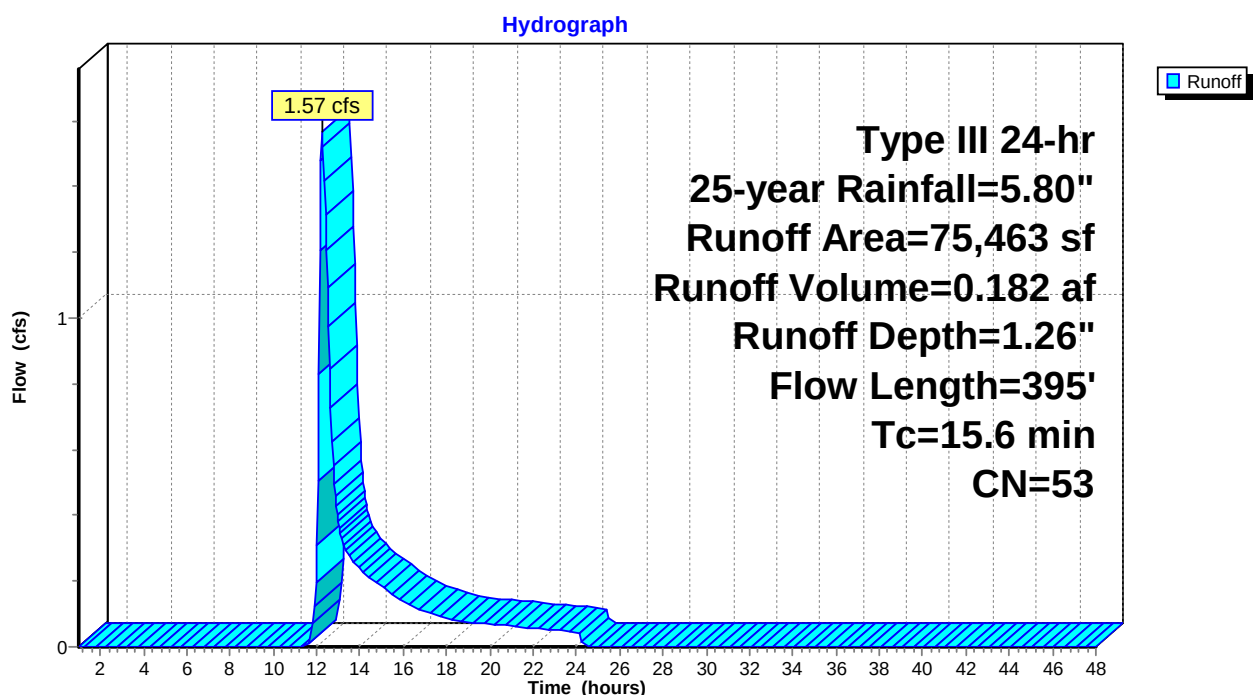
Summary for Subcatchment 1.6S: Developed/Undeveloped area

Runoff = 1.57 cfs @ 12.26 hrs, Volume= 0.182 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
37,858	30	Woods, Good, HSG A
* 5,348	39	Landscaped/open space
1,387	98	Unconnected roofs, HSG A
* 5,781	39	Wash Ave ditch
* 16,824	98	Washington ave, cross walks
* 1,195	98	Patios
* 305	80	Grass pavers
* 6,765	80	Landscaping/ HSG D
75,463	53	Weighted Average
56,057		74.28% Pervious Area
19,406		25.72% Impervious Area
1,387		7.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	100	0.0500	0.17		Sheet Flow, Sheet flow (A to B) Grass: Dense n= 0.240 P2= 3.27"
5.5	203	0.0600	0.61		Shallow Concentrated Flow, SCF (B to C) Forest w/Heavy Litter Kv= 2.5 fps
0.3	92	0.0400	5.40	17.28	Trap/Vee/Rect Channel Flow, Ditch Flow (C to D) Bot.W=2.00' D=0.80' Z= 2.5 ' /' Top.W=6.00' n= 0.035
15.6	395	Total			

Subcatchment 1.6S: Developed/Undeveloped area

Summary for Subcatchment 1.7N: SC 1.7N

Runoff = 0.01 cfs @ 12.43 hrs, Volume= 0.002 af, Depth= 0.39"

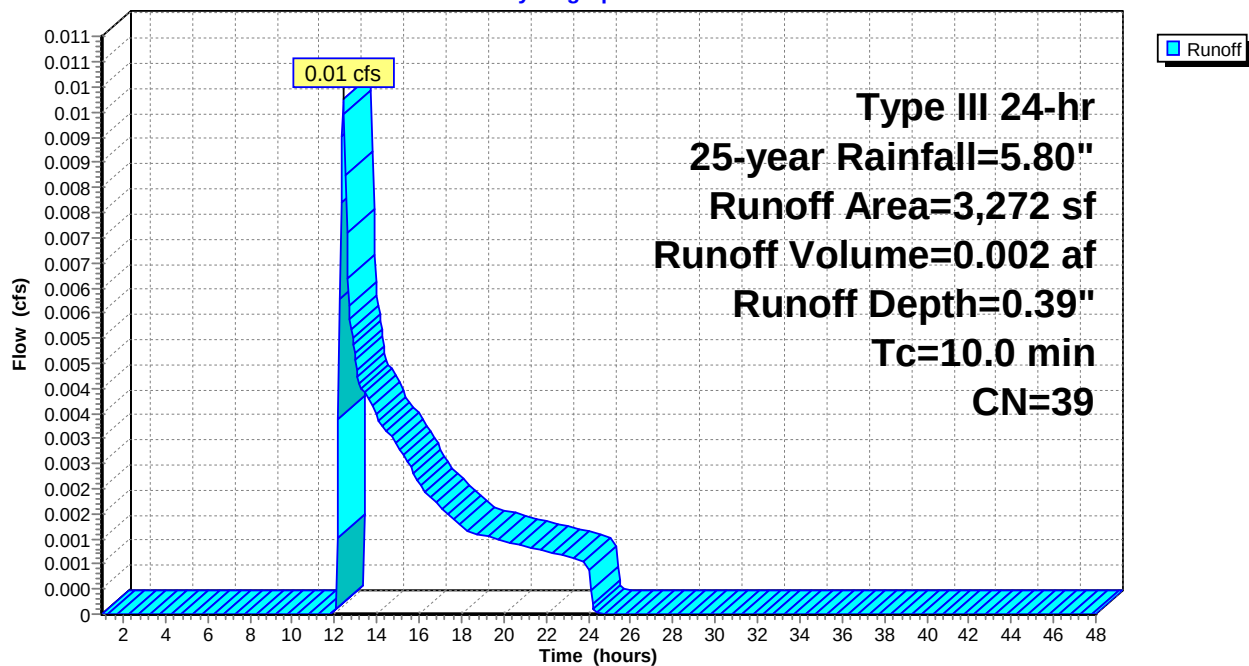
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	3,272	39	Lawn/lanscaping/ditch, HSG A
	3,272		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.7N: SC 1.7N

Hydrograph



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Type III 24-hr 25-year Rainfall=5.80"

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Summary for Subcatchment 1.7S: SC 1.7S

Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 4.01"

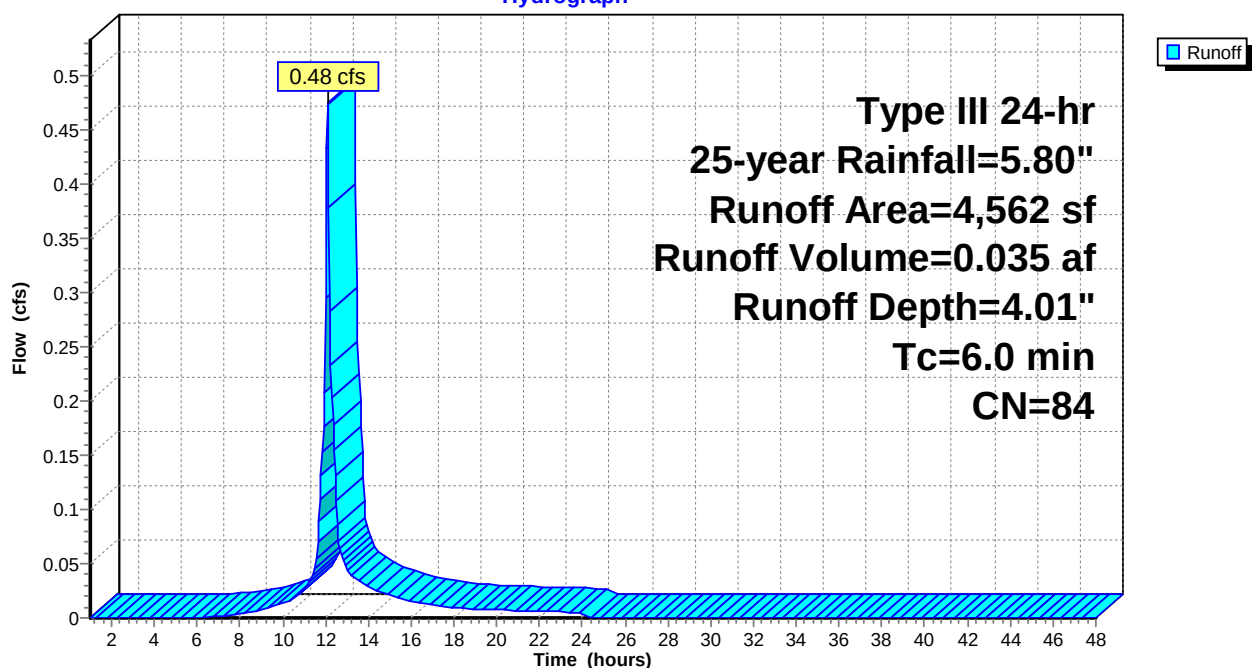
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	724	98	A.9/A.10 rear patios
*	356	98	Walkway
*	3,482	80	Lawn/landscaping, HSG D
	4,562	84	Weighted Average
	3,482		76.33% Pervious Area
	1,080		23.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.7S: SC 1.7S

Hydrograph



Summary for Subcatchment 1.8N: Common

Runoff = 0.47 cfs @ 12.16 hrs, Volume= 0.045 af, Depth= 1.33"

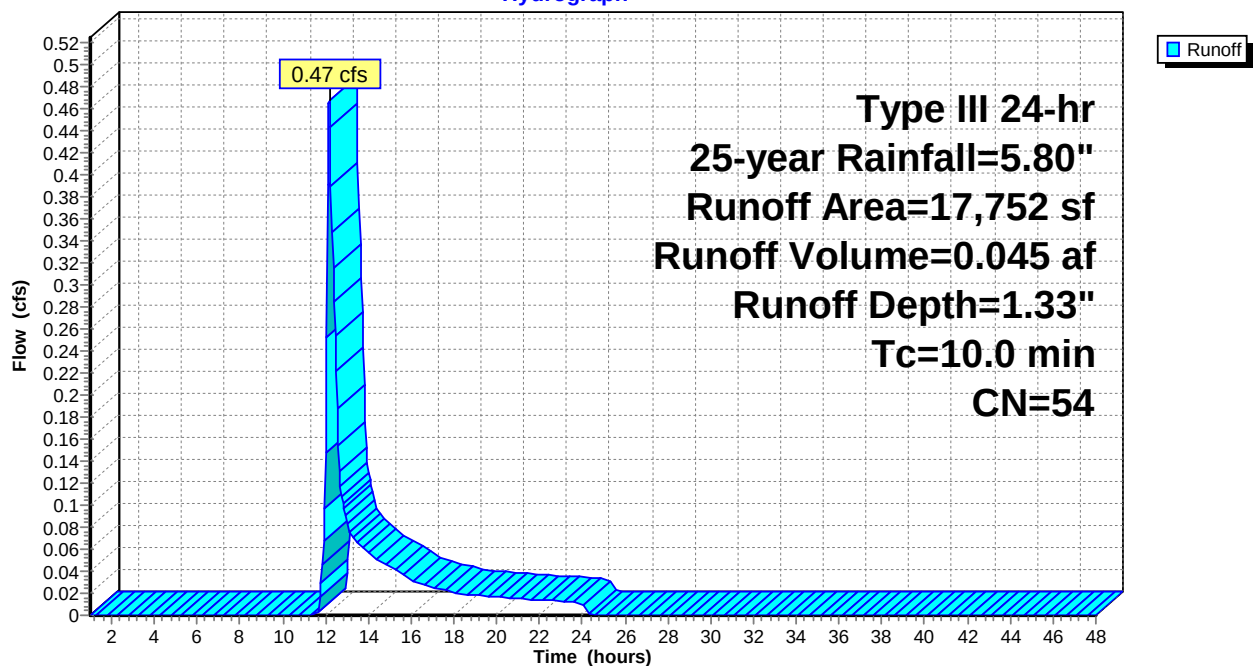
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	2,549	98	Paved walkway
*	1,558	98	Pavers & covered pav
*	472	98	patios
*	16	98	transformer
*	13,157	39	Open space, landscaping, HSG A
	17,752	54	Weighted Average
	13,157		74.12% Pervious Area
	4,595		25.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment 1.8N: Common

Hydrograph



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Type III 24-hr 25-year Rainfall=5.80"

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Summary for Subcatchment 1.9N: SC 1.9N

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 4.11"

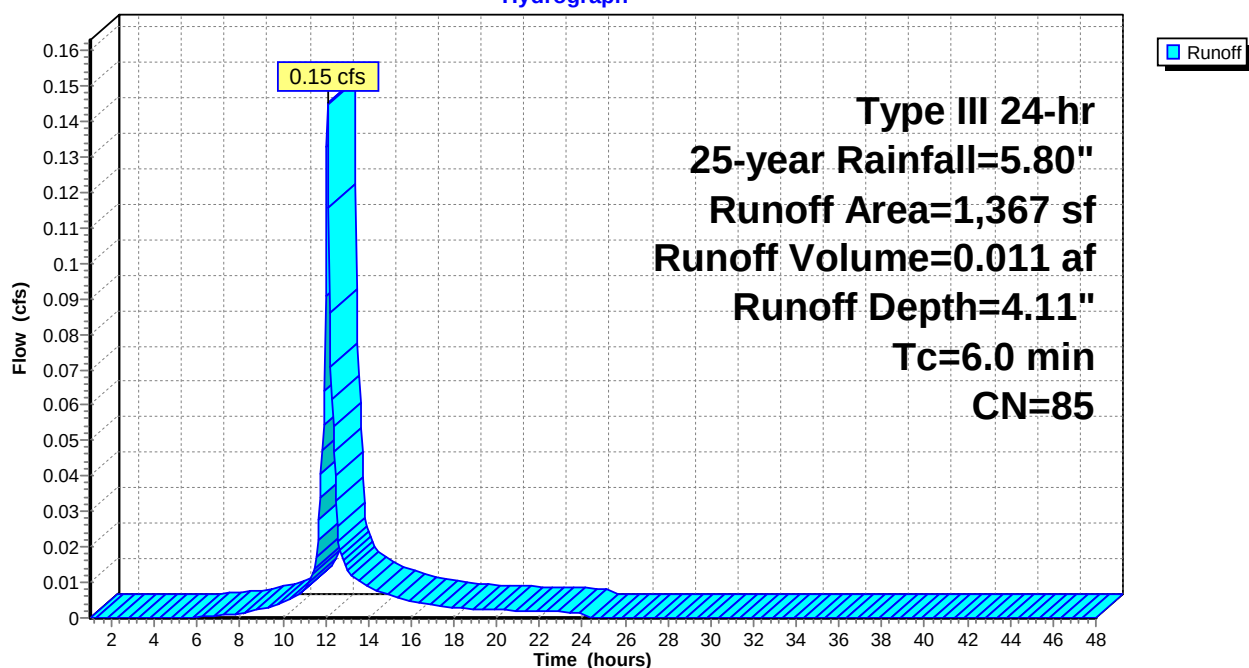
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	719	98	Wash Ave
*	336	98	sidewalk
*	312	39	Landscaping/esplanade
	1,367	85	Weighted Average
	312		22.82% Pervious Area
	1,055		77.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 1.9N: SC 1.9N

Hydrograph



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Type III 24-hr 25-year Rainfall=5.80"

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Summary for Subcatchment 2.1N: SC 2.1N

Runoff = 5.59 cfs @ 12.35 hrs, Volume= 0.658 af, Depth= 3.60"

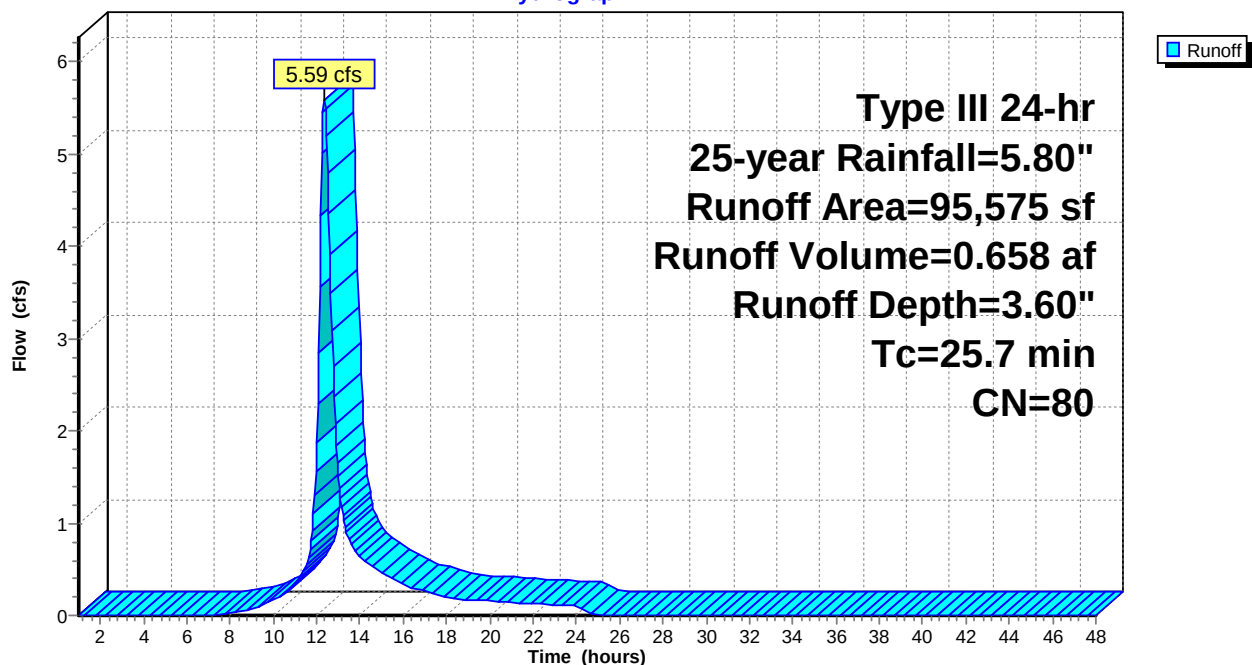
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	7,465	80	Road sideslope
	37,683	77	Woods, Good, HSG D
*	2,842	98	N sidewalk
*	10,913	98	Wash. Ave and S. Conc apron
*	6,794	98	Rooftop and driveway
*	414	98	Rooftop
*	21,315	80	Lawns/landscaping, HSG D
	5,316	30	Woods, Good, HSG A
*	2,833	80	Landscaping/open space
	95,575	80	Weighted Average
	74,612		78.07% Pervious Area
	20,963		21.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7					Direct Entry, Direct input of pre Tc

Subcatchment 2.1N: SC 2.1N

Hydrograph



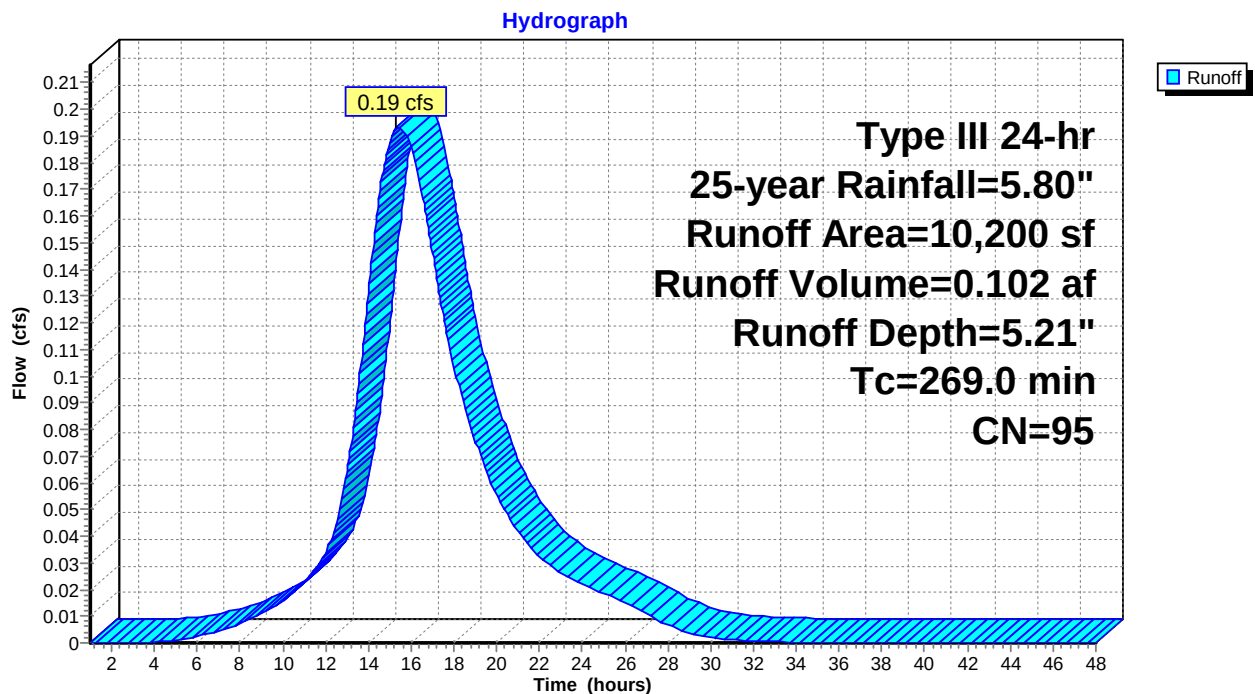
Summary for Subcatchment 2.1S: Eastern Parking Lot

Runoff = 0.19 cfs @ 15.29 hrs, Volume= 0.102 af, Depth= 5.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	1,296	98	Porous Horizontal
*	4,187	98	Paved driveaisle
*	857	98	Walkway/patio
*	501	98	Rear walkway/patio
*	180	98	dumpster pad
*	1,134	98	Porous Vertical
*	234	98	Curbing
	1,811	80	>75% Grass cover, Good, HSG D
	10,200	95	Weighted Average
	1,811		17.75% Pervious Area
	8,389		82.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 2.1S: Eastern Parking Lot

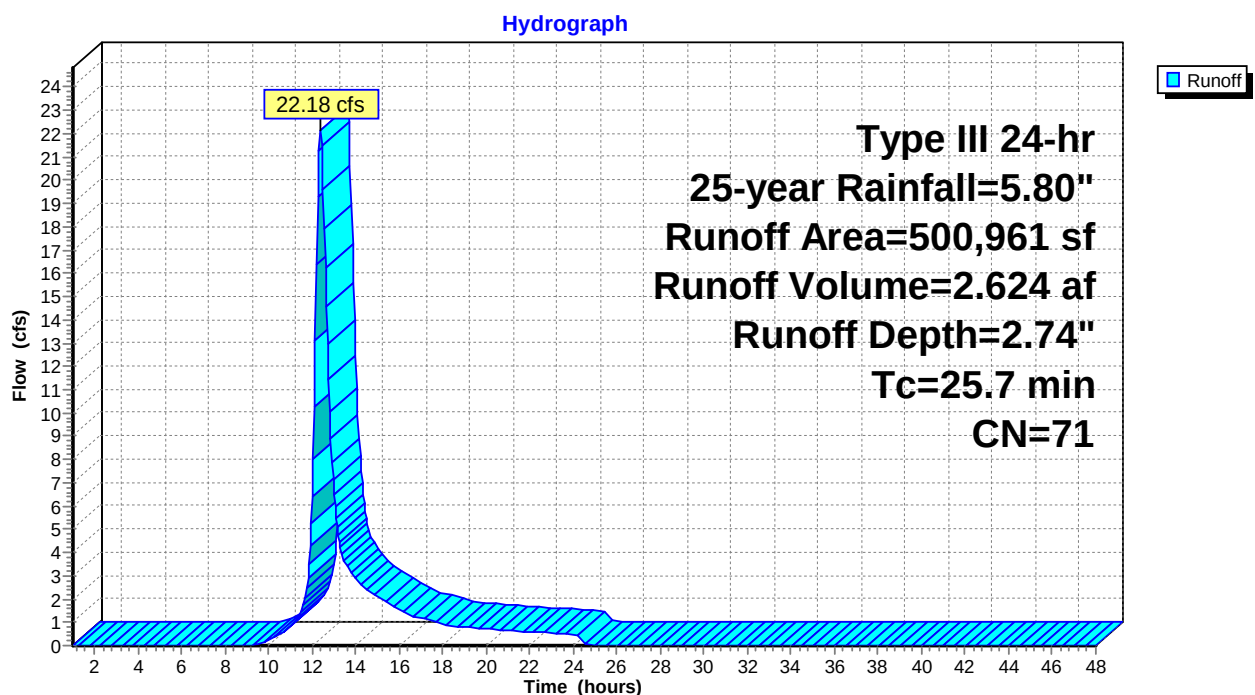
Summary for Subcatchment 2.2S: Developed/nondeveloped area

Runoff = 22.18 cfs @ 12.37 hrs, Volume= 2.624 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	4,589	39	Slope behind patios, HSG A
*	30,826	39	>75% Grass cover, Good, HSG A
*	3,896	98	Roofs/driveways/patios (HSG A)
	24,173	55	Woods, Good, HSG B
	6,557	70	Woods, Good, HSG C
	146,595	70	Woods, Good, HSG C
	240,888	77	Woods, Good, HSG D
*	10,866	80	>75% Grass cover, Good, HSG D
*	3,503	98	Roofs/driveways/patios (HSG D)
*	4,921	98	Wash Ave
*	4,026	98	Sidewalk
*	8,474	80	Roadside ditch/slope
*	1,546	98	Auburn St
*	820	80	Landscaping Auburn St
	9,281	39	>75% Grass cover, Good, HSG A
	500,961	71	Weighted Average
	483,069		96.43% Pervious Area
	17,892		3.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.7					Direct Entry, copy from pre

Subcatchment 2.2S: Developed/nondeveloped area

Summary for Subcatchment 3.1N: SC 3.1N

Runoff = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af, Depth= 1.56"

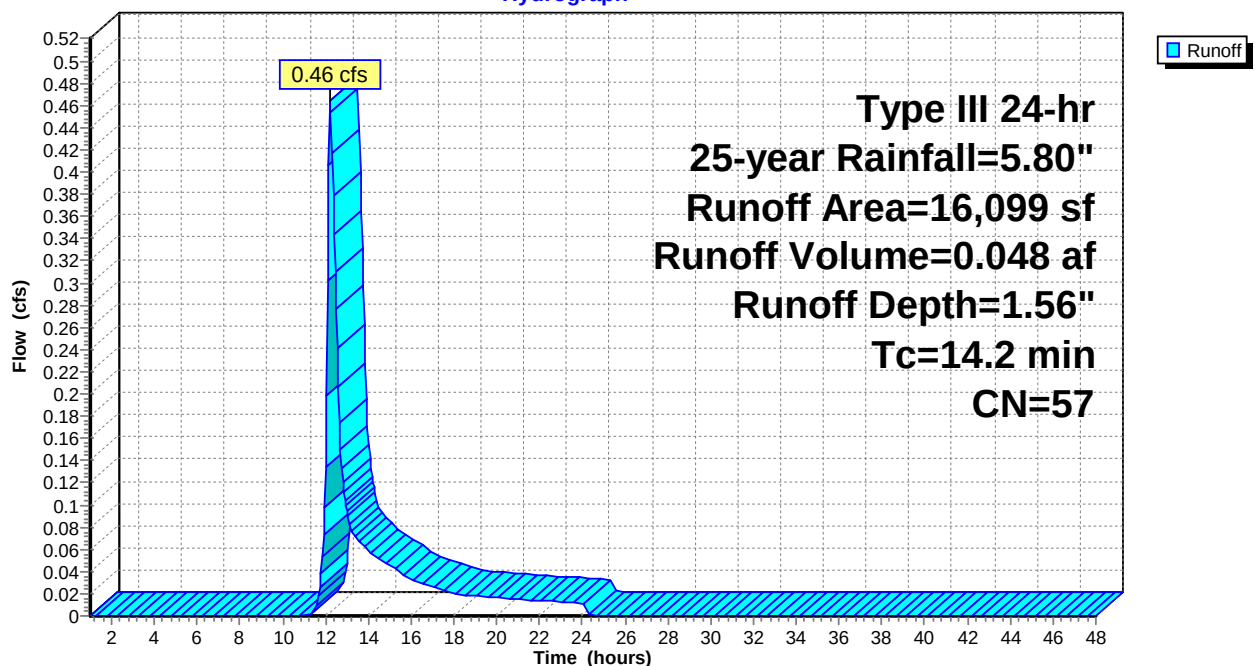
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
4,070	30	Woods, Good, HSG A
* 3,619	39	Landscaping/swale, HSG A
5,115	77	Woods, Good, HSG D
* 3,295	80	Landscaping/slope, HSG D
16,099	57	Weighted Average
16,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2					Direct Entry, Direct input of pre Tc

Subcatchment 3.1N: SC 3.1N

Hydrograph



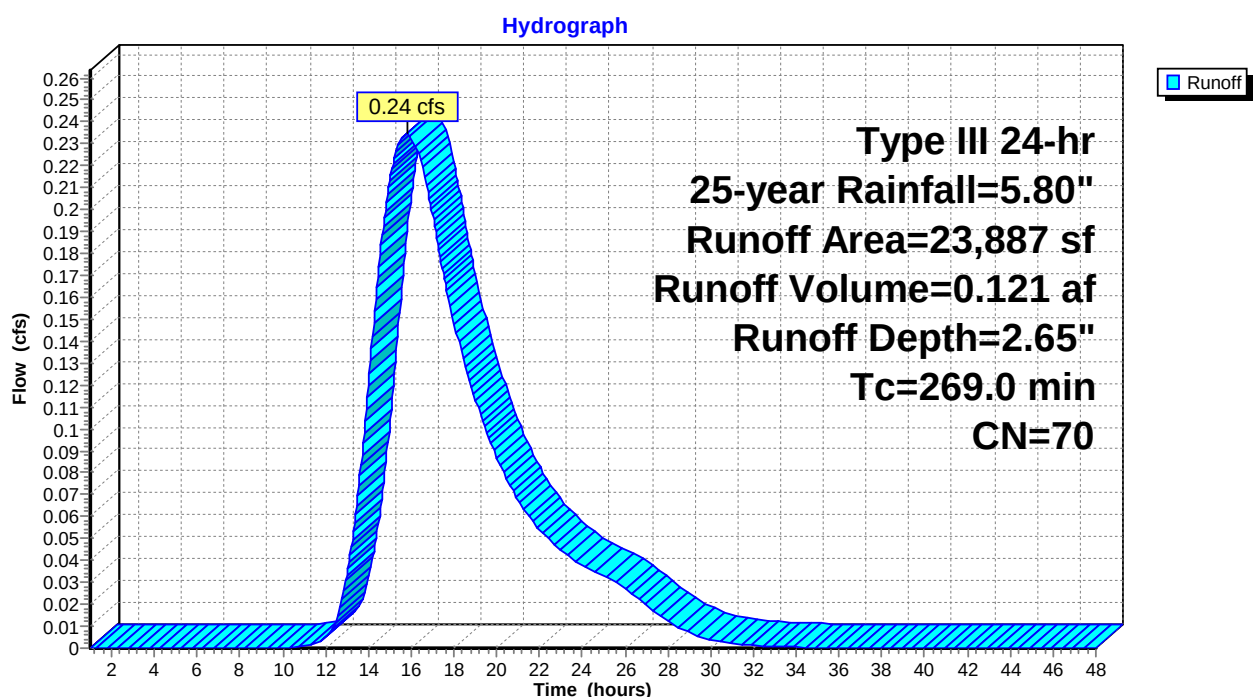
Summary for Subcatchment 4.1N: 4.1N

Runoff = 0.24 cfs @ 15.84 hrs, Volume= 0.121 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	1,940	98	Curb & Pavement
*	5,213	98	Porous Pavement
*	2,866	98	Patios
*	612	98	Patios
*	16	98	transformer pad
*	185	98	Paved Walkway
*	394	98	Paved Walkway
*	408	98	Patios
*	655	98	Patios
*	128	98	Solid Waste Location
*	112	98	Patios
*	46	98	Paved Walkway
*	11,312	39	Lawn/landscaping, HSG A
	23,887	70	Weighted Average
	11,312		47.36% Pervious Area
	12,575		52.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 4.1N: 4.1N

Summary for Subcatchment 4.2N: Eastern Parking Lot

Runoff = 0.19 cfs @ 15.57 hrs, Volume= 0.094 af, Depth= 3.80"

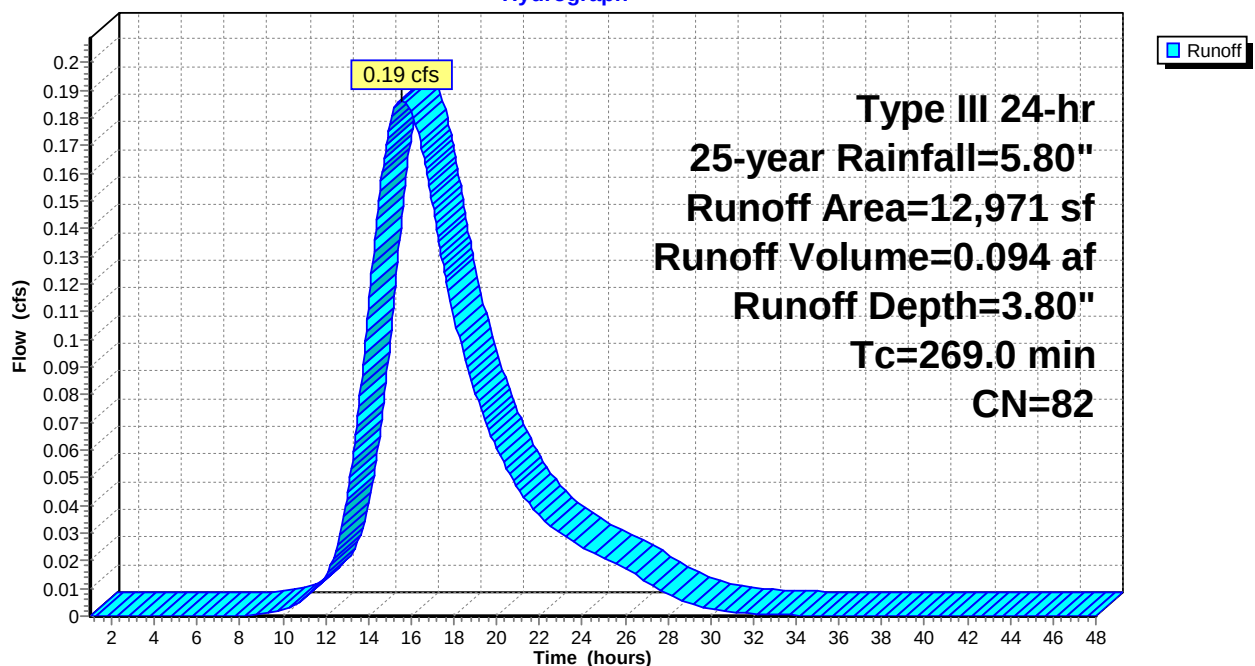
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

	Area (sf)	CN	Description
*	569	98	Sidewalk
*	2,420	98	Porous pavement
*	6,517	98	Parking lot
*	3,465	39	Landscaping/open space, HSG A
	12,971	82	Weighted Average
	3,465		26.71% Pervious Area
	9,506		73.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
269.0					Direct Entry, UNH

Subcatchment 4.2N: Eastern Parking Lot

Hydrograph



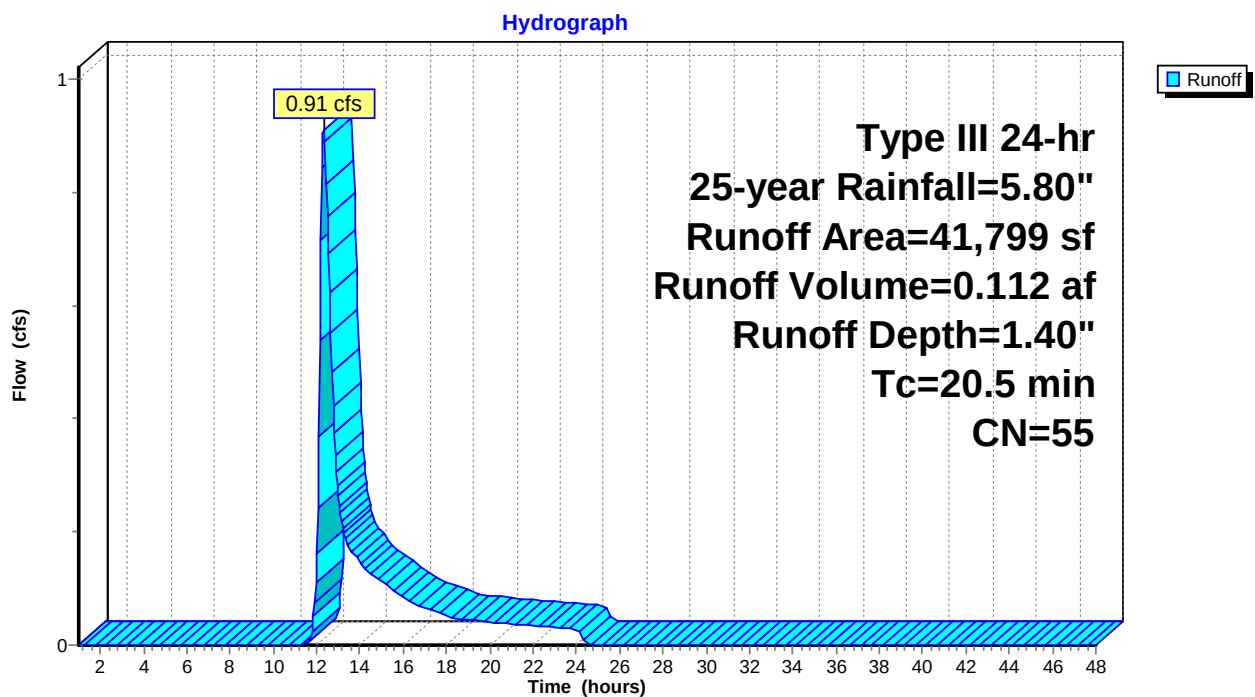
Summary for Subcatchment 4.3N: SC 4.3N

Runoff = 0.91 cfs @ 12.33 hrs, Volume= 0.112 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=5.80"

Area (sf)	CN	Description
4,033	80	>75% Grass cover, Good, HSG D
6,717	77	Woods, Good, HSG D
18,402	30	Woods, Good, HSG A
* 1,998	39	Landscaping/slope, HSG A
* 10,649	77	Woods, Good, HSG D
41,799	55	Weighted Average
41,799		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5					Direct Entry, copy from pre

Subcatchment 4.3N: SC 4.3N

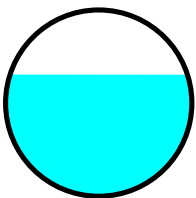
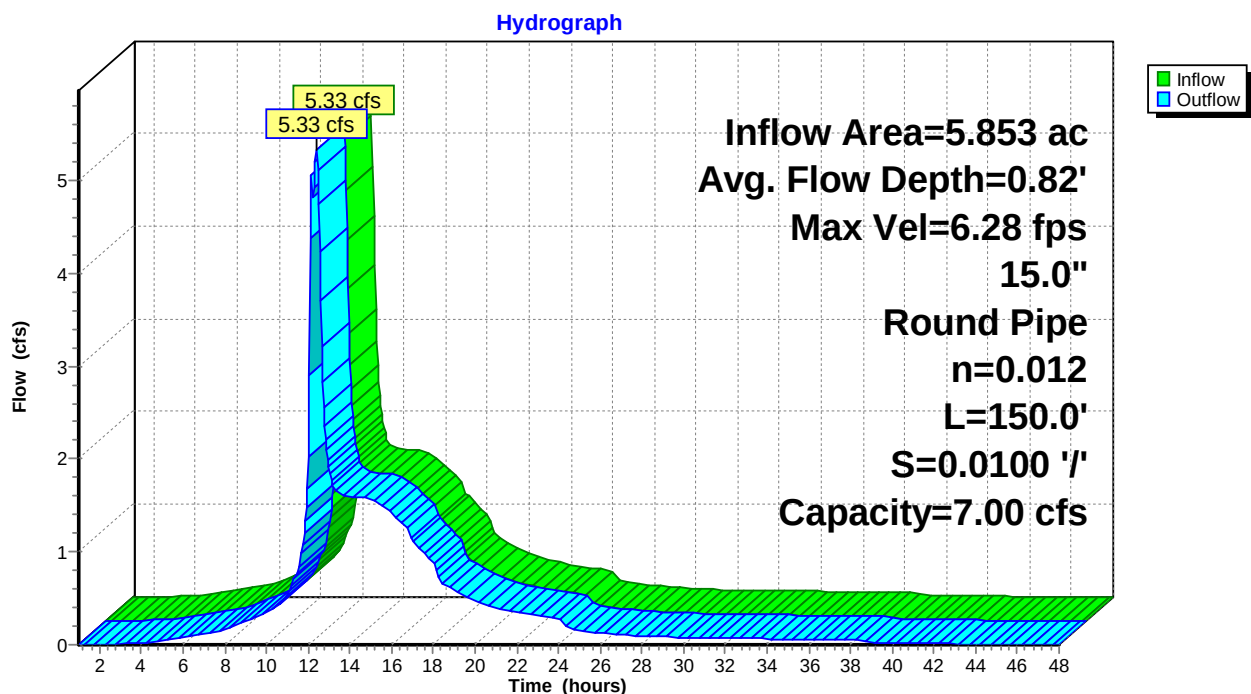
Summary for Reach 1: POI #1 - LAMBERT/WASH INTERSECTION

Inflow Area = 5.853 ac, 48.76% Impervious, Inflow Depth > 2.88" for 25-year event
 Inflow = 5.33 cfs @ 12.38 hrs, Volume= 1.404 af
 Outflow = 5.33 cfs @ 12.39 hrs, Volume= 1.404 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 6.28 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 2.27 fps, Avg. Travel Time= 1.1 min

Peak Storage= 128 cf @ 12.39 hrs
 Average Depth at Peak Storage= 0.82'
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.00 cfs

15.0" Round Pipe
 n= 0.012 Concrete pipe, finished
 Length= 150.0' Slope= 0.0100 '/'
 Inlet Invert= 87.18', Outlet Invert= 85.68'

**Reach 1: POI #1 - LAMBERT/WASH INTERSECTION**

1145 POST

Prepared by HP Inc.

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Type III 24-hr 25-year Rainfall=5.80"

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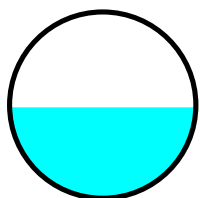
Summary for Reach 1R: N. DITCH CB OUTLET

Inflow Area = 2.285 ac, 52.04% Impervious, Inflow Depth > 2.93" for 25-year event
Inflow = 3.44 cfs @ 12.12 hrs, Volume= 0.558 af
Outflow = 3.40 cfs @ 12.12 hrs, Volume= 0.558 af, Atten= 1%, Lag= 0.2 min

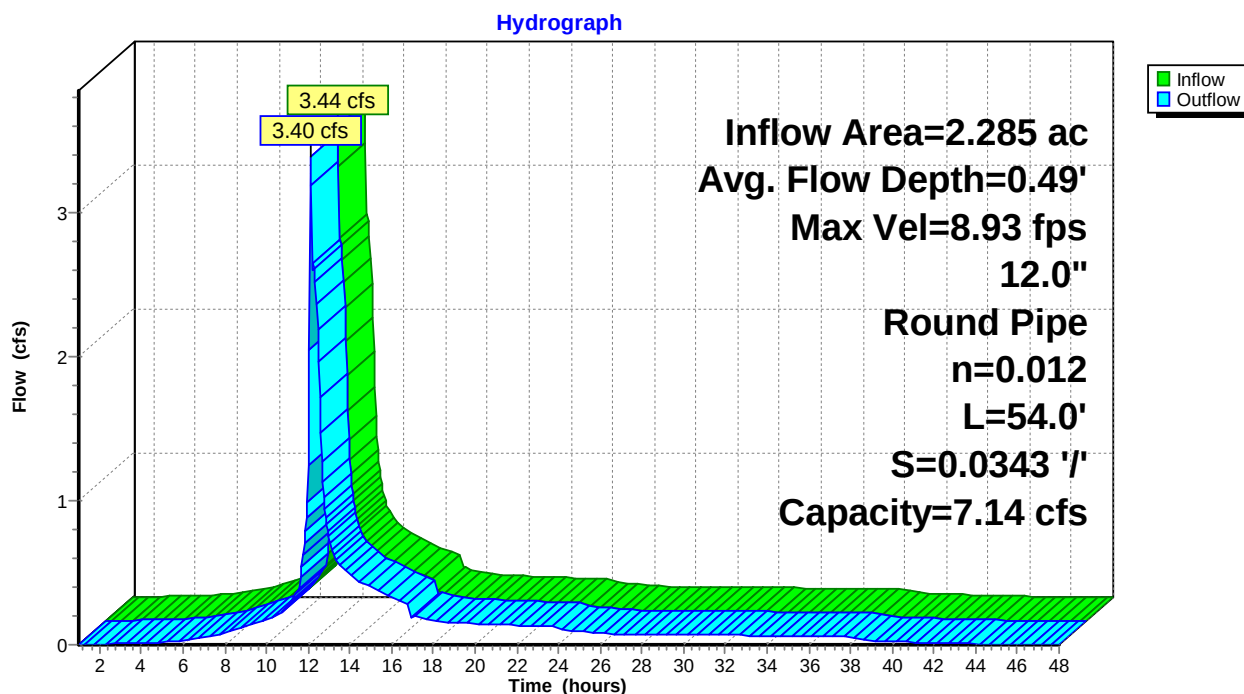
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.93 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.95 fps, Avg. Travel Time= 0.3 min

Peak Storage= 21 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 7.14 cfs

12.0" Round Pipe
n= 0.012
Length= 54.0' Slope= 0.0343 '/'
Inlet Invert= 87.63', Outlet Invert= 85.78'



Reach 1R: N. DITCH CB OUTLET



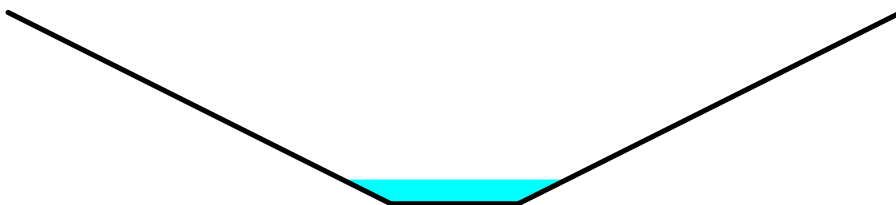
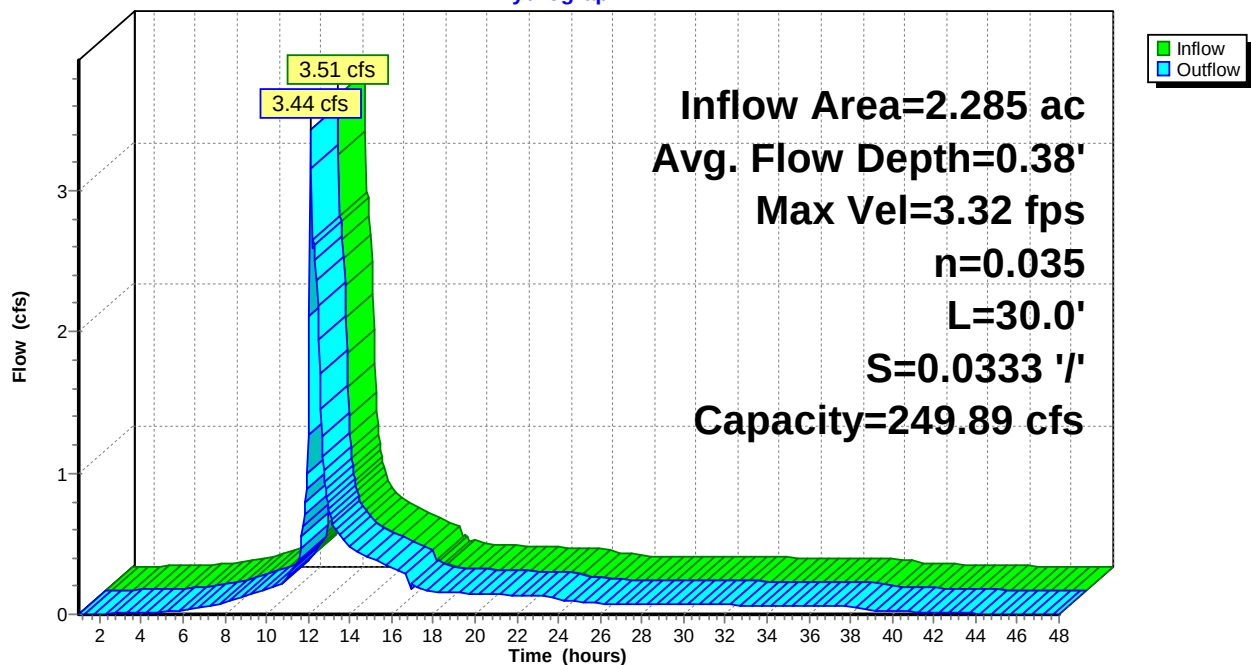
Summary for Reach 2R: N. DITCH

Inflow Area = 2.285 ac, 52.04% Impervious, Inflow Depth > 2.93" for 25-year event
 Inflow = 3.51 cfs @ 12.11 hrs, Volume= 0.558 af
 Outflow = 3.44 cfs @ 12.12 hrs, Volume= 0.558 af, Atten= 2%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.32 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.01 fps, Avg. Travel Time= 0.5 min

Peak Storage= 31 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.38'
 Bank-Full Depth= 3.00' Flow Area= 24.0 sf, Capacity= 249.89 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
 Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
 Length= 30.0' Slope= 0.0333 ' '
 Inlet Invert= 94.00', Outlet Invert= 93.00'

**Reach 2R: N. DITCH****Hydrograph**

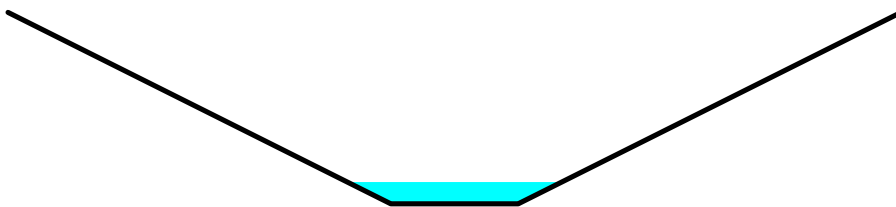
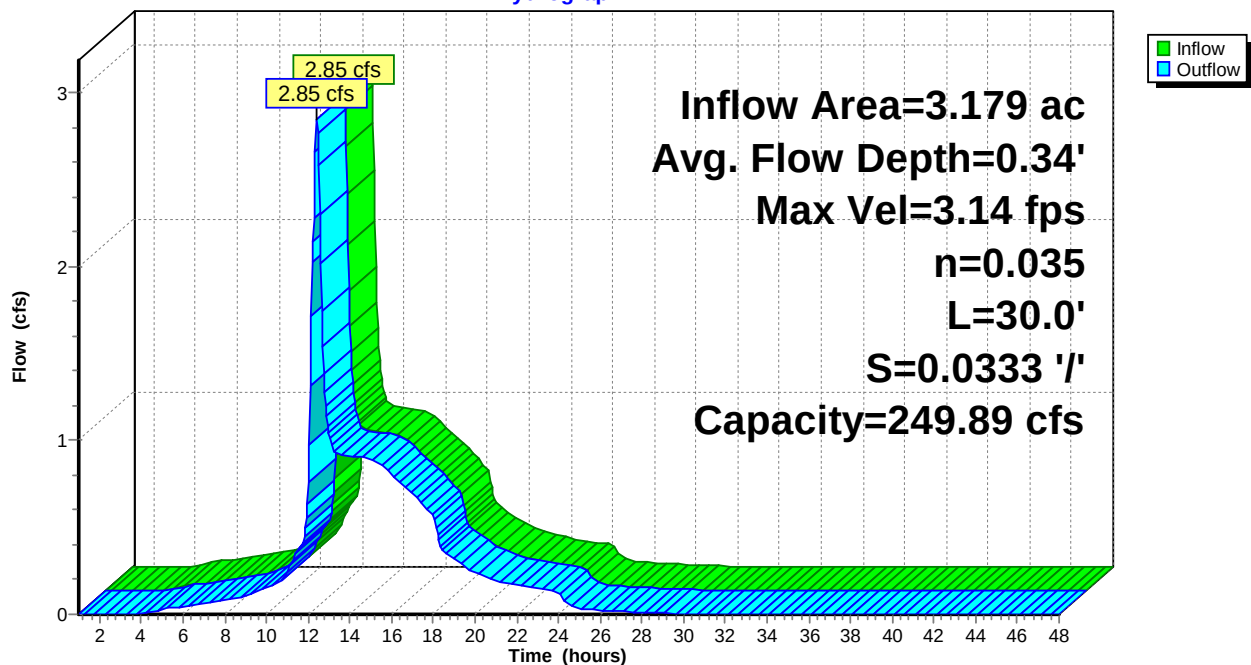
Summary for Reach 3R: S. DITCH

Inflow Area = 3.179 ac, 43.82% Impervious, Inflow Depth = 2.60" for 25-year event
 Inflow = 2.85 cfs @ 12.41 hrs, Volume= 0.690 af
 Outflow = 2.85 cfs @ 12.41 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.14 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.17 fps, Avg. Travel Time= 0.4 min

Peak Storage= 27 cf @ 12.41 hrs
 Average Depth at Peak Storage= 0.34'
 Bank-Full Depth= 3.00' Flow Area= 24.0 sf, Capacity= 249.89 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
 Side Slope Z-value= 2.0 ' ' Top Width= 14.00'
 Length= 30.0' Slope= 0.0333 ' '
 Inlet Invert= 94.00', Outlet Invert= 93.00'

**Reach 3R: S. DITCH****Hydrograph**

Summary for Reach 4R: WASH. CROSS CULVERT

Inflow Area = 2.194 ac, 21.93% Impervious, Inflow Depth = 3.60" for 25-year event
 Inflow = 5.59 cfs @ 12.35 hrs, Volume= 0.658 af
 Outflow = 4.22 cfs @ 12.22 hrs, Volume= 0.658 af, Atten= 25%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.77 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 2.67 fps, Avg. Travel Time= 0.6 min

Peak Storage= 82 cf @ 12.25 hrs

Average Depth at Peak Storage= 1.00'

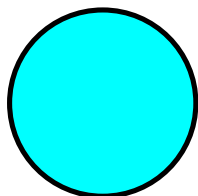
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.99 cfs

12.0" Round Pipe

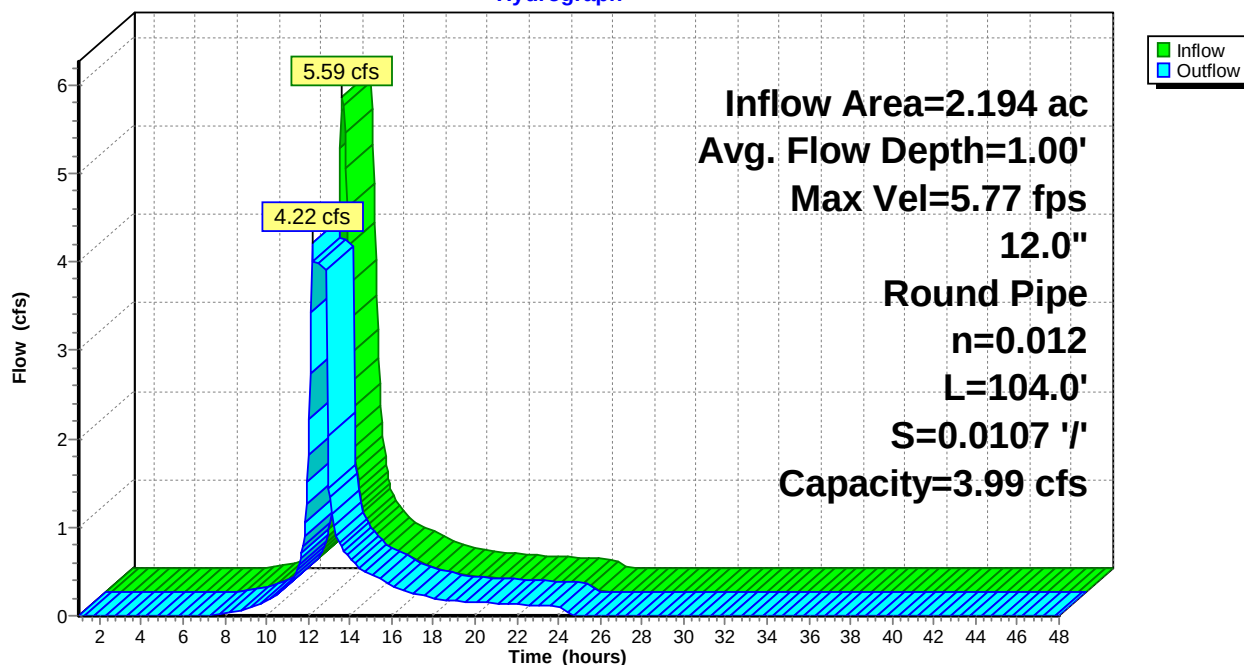
n= 0.012 Corrugated PP, smooth interior

Length= 104.0' Slope= 0.0107 '/'

Inlet Invert= 113.80', Outlet Invert= 112.69'

**Reach 4R: WASH. CROSS CULVERT**

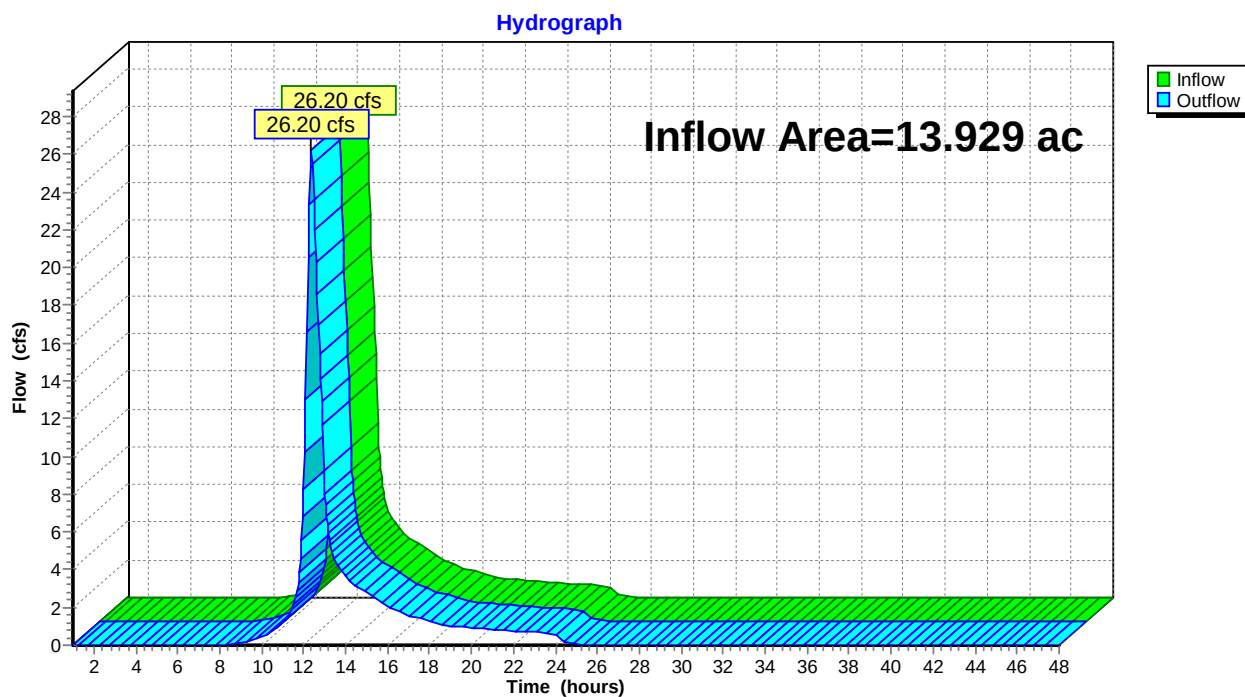
Hydrograph



Summary for Reach POI 2: POI #2 - LAMBERT CROSS CULVERT

Inflow Area = 13.929 ac, 7.79% Impervious, Inflow Depth = 2.92" for 25-year event
Inflow = 26.20 cfs @ 12.37 hrs, Volume= 3.385 af
Outflow = 26.20 cfs @ 12.37 hrs, Volume= 3.385 af, Atten= 0%, Lag= 0.0 min

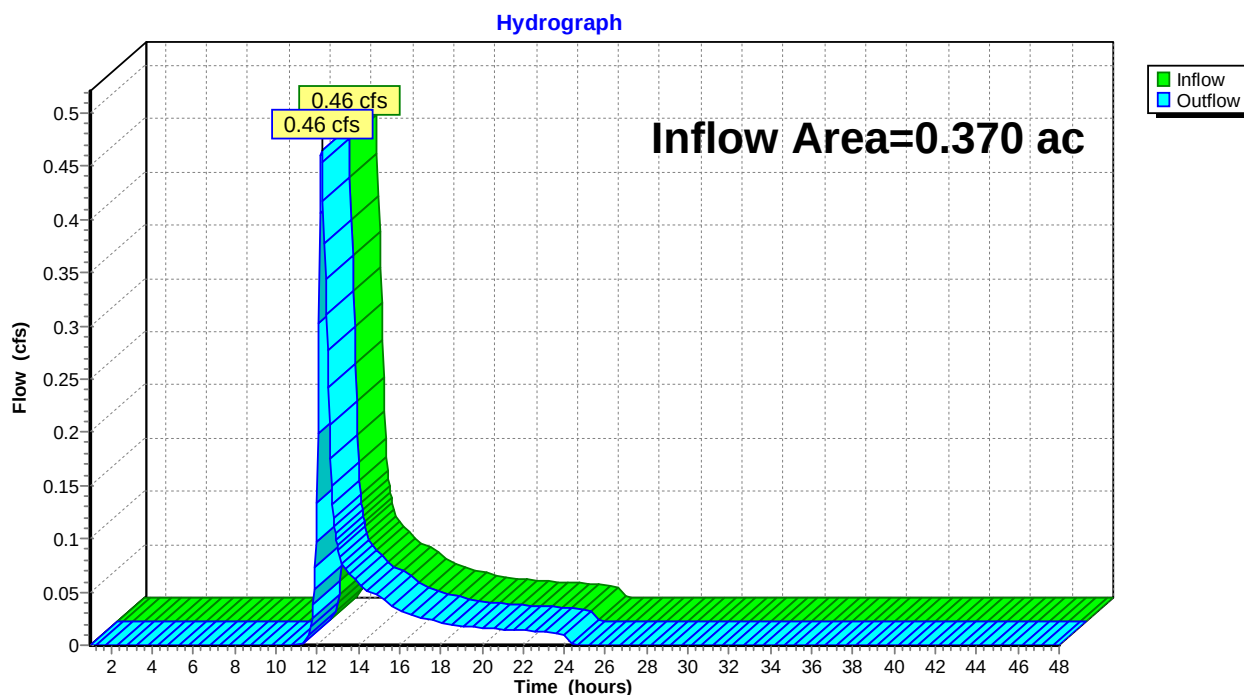
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 2: POI #2 - LAMBERT CROSS CULVERT

Summary for Reach POI 3: POI #3 - FALMOUTH WETLANDS

Inflow Area = 0.370 ac, 0.00% Impervious, Inflow Depth = 1.56" for 25-year event
Inflow = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af
Outflow = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.0 min

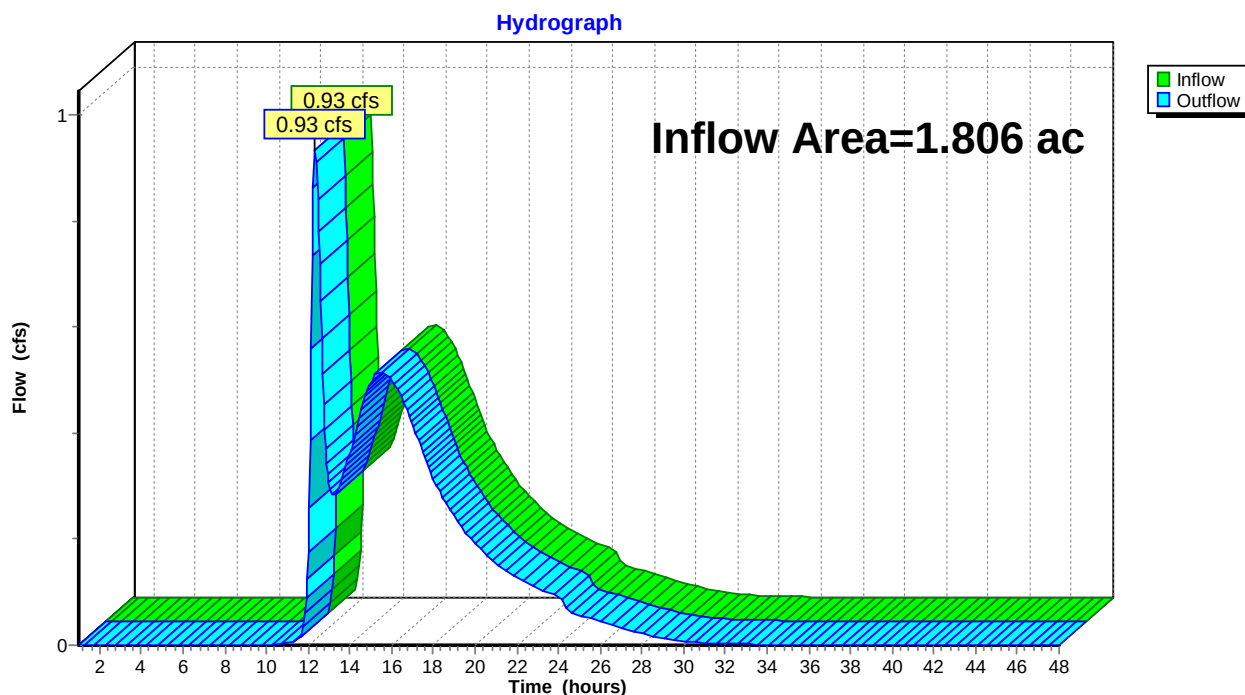
Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 3: POI #3 - FALMOUTH WETLANDS

Summary for Reach POI 4: POI #4 - N STREAM

Inflow Area = 1.806 ac, 28.07% Impervious, Inflow Depth = 2.17" for 25-year event
Inflow = 0.93 cfs @ 12.33 hrs, Volume= 0.326 af
Outflow = 0.93 cfs @ 12.33 hrs, Volume= 0.326 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs

Reach POI 4: POI #4 - N STREAM

Summary for Pond 1P: USSF 1 - StormTech 3500

Inflow Area = 0.992 ac, 61.97% Impervious, Inflow Depth > 3.43" for 25-year event
 Inflow = 3.19 cfs @ 12.09 hrs, Volume= 0.284 af
 Outflow = 1.17 cfs @ 12.40 hrs, Volume= 0.276 af, Atten= 63%, Lag= 18.4 min
 Primary = 1.17 cfs @ 12.40 hrs, Volume= 0.276 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 108.89' @ 12.40 hrs Surf.Area= 4,998 sf Storage= 5,544 cf

Plug-Flow detention time= 474.0 min calculated for 0.276 af (97% of inflow)

Center-of-Mass det. time= 456.2 min (1,226.3 - 770.1)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	1,714 cf	34.00'W x 49.00'L x 4.75'H Stone 7,914 cf Overall - 3,629 cf Embedded = 4,284 cf x 40.0% Voids
#2	105.50'	3,629 cf	ADS StormTech MC-3500 d +Cap @ 7.50' L x 30 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.50'L = 115.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 30 Chambers in 6 Rows Cap Storage= +14.9 cf x 2 x 6 rows = 178.8 cf
#3	103.50'	125 cf	34.00'W x 49.00'L x 1.50'H Sand 2,499 cf Overall x 5.0% Voids
#4	102.50'	661 cf	34.00'W x 49.00'L x 1.00'H Crushed Stone 1,666 cf Overall - 13 cf Embedded = 1,653 cf x 40.0% Voids
#5	102.75'	13 cf	4.0" Round Underdrain Storage Inside #4 L= 150.0'
6,142 cf			Total Available Storage

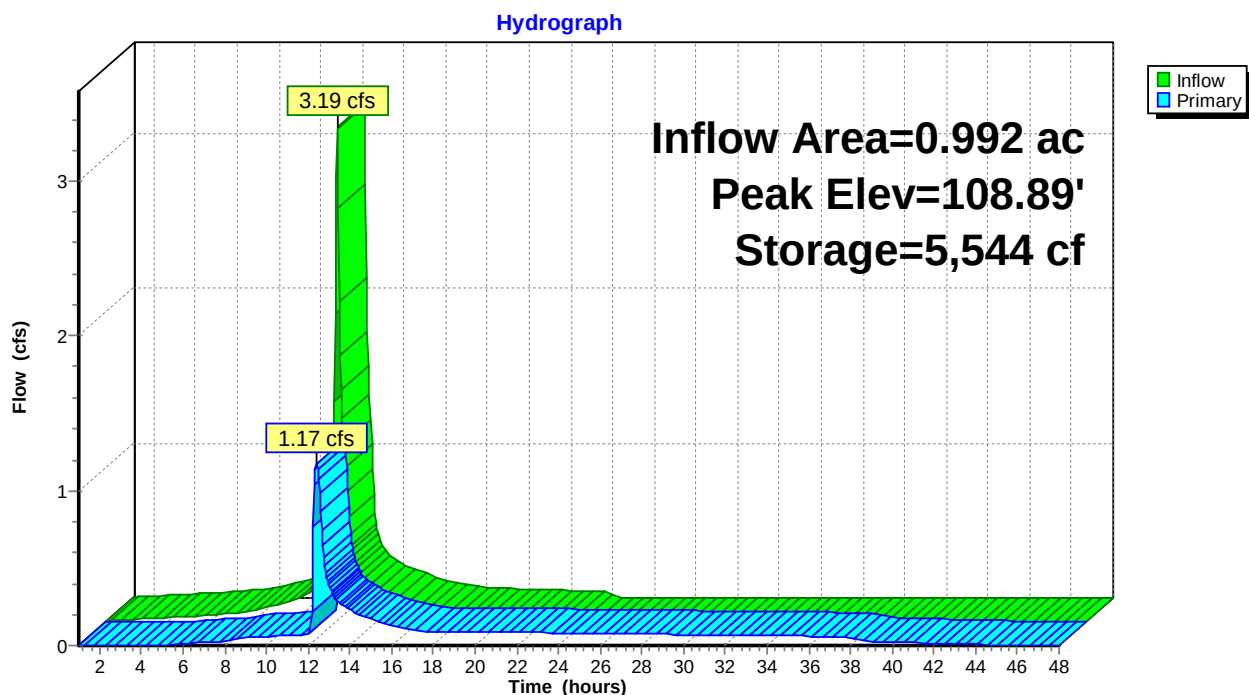
Device	Routing	Invert	Outlet Devices
#1	Primary	103.00'	1.2" Vert. Underdrain/Orifice C= 0.600
#2	Primary	108.27'	6.0" Round Bypass Overflow X 2.00 L= 6.0' Ke= 0.600 Inlet / Outlet Invert= 108.27' / 108.00' S= 0.0450 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=1.17 cfs @ 12.40 hrs HW=108.89' (Free Discharge)

↑ **1=Underdrain/Orifice** (Orifice Controls 0.09 cfs @ 11.63 fps)

— **2=Bypass Overflow** (Inlet Controls 1.08 cfs @ 2.74 fps)

Pond 1P: USSF 1 - StormTech 3500



Summary for Pond 2P: Pavement Profile/Drainage

Inflow Area = 0.298 ac, 73.29% Impervious, Inflow Depth = 3.80" for 25-year event
 Inflow = 0.19 cfs @ 15.57 hrs, Volume= 0.094 af
 Outflow = 0.19 cfs @ 15.61 hrs, Volume= 0.094 af, Atten= 0%, Lag= 2.3 min
 Primary = 0.19 cfs @ 15.61 hrs, Volume= 0.094 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 109.06' @ 15.61 hrs Surf.Area= 140 sf Storage= 39 cf

Plug-Flow detention time= 7.4 min calculated for 0.094 af (100% of inflow)

Center-of-Mass det. time= 4.8 min (1,059.9 - 1,055.1)

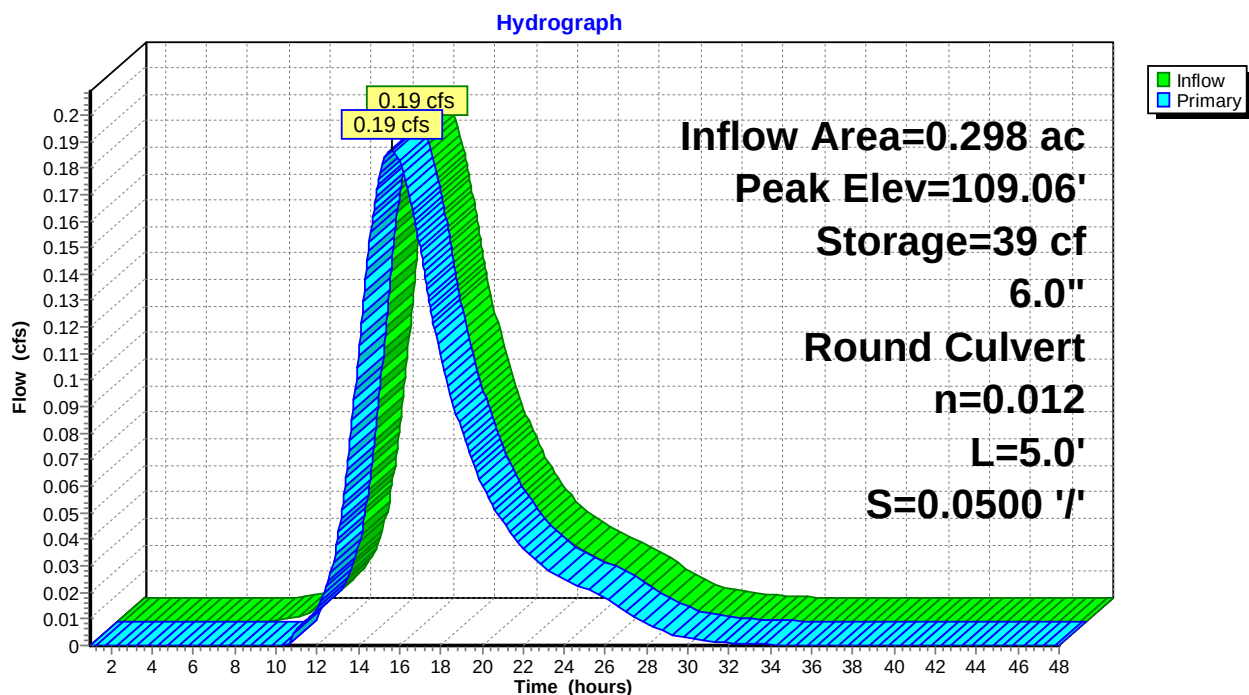
Volume	Invert	Avail.Storage	Storage Description
#1	108.50'	48 cf	1.33'W x 105.00'L x 1.00'H 6" Trench 140 cf Overall - 21 cf Embedded = 119 cf x 40.0% Voids
#2	109.50'	189 cf	18.00'W x 105.00'L x 0.25'H 3" - 3/4" Stone 473 cf Overall x 40.0% Voids
#3	109.75'	78 cf	18.00'W x 105.00'L x 0.83'H 10" - Filter MDOT Type D 1,569 cf Overall x 5.0% Voids
#4	110.58'	249 cf	18.00'W x 105.00'L x 0.33'H 4" - Choker 1-1/2" 624 cf Overall x 40.0% Voids
#5	110.91'	125 cf	18.00'W x 105.00'L x 0.33'H 4" - OGFC 624 cf Overall x 20.0% Voids
#6	108.75'	21 cf	6.0" Round 6 SD Inside #1 L= 105.0'
710 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	108.75'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 108.75' / 108.50' S= 0.0500 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.19 cfs @ 15.61 hrs HW=109.06' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.19 cfs @ 1.48 fps)

Pond 2P: Pavement Profile/Drainage



Summary for Pond 3P: Pavement Profile/Drainage

Inflow Area = 0.548 ac, 52.64% Impervious, Inflow Depth = 2.65" for 25-year event
 Inflow = 0.24 cfs @ 15.84 hrs, Volume= 0.121 af
 Outflow = 0.23 cfs @ 15.89 hrs, Volume= 0.120 af, Atten= 0%, Lag= 3.4 min
 Primary = 0.23 cfs @ 15.89 hrs, Volume= 0.120 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 107.75' @ 15.89 hrs Surf.Area= 557 sf Storage= 171 cf

Plug-Flow detention time= 22.4 min calculated for 0.120 af (99% of inflow)

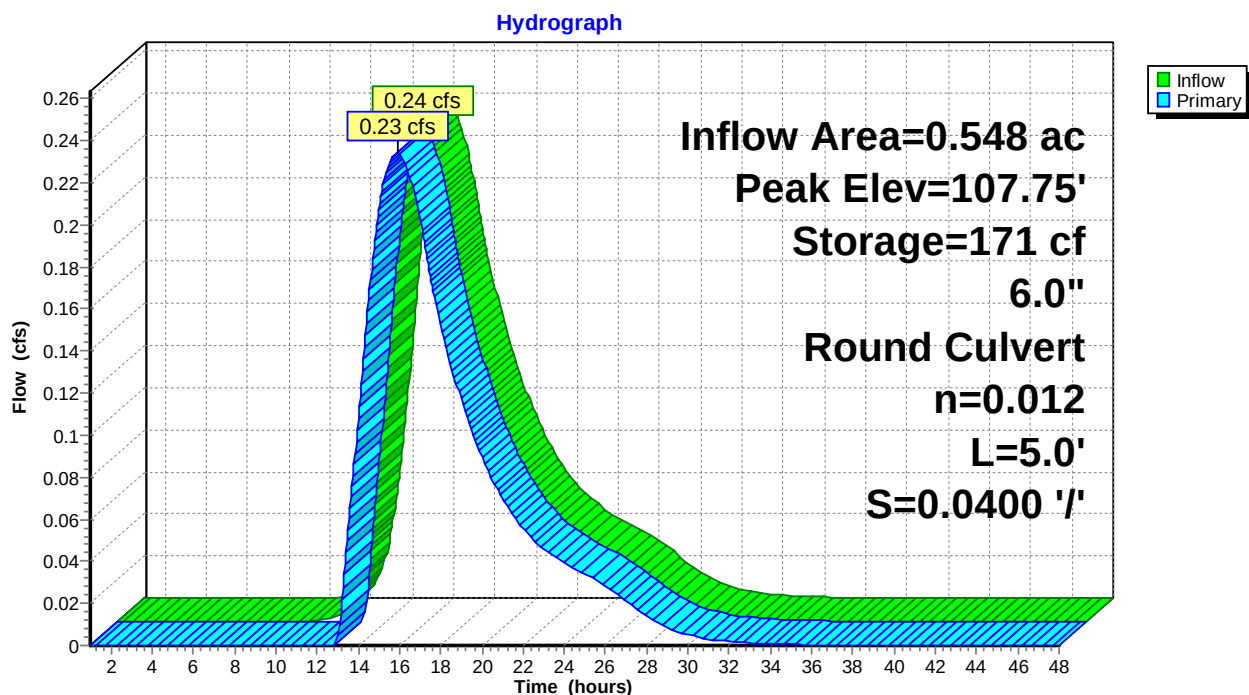
Center-of-Mass det. time= 15.1 min (1,100.0 - 1,084.9)

Volume	Invert	Avail.Storage	Storage Description
#1	107.15'	190 cf	1.33'W x 419.00'L x 1.00'H 6" Trench 557 cf Overall - 82 cf Embedded = 475 cf x 40.0% Voids
#2	108.15'	461 cf	11.00'W x 419.00'L x 0.25'H 3" - 3/4" Stone 1,152 cf Overall x 40.0% Voids
#3	108.40'	191 cf	11.00'W x 419.00'L x 0.83'H 10" - Filter MDOT Type D 3,825 cf Overall x 5.0% Voids
#4	109.23'	608 cf	11.00'W x 419.00'L x 0.33'H 4" - Choker 1-1/2" 1,521 cf Overall x 40.0% Voids
#5	109.56'	304 cf	11.00'W x 419.00'L x 0.33'H 4" - OGFC 1,521 cf Overall x 20.0% Voids
#6	107.40'	82 cf	6.0" Round 6 SD Inside #1 L= 419.0'
		1,837 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	107.40'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 107.40' / 107.20' S= 0.0400 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=0.23 cfs @ 15.89 hrs HW=107.75' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.23 cfs @ 1.59 fps)

Pond 3P: Pavement Profile/Drainage

Summary for Pond 4P: Pavement Profile/Drainage

Inflow Area = 0.358 ac, 69.20% Impervious, Inflow Depth = 4.87" for 25-year event
 Inflow = 0.28 cfs @ 15.49 hrs, Volume= 0.145 af
 Outflow = 0.28 cfs @ 15.50 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.1 min
 Primary = 0.28 cfs @ 15.50 hrs, Volume= 0.145 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 110.26' @ 15.50 hrs Surf.Area= 203 sf Storage= 1 cf

Plug-Flow detention time= 0.0 min calculated for 0.145 af (100% of inflow)

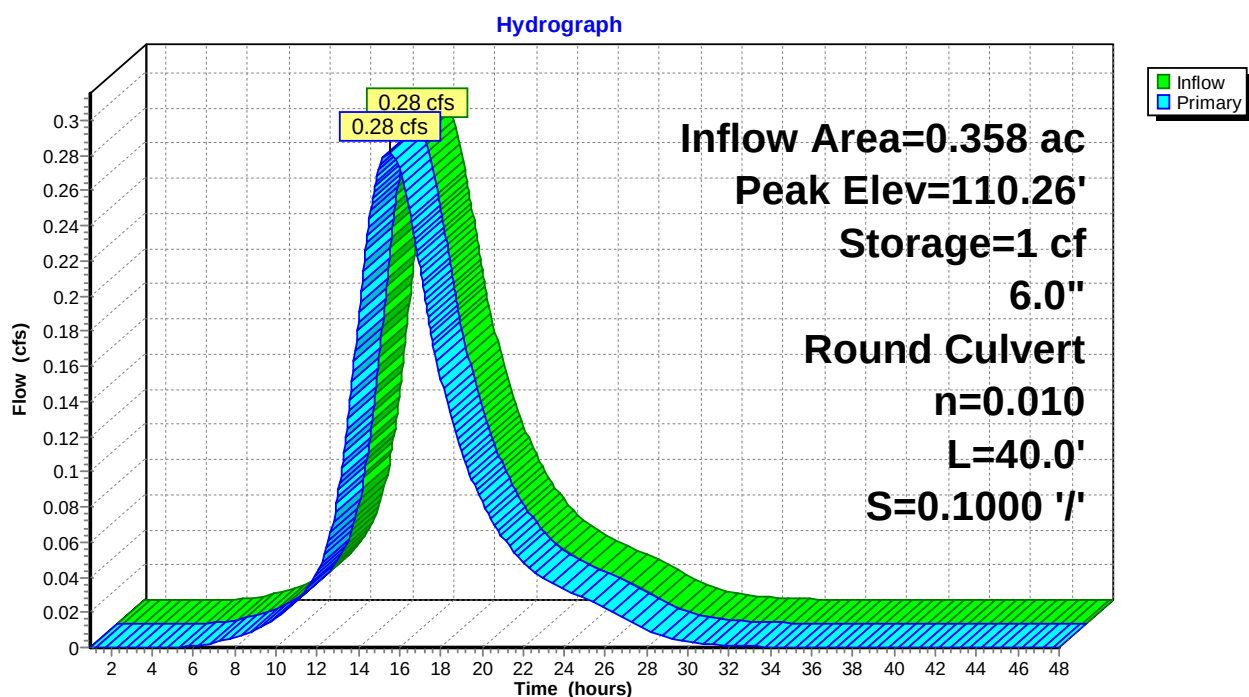
Center-of-Mass det. time= 0.0 min (1,022.9 - 1,022.9)

Volume	Invert	Avail.Storage	Storage Description
#1	110.25'	76 cf	1.50'W x 135.00'L x 1.00'H 6" Trench 203 cf Overall - 12 cf Embedded = 191 cf x 40.0% Voids
#2	111.25'	371 cf	11.00'W x 337.00'L x 0.25'H 3" - 3/4" Stone 927 cf Overall x 40.0% Voids
#3	112.08'	62 cf	11.00'W x 135.00'L x 0.83'H 10" - Filter MDOT Type D 1,233 cf Overall x 5.0% Voids
#4	112.41'	196 cf	11.00'W x 135.00'L x 0.33'H 4" - Choker 1-1/2" 490 cf Overall x 40.0% Voids
#5	112.74'	98 cf	11.00'W x 135.00'L x 0.33'H 4" - OGFC 490 cf Overall x 20.0% Voids
#6	110.50'	12 cf	4.0" Round 6 SD Inside #1 L= 135.0'
814 cf			Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	108.00'	6.0" Round 6" Pipe L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 108.00' / 104.00' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.06 cfs @ 15.50 hrs HW=110.26' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 1.06 cfs @ 5.39 fps)

Pond 4P: Pavement Profile/Drainage

Summary for Pond 5P: Pavement Profile/Drainage

Inflow Area = 0.282 ac, 91.32% Impervious, Inflow Depth = 4.99" for 25-year event
 Inflow = 0.23 cfs @ 15.50 hrs, Volume= 0.117 af
 Outflow = 0.23 cfs @ 15.50 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.23 cfs @ 15.50 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 104.94' @ 15.50 hrs Surf.Area= 216 sf Storage= 89 cf

Plug-Flow detention time= 18.8 min calculated for 0.116 af (99% of inflow)

Center-of-Mass det. time= 9.8 min (1,028.4 - 1,018.7)

Volume	Invert	Avail.Storage	Storage Description
#1	104.00'	81 cf	1.50'W x 144.00'L x 1.00'H 6" Underdrained Trench 216 cf Overall - 13 cf Embedded = 203 cf x 40.0% Voids
#2	105.00'	259 cf	18.00'W x 144.00'L x 0.25'H 3" - 3/4" Stone 648 cf Overall x 40.0% Voids
#3	105.25'	108 cf	18.00'W x 144.00'L x 0.83'H 10" - Filter MDOT Type D 2,151 cf Overall x 5.0% Voids
#4	106.08'	342 cf	18.00'W x 144.00'L x 0.33'H 4" - Choker 1-1/2" 855 cf Overall x 40.0% Voids
#5	106.41'	171 cf	18.00'W x 144.00'L x 0.33'H 4" - OGFC 855 cf Overall x 20.0% Voids
#6	104.25'	13 cf	4.0" Round 4 SD Inside #1 L= 144.0'
974 cf			Total Available Storage

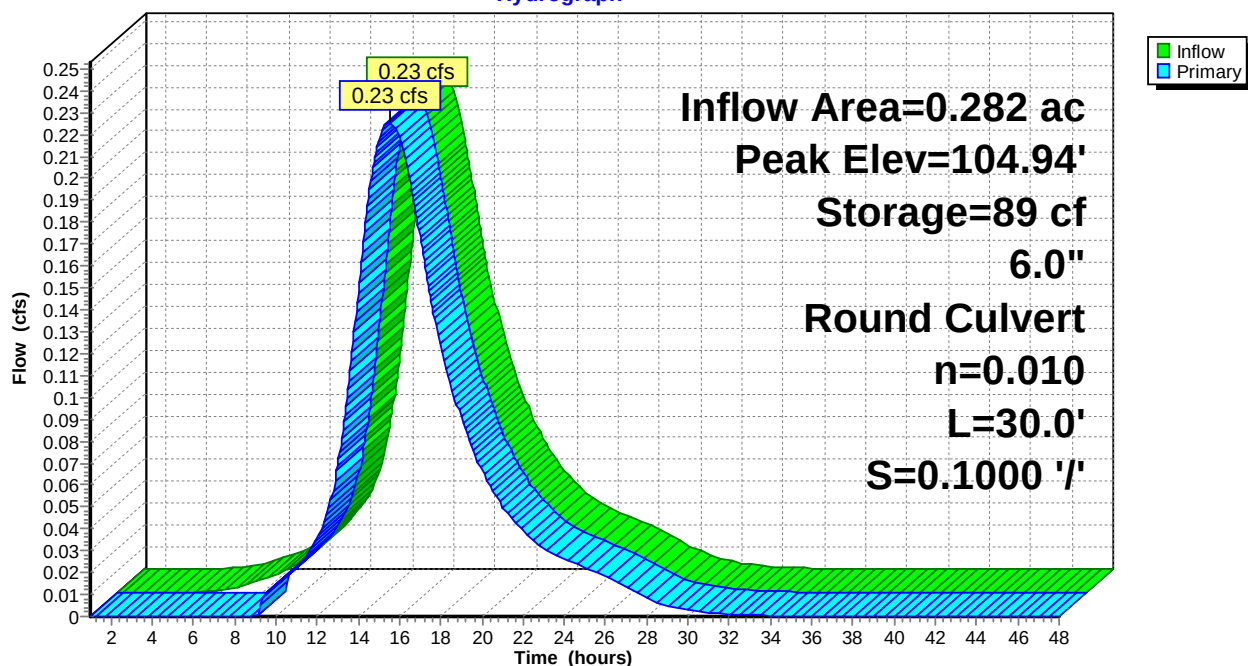
Device	Routing	Invert	Outlet Devices
#1	Primary	104.60'	6.0" Round 6" Pipe L= 30.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 104.60' / 101.60' S= 0.1000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.23 cfs @ 15.50 hrs HW=104.94' (Free Discharge)

↑ **1=6" Pipe** (Inlet Controls 0.23 cfs @ 1.57 fps)

Pond 5P: Pavement Profile/Drainage

Hydrograph



Summary for Pond 6P: USSF 2 - StormTech 3500

Inflow Area = 1.164 ac, 59.23% Impervious, Inflow Depth > 4.09" for 25-year event
 Inflow = 4.66 cfs @ 12.09 hrs, Volume= 0.397 af
 Outflow = 1.52 cfs @ 12.44 hrs, Volume= 0.392 af, Atten= 67%, Lag= 20.4 min
 Primary = 1.52 cfs @ 12.44 hrs, Volume= 0.392 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 105.15' @ 12.44 hrs Surf.Area= 6,091 sf Storage= 6,015 cf

Plug-Flow detention time= 107.2 min calculated for 0.392 af (99% of inflow)
 Center-of-Mass det. time= 99.1 min (871.6 - 772.6)

Volume	Invert	Avail.Storage	Storage Description
#1	101.50'	2,418 cf	35.08'W x 57.88'L x 4.75'H Stone 9,645 cf Overall - 3,599 cf Embedded = 6,045 cf x 40.0% Voids
#2	102.00'	3,599 cf	ADS StormTech MC-3500 d +Cap @ 7.50' L x 30 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.50'L = 115.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 30 Chambers in 5 Rows Cap Storage= +14.9 cf x 2 x 5 rows = 149.0 cf
#3	100.00'	152 cf	35.08'W x 57.88'L x 1.50'H Sand 3,046 cf Overall x 5.0% Voids
#4	99.00'	807 cf	35.08'W x 57.88'L x 1.00'H Crushed Stone 2,030 cf Overall - 13 cf Embedded = 2,017 cf x 40.0% Voids
#5	99.33'	13 cf	4.0" Round Underdrain Storage Inside #4 L= 150.0'
6,990 cf			Total Available Storage

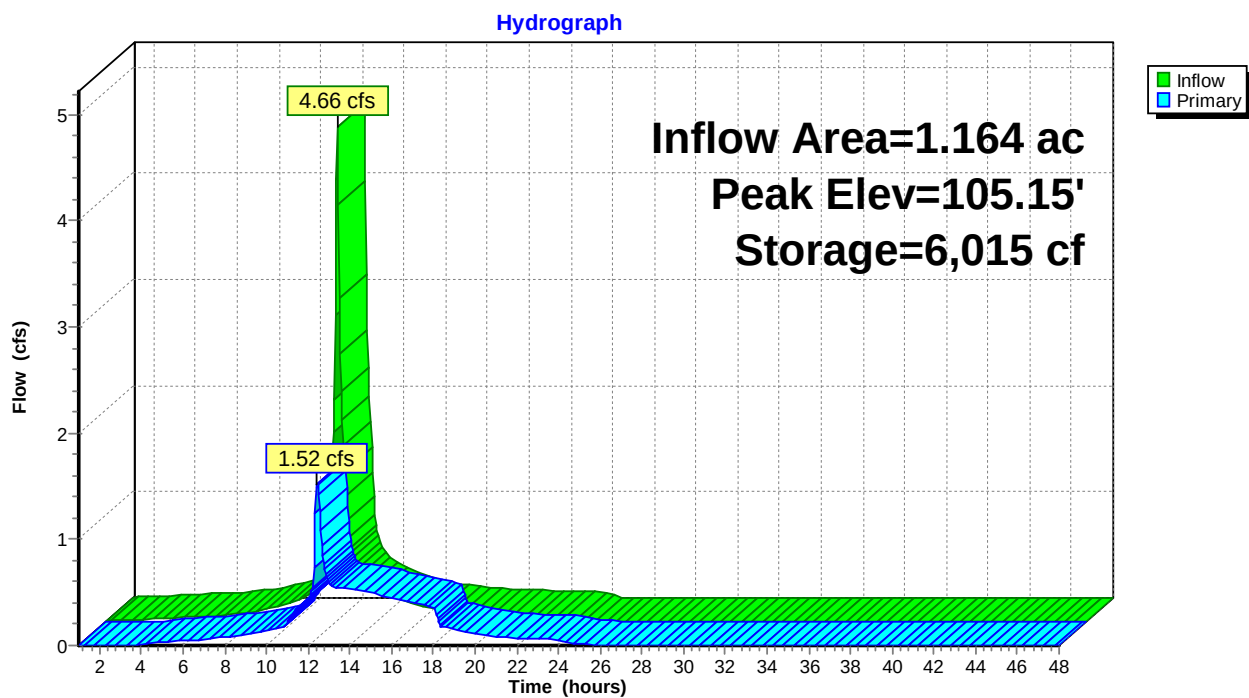
Device	Routing	Invert	Outlet Devices
#1	Primary	99.25'	3.0" Vert. Underdrain/Orifice C= 0.600
#2	Primary	104.77'	6.0" Round Bypass Overflow X 3.00 L= 7.0' Ke= 0.600 Inlet / Outlet Invert= 104.77' / 104.00' S= 0.1100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Primary OutFlow Max=1.50 cfs @ 12.44 hrs HW=105.15' (Free Discharge)

1=Underdrain/Orifice (Orifice Controls 0.57 cfs @ 11.57 fps)

2=Bypass Overflow (Inlet Controls 0.94 cfs @ 1.96 fps)

Pond 6P: USSF 2 - StormTech 3500



Summary for Pond 7P: 6+00 Rain Garden

Inflow Area = 0.398 ac, 64.38% Impervious, Inflow Depth = 3.89" for 25-year event
 Inflow = 1.68 cfs @ 12.09 hrs, Volume= 0.129 af
 Outflow = 1.74 cfs @ 12.12 hrs, Volume= 0.129 af, Atten= 0%, Lag= 1.7 min
 Primary = 1.74 cfs @ 12.12 hrs, Volume= 0.129 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 110.04' @ 12.12 hrs Surf.Area= 773 sf Storage= 816 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 26.5 min (820.8 - 794.3)

Volume	Invert	Avail.Storage	Storage Description
#1	108.00'	902 cf	Ponding above surface (Prismatic) Listed below (Recalc)
#2	106.50'	31 cf	Soil Filter/Loam Topsoil (Prismatic) Listed below (Recalc)
			314 cf Overall x 10.0% Voids
			933 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
108.00	209	0	0
109.00	374	292	292
110.00	564	469	761
110.25	564	141	902

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
106.50	209	0	0
108.00	209	314	314

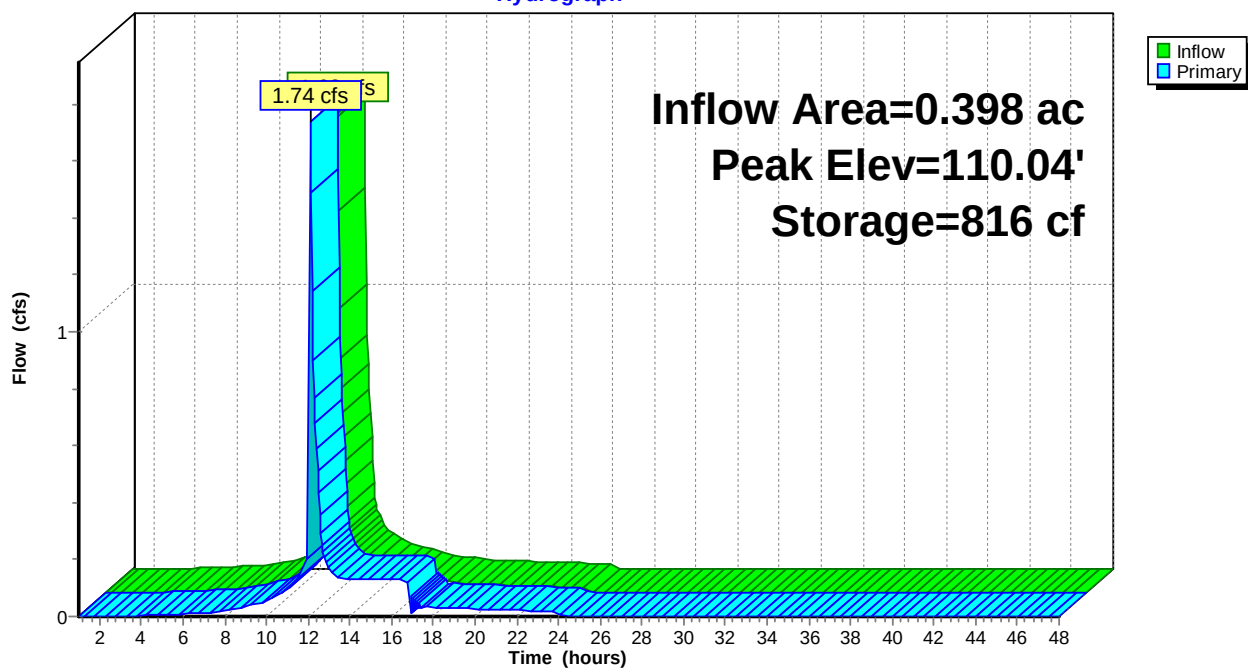
Device	Routing	Invert	Outlet Devices
#1	Primary	105.50'	12.0" Round Culvert L= 10.0' Ke= 0.600 Inlet / Outlet Invert= 105.50' / 105.35' S= 0.0150 ' /' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	106.50'	0.13 cfs Exfiltration when above 106.50'
#3	Primary	109.75'	12.0" Horiz. Beehive Overflow C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.60 cfs @ 12.12 hrs HW=110.02' (Free Discharge)

1=Culvert (Passes 0.13 cfs of 7.11 cfs potential flow)
 2=Exfiltration (Exfiltration Controls 0.13 cfs)
 3=Beehive Overflow (Weir Controls 1.47 cfs @ 1.71 fps)

Pond 7P: 6+00 Rain Garden

Hydrograph



Summary for Pond 8P: Pavement Profile/Drainage

Inflow Area = 0.234 ac, 82.25% Impervious, Inflow Depth = 5.21" for 25-year event
 Inflow = 0.19 cfs @ 15.29 hrs, Volume= 0.102 af
 Outflow = 0.19 cfs @ 15.29 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.1 min
 Primary = 0.19 cfs @ 15.29 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 111.80' @ 15.29 hrs Surf.Area= 180 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.102 af (100% of inflow)

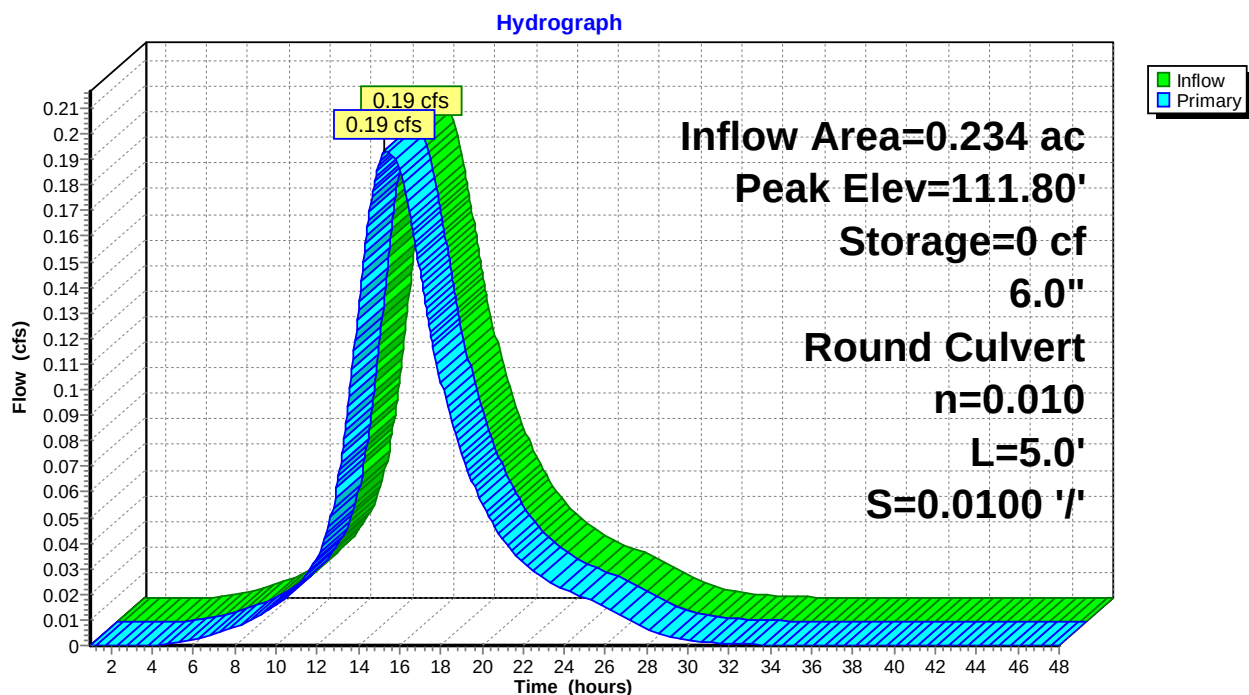
Center-of-Mass det. time= 0.0 min (1,009.1 - 1,009.1)

Volume	Invert	Avail.Storage	Storage Description
#1	111.80'	55 cf	1.33'W x 135.00'L x 0.83'H 4" Trench 149 cf Overall - 12 cf Embedded = 137 cf x 40.0% Voids
#2	112.59'	243 cf	49.30'W x 49.30'L x 0.25'H 3" - 3/4" Stone 608 cf Overall x 40.0% Voids
#3	112.84'	101 cf	49.30'W x 49.30'L x 0.83'H 10" - Filter MDOT Type D 2,017 cf Overall x 5.0% Voids
#4	113.67'	321 cf	49.30'W x 49.30'L x 0.33'H 4" - Choker 1-1/2" 802 cf Overall x 40.0% Voids
#5	114.00'	160 cf	49.30'W x 49.30'L x 0.33'H 4" - OGFC 802 cf Overall x 20.0% Voids
#6	111.80'	12 cf	4.0" Round 4 SD Inside #1 L= 135.0' S= 0.0010 '/'
		892 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	61.65'	6.0" Round 6" Pipe L= 5.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 61.65' / 61.60' S= 0.0100 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=5.27 cfs @ 15.29 hrs HW=111.80' (Free Discharge)

↑**1=6" Pipe** (Inlet Controls 5.27 cfs @ 26.85 fps)

Pond 8P: Pavement Profile/Drainage

Summary for Pond 9P: 4+25 Rain Garden

Inflow Area = 0.201 ac, 65.94% Impervious, Inflow Depth = 3.50" for 25-year event
 Inflow = 0.81 cfs @ 12.09 hrs, Volume= 0.059 af
 Outflow = 0.72 cfs @ 12.14 hrs, Volume= 0.059 af, Atten= 11%, Lag= 2.6 min
 Primary = 0.72 cfs @ 12.14 hrs, Volume= 0.059 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 103.56' @ 12.14 hrs Surf.Area= 210 sf Storage= 132 cf

Plug-Flow detention time= 20.3 min calculated for 0.059 af (100% of inflow)

Center-of-Mass det. time= 19.0 min (837.0 - 818.1)

Volume	Invert	Avail.Storage	Storage Description
#1	102.50'	195 cf	Ponding above surface (Prismatic) Listed below (Recalc)
#2	101.00'	9 cf	Soil Filter (Prismatic) Listed below (Recalc)
			90 cf Overall x 10.0% Voids
204 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
102.50	60	0	0
103.00	126	47	47
104.00	170	148	195

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
101.00	60	0	0
102.50	60	90	90

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	8.0" Round Culvert L= 78.0' Ke= 0.600 Inlet / Outlet Invert= 99.75' / 99.30' S= 0.0058 ' / Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	102.00'	0.01 cfs Exfiltration when above 102.00'
#3	Device 1	103.00'	6.0" Horiz. Beehive Overflow C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.70 cfs @ 12.14 hrs HW=103.54' (Free Discharge)

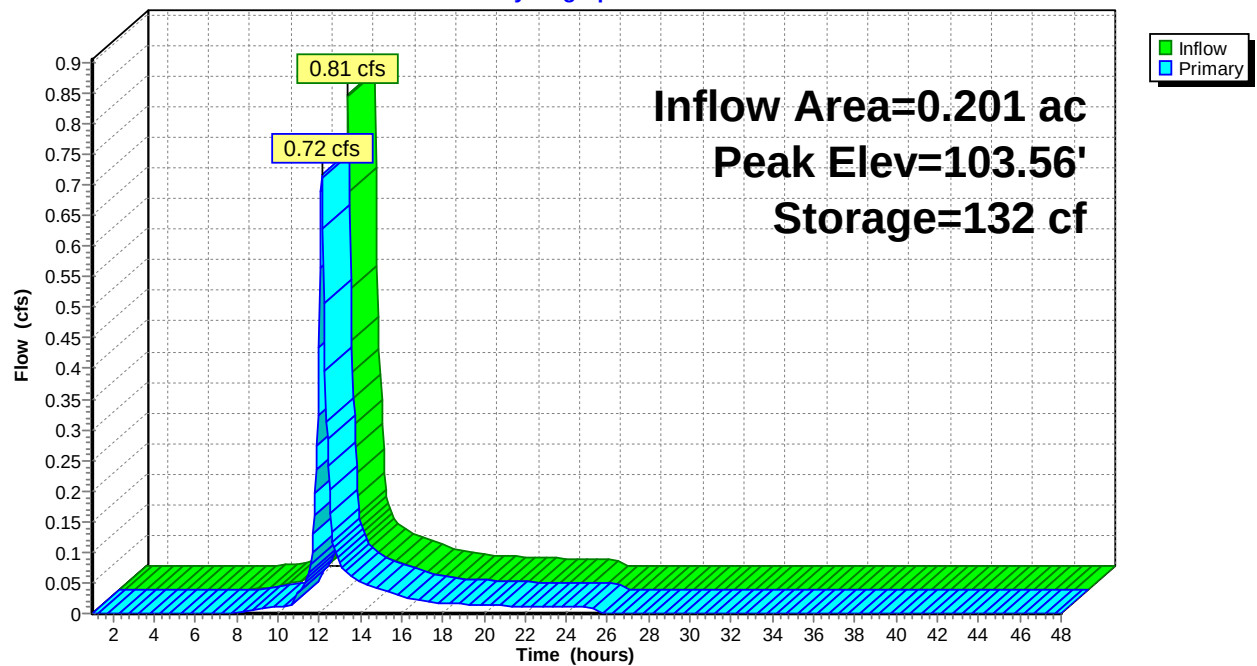
↑ **1=Culvert** (Passes 0.70 cfs of 2.33 cfs potential flow)

↑ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

↑ **3=Beehive Overflow** (Orifice Controls 0.69 cfs @ 3.54 fps)

Pond 9P: 4+25 Rain Garden

Hydrograph





United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Cumberland County and Part of Oxford County, Maine



January 5, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

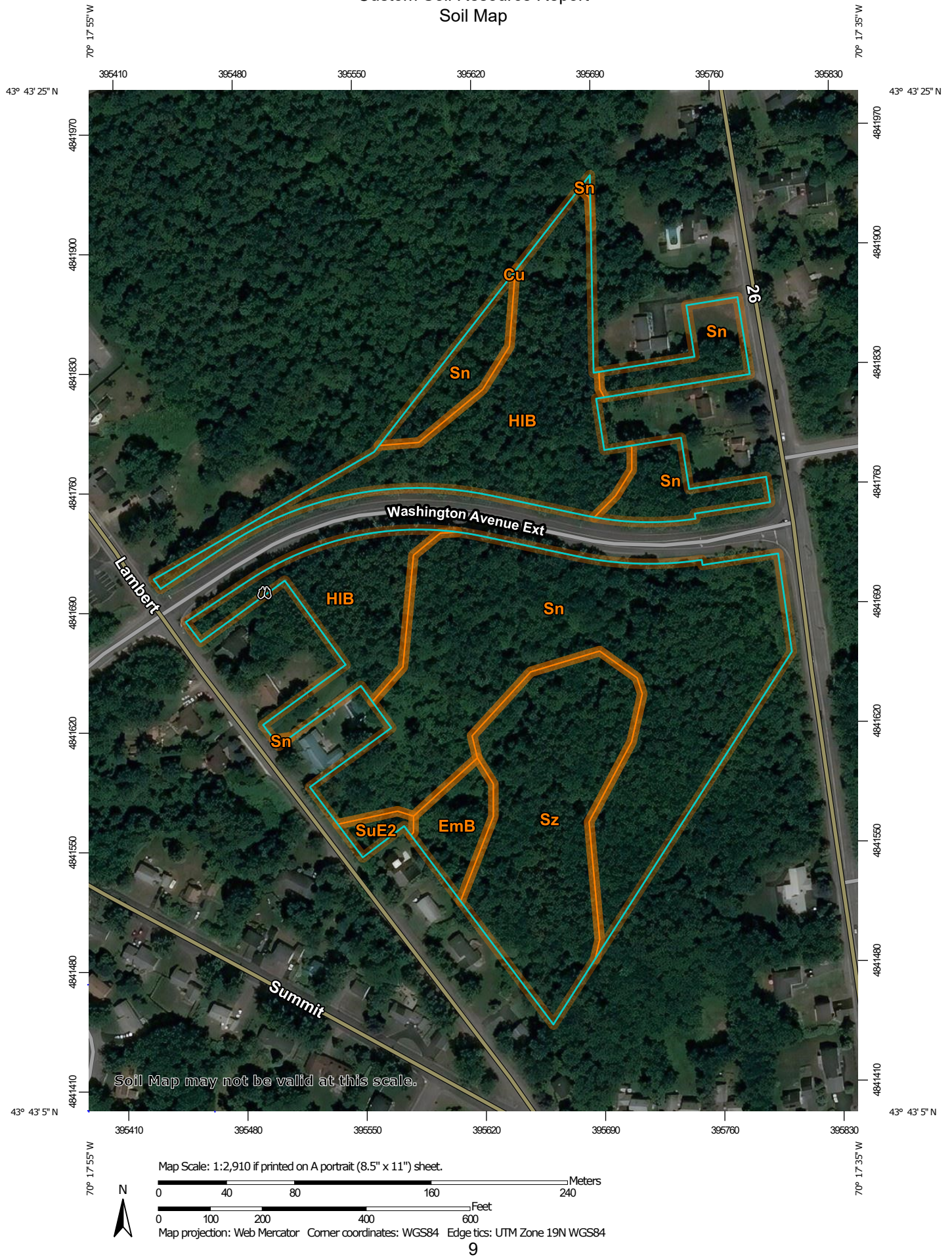
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 18, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cu	Cut and fill land	0.0	0.0%
EmB	Elmwood fine sandy loam, 0 to 8 percent slopes	0.6	3.1%
HIB	Hinckley loamy sand, 3 to 8 percent slopes	5.0	27.8%
Sn	Scantic silt loam, 0 to 3 percent slopes	8.9	49.6%
SuE2	Suffield silt loam, 25 to 45 percent slopes, eroded	0.2	0.8%
Sz	Swanton fine sandy loam	3.4	18.7%
Totals for Area of Interest		18.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Cumberland County and Part of Oxford County, Maine

Cu—Cut and fill land

Map Unit Composition

Cut and fill land: 90 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cut And Fill Land

Typical profile

H1 - 0 to 65 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 35 percent

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)

Depth to water table: About 24 to 42 inches

Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

EmB—Elmwood fine sandy loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: blh8

Elevation: 10 to 900 feet

Mean annual precipitation: 38 to 55 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 130 to 195 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Elmwood and similar soils: 88 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elmwood

Setting

Landform: Stream terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Coarse-loamy glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: fine sandy loam

H2 - 8 to 25 inches: sandy loam

H3 - 25 to 65 inches: silty clay loam

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Custom Soil Resource Report

Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F144BY402ME - Clay Hills
Hydric soil rating: No

HIB—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash plains, eskers, moraines, kame terraces, kames, outwash terraces, outwash deltas
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Sn—Scantic silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2slv3
Elevation: 10 to 900 feet
Mean annual precipitation: 33 to 60 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 90 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Scantic and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scantic

Setting

Landform: Marine terraces, river valleys
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciomarine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Bg1 - 9 to 16 inches: silty clay loam
Bg2 - 16 to 29 inches: silty clay
Cg - 29 to 65 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: D

Ecological site: F144BY304ME - Wet Clay Flat

Hydric soil rating: Yes

SuE2—Suffield silt loam, 25 to 45 percent slopes, eroded

Map Unit Setting

National map unit symbol: blk3

Elevation: 10 to 900 feet

Mean annual precipitation: 34 to 48 inches

Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 160 days

Farmland classification: Not prime farmland

Map Unit Composition

Suffield and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Suffield

Setting

Landform: Coastal plains

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Riser

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Fine glaciolacustrine deposits

Typical profile

H1 - 0 to 6 inches: silt loam

H2 - 6 to 23 inches: silt loam

H3 - 23 to 33 inches: silty clay

H4 - 33 to 65 inches: silty clay

Properties and qualities

Slope: 25 to 45 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C

Ecological site: F144BY402ME - Clay Hills

Hydric soil rating: No

Sz—Swanton fine sandy loam

Map Unit Setting

National map unit symbol: blk4

Elevation: 10 to 900 feet

Mean annual precipitation: 36 to 48 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 90 to 160 days

Farmland classification: Not prime farmland

Map Unit Composition

Swanton and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swanton

Setting

Landform: Outwash plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy glaciolacustrine deposits

Typical profile

H1 - 0 to 9 inches: fine sandy loam

H2 - 9 to 32 inches: fine sandy loam

H3 - 32 to 65 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 0 to 18 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Custom Soil Resource Report

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

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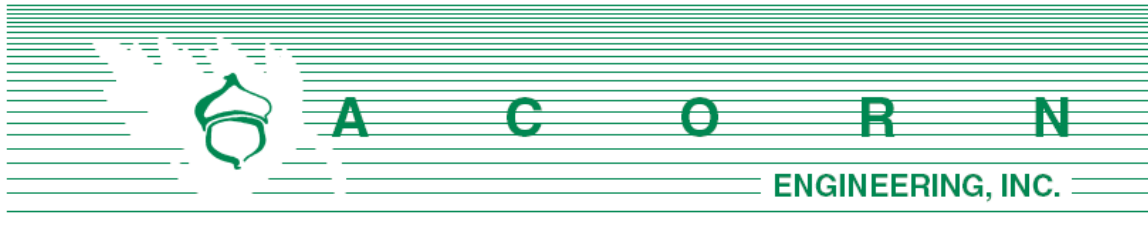
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K. EROSION & SEDIMENTATION **CONTROL REPORT**

Prepared For:

**165 Lambert Street
Portland, Maine 04103**

Prepared By:

**Acorn Engineering, Inc.
PO Box 3372
Portland, Maine 04104**



June 2022

INTRODUCTION

Acorn Engineering, Inc. has been retained by The Maine Cooperative Development Partners to provide civil engineering services for the proposed development at 165 Lambert Street and 622 Auburn Street. The property consists of approximately 17.95 acres of land and contains the following parcels (Chart, Book, Lot, 385-A-1, 386-C-1, 386-B-12, and 386-B-15).

The following Erosion and Sedimentation Control Report was developed in accordance with the City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards and the Maine DEP Chapter 500 Stormwater Management Appendix A and B (1), Amended August 12, 2015. This narrative also meets the standards required in the Maine DEP's Erosion & Sediment Control BMP's Manual, revised in 2016.

1.0 EXISTING CONDITIONS

The project site is bordered by Lambert Street, Auburn Street, and Washington Ave. A boundary plan has been prepared by Owen Haskell Inc., dated June 14th 2021 and revised December 21st, 2021. Two wetland investigations were performed (separate investigations for both parcels) by Jones Associates Inc., dated June 2021, October, 2021.

The property is in the R-3 Residential Zone. Abutting Uses include the R-2 Residential Zone in the abutting Portland properties, and Mixed Use Cluster in the abutting Falmouth properties.

The site currently consists of 17.95 acres of undeveloped land divided into to parcels bisected by Washington Ave. To the very north of the property the land slopes down to a stream. The approximate slope in this area is between 5-10% for a majority of the land with steeper slopes along the banks of the stream. The southern portion of the north parcel slopes towards the Washington Ave roadside ditch at an approximate slope of 3-6%. The northern portion of the southern parcel slopes towards a slight depression with the low point of the area occurring at the end of the Washington Ave roadside ditch. The slope of the valley is approximately 3-6%. The southern portion of the south parcel slopes down to a stream. The slopes vary from approximately 5-10% for a majority of the land with steeper slopes along the banks of the stream. There are also two wetlands within the northern parcel where one is considered a WOSS due to its close proximity to an identified stream. Jones associates identified multiple streams in both parcels, the southern parcel consists of four streams, with two stream converging at the eastern portion of the parcel creating one larger stream flowing from the east to west, said streams are a result of culverts flowing onto the property. Two feeder streams also contribute to the large stream and drain from the south to the north. One stream is located on the northern parcel and flows from east to northwest, this stream is formed from a culvert draining onto the property. The site is not in the watershed of an urban impaired stream.

1.1 Existing Soils



Onsite soil information includes the following:

- Soil Conservation Service Medium Intensity Soil Survey for Cumberland County
- United States Department of Agriculture Web Soil Survey

Given the soils information, listed above, no onsite wastewater is proposed; the applicant does not intend to perform a more intense hydric soil boundary delineation because the waiver requirements set forth in the City of Portland Technical Manual – Section 7 – Soil Survey, Rev. 6/17/11 are met.

The area within and surrounding the project includes soil types listed in the table below. The susceptibility of soils to erosion is indicated on a relative “K” scale of values over a range of 0.02 to 0.69. Higher “K” values indicate more erodible soils.

Table 1 - “K” Value		
Soils Type	Subsurface	Substratum
Elmwood fine sandy loam (EmB)	.32	.49
Hinkley Loamy Sand (HIC)	.17	.17
Suffield Silt Loam (SuE2)	.49	.49
Scantic silt loam (SN)	.49	.49
Swanton Fine Sandy Loam (SZ)	.32	.49

Implementation of the proposed Erosion & Sedimentation Measures by the contractor will be of the utmost importance given the sustained slope and natural resources in vicinity of the site.

1.2 Existing Erosion Problems

There are signs of erosion along the stream banks as a result of the culverts outletting into the property. This area is not proposed to be altered or disturbed as part of the project.

1.3 Critical Areas

Critical areas identified onsite include the identified wetlands and streams. A double row of sedimentation barriers will be proposed for all disturbance upgradient of critical areas.

1.4 Protected Natural Resource

The client is not aware of the presence of any existing significant natural features located on the site as listed in Section 14-526 (b) 1. of the Land Use Code. The project



is not located within a watershed classified as an Urban Impaired Stream by the Maine DEP.

1.5 Previous Construction Activity (5 years)

Acorn Engineering, Inc. is not aware of any construction related activities within the project limits within the past 5 years.

1.6 Timber Harvesting

Acorn Engineering, Inc. is not aware of any timber harvesting within the past five years.

2.0 EROSION CONTROL MEASURES AND SITE STABILIZATION

As part of the site development, the following temporary and permanent erosion and sedimentation control devices shall be implemented. Devices shall be installed as described in this report or within the plan set. See the Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices for further reference.

2.1 Temporary Erosion Control Measures

The following temporary erosion and sedimentation control measures are planned for the project's construction period:

2.1.1 Crushed stone stabilized construction entrances shall be placed at all access points to the project site where there are disturbed areas. The following specifications shall be followed at a minimum:

- Stone size shall be 2-3 inches, or reclaimed or recycled concrete equivalent.
- The thickness of the entrance stone layer shall be no less than 6 inches.
- The entrance shall not be less than 20 feet wide, however not less than the full width of points where ingress or egress occurs. The length shall not be less than 50 feet in length.
- Geotextile fabric (woven or non-woven) shall be placed over the entire entrance area.
- The entrance/exit shall be maintained to the extent that it will prevent the tracking of sediment onto public road ways.

2.1.2 Siltation fence or erosion control berm shall be installed downgradient of any disturbed areas to trap runoff borne sediments until permanent stabilization is achieved. The silt fence or erosion control berm shall be installed per the details provided in the plan set and inspected before and immediately after each rainfall and at least daily during prolonged rainfall. Repairs shall be made if there are any signs of erosion or sedimentation below the fence line or berm. If there are signs of undercutting at the center or the edges or



impounding large volumes of water behind the fence or berm, the barrier shall be replaced with a stone check dam. When time for removal, it is recommended that silt fences be removed by cutting the fence material at ground level to avoid additional soil disturbance.

- 2.1.3 Hay mulch, including hydroseeding, is intended to provide cover for denuded or seeded areas until revegetation is established. Temporary mulch should be applied to areas that will not be actively worked for more than 14 days (7 days in sensitive areas). Mulch placed between April 15th and November 1st on slopes of less than 15 percent shall be covered by fabric netting and anchored with staples in accordance with the manufacturer's recommendation. Mulch placed between November 1st and April 15th on slopes equal to or steeper than 8 percent and equal to or flatter than 2:1 shall use mats or fabric netting and anchored with staples in accordance with the manufacturer's recommendation.
- 2.1.4 At any time of the year, all slopes greater than 3:1 shall be stabilized with Double Net Erosion Control Blanket Bionet SC150BN by North American Green or Approved Equal, or Erosion Control Mix Slope Protection as detailed within the plans.
- 2.1.5 Lambert street (any of the other streets?) shall be swept to control mud and dust from the construction site as necessary. Add additional stone to the stabilized construction entrance to minimize the tracking of material off the site and onto the surrounding roadways.
- 2.1.6 During demolition, clearing and grubbing operations, stone check dams shall be installed at any areas of concentrated flow. The maximum height of the check dam shall not exceed 2 feet. The center of the check dam shall be 6 inches below the outer edges of the dam. The contractor shall mulch the side slopes and install stone check dams for all newly excavated ditch lines within 24 hours of their creation.
- 2.1.7 Silt fence stake spacing shall not exceed 6 feet unless the fence is supported with 14-gauge wire in which case the maximum spacing shall not exceed 10 feet. The silt fence shall be "toed" into the ground.
- 2.1.8 Storm drain inlet protection shall be provided to storm drains using any of the following: hay bale drop inlet structures, silt fence drop inlet sediment filter, gravel and wire mesh drop inlet sediment filter, or curb inlet sediment filter. Barriers shall be inspected after every rainfall event and repaired as necessary. Sediments shall be removed when accumulation has reached ½ the design height.
- 2.1.9 Dust control shall be accomplished using any of the following: water, calcium chloride, stone, or an approved MDEP product. Dust control shall be applied as needed to accomplish dust control.



- 2.1.10 Temporary loam, seed, and mulching shall be used in areas where no other erosion control measure is used. Application rates for seeding are provided at the end of this report.
- 2.1.11 Stockpiles shall be stabilized within 7 days of formation unless a scheduled rain event occurs prior to the 7-day window, in which case the stockpile shall be stabilized prior to the rain event. Methods of stabilization shall be mulch, erosion control mix, or erosion control blankets/mats. Silt fence or a wood waste compost filter berm shall be placed downhill of any soil stockpile location.
- 2.1.12 For disturbance between November 1 and April 15, please refer to winter stabilization plan in this report and the Maine Erosion and Sediment Control BMP manual for further information.
- 2.1.13 It is of the utmost importance that stormwater runoff and potential sediment from the construction site be diverted around the proposed underdrains until the trench is backfilled.

2.2 Permanent Erosion Control Measures

The following permanent erosion control measures are intended for post disturbance areas of the project.

- 2.2.1 All disturbed areas during construction, not subject to other proposed conditions, shall receive a minimum 4" of loam, limed, and mulched. Erosion control blankets or mats shall be placed over the mulch in areas noted in paragraph 4.1 of this report.
- 2.2.2 All stormwater devices shall be installed and tributary areas stabilized prior receiving stormwater.
- 2.2.3 Refer to the Maine Erosion and Sediment Control BMP manual for additional information.

3.0 EROSION AND SEDIMENTATION CONTROL PLAN

3.1 The Construction Management & Erosion Control Plan is included within the plan set.

4.0 DETAILS AND SPECIFICATIONS

4.1 Erosion & Sedimentation Control Details and Specifications are included in the plan set.

5.0 STABILIZATION PLAN FOR WINTER CONSTRUCTION

Winter Construction consists of earthwork disturbance between the dates of November 1 and April 15. If a construction site is not stabilized with pavement, a road gravel base, 75%



mature vegetation cover or riprap by November 15, then the site shall be protected with over-winter stabilization. Any area not stabilized with pavement, vegetation, mulching, erosion control mix, erosion control mats, riprap, or gravel base on a road shall be considered open.

The contractor shall limit the work area to areas that work will occur in during the subsequent 15 days and so that it can be mulched one day prior to a snow event. The contractor shall stabilize work areas prior to opening additional work areas to minimize areas without erosion control measures.

The following measures shall be implemented during winter construction periods:

5.1 Sediment Barriers

During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

5.2 Mulching

All areas shall be considered to be denuded until seeded and mulched. Hay and straw mulch shall be applied at a rate of 150 lb. per 1,000 square feet or 3 tons/acre (twice the normal accepted rate of 75-lbs./1,000 s.f. or 1.5 tons/acre) and shall be properly anchored. Erosion control mix must be applied with a minimum 4-inch thickness. Mulch shall not be spread on top of snow. The snow shall be removed down to a one-inch depth or less prior to application. After each day of final grading, the area shall be properly stabilized with anchored hay or straw or erosion control matting. An area shall be considered to have been stabilized when exposed surfaces have been either mulched or adequately anchored so that ground surface is not visible through the mulch. Between the dates of November 1 and April 15, all mulch shall be anchored by either mulch netting, tracking or wood cellulose fiber. The cover will be considered sufficient when the ground surface is not visible through the mulch. After November 1st, mulch and anchoring of all exposed soil shall occur at the end of each final grading workday.

5.3 Soil Stockpiling

Stockpiles of soil or subsoil shall be mulched for over winter protection with hay or straw at twice the normal rate or with a four-inch layer of erosion control mix. This shall be done within 24 hours of stocking and re-established prior to any rainfall or snowfall.

5.4 Seeding

Between the dates of October 15th and April 1st, loam or seed shall not be required. During periods of above freezing temperatures finished areas shall be fine graded and



either protected with mulch or temporarily seeded and mulched until the final treatment can be applied. If the date is after November 1st and if the exposed area has not been loamed, final grading with a uniform surface, then the area may be dormant seeded at a rate of 3 times higher than specified for permanent seed and then mulched.

Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas shall receive 4" of loam and seed at an application rate of 5 lbs./1,000 s.f. All areas seeded during the winter shall be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75% catch) shall be revegetated by replacing loam, seed and mulch. If dormant seeding is not used for the site, all disturbed areas shall be revegetated in the spring.

5.5 Over winter stabilization of disturbed soils

By September 15th, all disturbed soils on areas having a slope less than 15% shall be seeded and mulched. If the disturbed areas are not stabilized by this date, then one of the following actions shall be taken to stabilize the soil for late fall and winter:

- Stabilize the soil with temporary vegetation – By October 1st, seed the disturbed soil with winter rye at a seeding rate of 3lbs per 1,000 s.f., lightly mulch the seeded soil with hay or straw at 75 lbs per 1,000 s.f., and anchor the mulch with plastic netting. Monitor growth of the rye over the next 30 days. If the rye fails to grow at least three inches or fails to cover at least 75% of the disturbed soil before November 1st, then mulch the area for over-winter protection.
- Stabilize the soil with sod – Stabilize the disturbed soil with properly installed sod by October 1st. Proper installation includes pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil.
- Stabilize the soil with mulch – By November 15th, mulch the disturbed soil by spreading hay or straw at a rate of at least 150 lbs per 1,000 s.f. on the area so that no soil is visible through the mulch. Immediately after applying the mulch, anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

5.6 Over winter stabilization of disturbed slopes

All stone-covered slopes shall be constructed and stabilized by November 15th. All slopes to be vegetated shall be seeded and mulched by September 1st. A slope is considered a grade greater than 15%. If a slope to be vegetated is not stabilized by September 1st, then one of the following action shall be taken to stabilize the slope for late fall and winter:



- Stabilize the soil with temporary vegetation and erosion control mats – By October 1st the disturbed slope shall be seeded with winter rye at a seeding rate of 3 lbs per 1,000 s.f. and then install erosion control mats or anchored mulch over the seeding. If the rye fails to grow at least three inches or fails to cover at least 75% of the slope by November 1st, then the contractor shall cover the slope with a layer of erosion control mix or with stone riprap.
- Stabilize the soil with sod – The disturbed slope shall be stabilized with properly installed sod by October 1st. Proper installation includes the contractor pinning the sod onto the slope with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. The contractor shall not use late-season sod installation to stabilize slopes having a grade greater than 3H:1V or having groundwater seeps on the slope face.
- Stabilize the soil with erosion control mix – Erosion control mix shall be properly installed by November 15th. The contractor shall not use erosion control mix to stabilize slopes having grades greater than 2H:1V or having groundwater seeps on the slope face.
- Stabilize the soil with stone riprap – Place a layer of stone riprap on the slope by November 15th. A registered professional engineer shall be hired to determine the stone size needed for stability on the slope and to design a filter layer for underneath the riprap.

6.0 INSPECTION AND MAINTENANCE

A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct periodic visual inspections of installed erosion control measures. The frequency of inspection shall occur at least once every two weeks, as well as after a “storm event”. A “storm event” shall consist 0.5 inches of rain within a 24-hour period. The following Erosion and Sediment Control - Best Management Practices (BMP's) shall be inspected in the manner as described.

6.1 Sediment Barriers

Hay bale barriers, silt fences and filter berms shall be inspected and repaired for the following if there are any signs of erosion or sedimentation below them. If there are signs of undercutting at the center or the edges of the barrier, or impounding of large volumes of water behind them, sediment barriers shall be replaced with a temporary check dam. Should the fabric on a silt fence or filter barrier decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits should be removed when deposits reach approximately one-half the height of the barrier. Filter berms should be reshaped as needed. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared and seeded.



6.2 Stabilized Stone Construction Entrances

The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way. When the control pad becomes ineffective, the stone shall be removed along with the collected soil material and redistributed on site in a stable manner. The entrance should then be reconstructed. The contractor shall sweep or wash pavement at exits, which have experienced mud-tracking on to the pavement or traveled way. When washing is required, it shall be done on an area stabilized with aggregate, which drains into an approved sediment trapping device. All sediment shall be prevented from entering storm drains, ditches, or waterways. All sweeping conducted shall not be sweep into the existing wetland.

6.3 Mulched Areas

All mulches must be inspected periodically, in particular after rainstorms, to check for rill erosion. If less than 90% of the soil surface is covered by mulch, additional mulch shall be immediately applied. Nets must be inspected after rain events for dislocation or failure. If washouts or breakage occur, re-install the nets as necessary after repairing damage to the slope. Where mulch is used in conjunction with ornamental plantings, inspect periodically throughout the year to determine if mulch is maintaining coverage of the soil surface. Repair as needed.

6.4 Dust Control

When temporary dust control measures are used, repetitive treatment shall be applied as needed to accomplish control. Frequent reapplication of water may be necessary to mitigate dust occurring on warm sunny days, the distribution of water should not cause turbid runoff. Sweeping of paved road surface should occur during dry conditions and shall be swept from the centerline to the edge of the travel way, and shall not to be swept into a waterbody or wetland. Public roads may also require sweeping when necessary.

6.5 Stormwater Appurtenances

All underdrains, storm drains, and catch basins need to be operating effectively and free of debris.

6.6 Erosion and Sedimentation Control Inspections:

Acorn Engineering has personnel qualified to conduct Erosion and Sedimentation Control Inspections. For further information, contact:

Contact: Will Savage, PE
Telephone: (207) 775-2655



Qualifications:

- Maine Professional Engineering License #11419
- Maine DEP - Certified in Maintenance & Inspection of Stormwater BMP's Cert #14
- Certified Erosion, Sediment and Storm Water Inspector (CESSWI) Cert #0293
- Certified Professional in Erosion and Sediment Control (CPESC) Cert. #4620

The Contractor has sole responsibility for complying with the Erosion and Sedimentation Report/Plan, including control of fugitive dust. The Contractor shall be responsible for any monetary penalties resulting from failure to comply with these standards.

7.0 IMPLEMENTATION SCHEDULE

The following implementation sequence is intended to maximize the effectiveness of the above described erosion control measures. Contractors should avoid overexposing disturbed areas and limit the amount of stabilization area.

1. Install a stabilized construction entrance in all locations where construction traffic will enter and exit the site.
2. Install perimeter silt fence or erosion control berm.
3. Install all other erosion control devices as necessary throughout the remainder of this schedule.
4. Commence installation of drainage infrastructure.
5. Prioritize the downhill side to contain runoff within the site while providing an engineered outlet to the municipal storm drain system within Lambert Street.
6. Commence earthwork operations, associated with the parking lot construction.
7. Commence installation of utilities.
8. Continue earthwork and grading to subgrade as necessary for construction.
9. Complete installation of drainage infrastructure, as well as other utility work.
10. Complete remaining earthwork operations.
11. Install sub-base and base gravels in paved areas.
12. Install paving, curbing and brickwork.
13. Loam, lime, fertilize, seed and mulch disturbed areas and complete all landscaping.
14. Once the site is stabilized and mulching of landscape areas is complete, remove all temporary erosion control measures.
15. Touch up areas without a vigorous catch of grass with loam and seed.
16. Complete site signage and striping.
17. Execute proper maintenance of all temporary and permanent erosion control measures throughout the project.

The above implementation sequence should be generally followed by the site contractor. However, the contractor may construct several items simultaneously. The contractor shall submit to the owner a schedule of the completion of the work. If the contractor is to commence the construction of more than one item above, they shall limit the amount of exposed areas to those areas in which work is expected to be undertaken during the following 30 days.



The contractor shall re-vegetate disturbed areas as rapidly as possible. All areas shall be permanently stabilized within 7 days of final grading or before a storm event. The contractor shall incorporate planned inlets and drainage systems as early as possible into the construction phase.

8.0 CONCLUSION

The above erosion control narrative is intended to minimize the development impact by implementing temporary and permanent erosion control measures. The contractor shall also refer to the Maine Erosion and Sediment Control BMP manual for additional information.



9.0 ATTACHMENTS

- Temporary Seeding Plan



TEMPORARY SEEDING PLAN

Site Preparation

The seeded areas shall be feasibly graded out to provide the use of equipment for seedbed preparation, seeding, mulch application, and mulch anchoring. If necessary, the site may require additional temporary erosion control measures outlined in the Erosion Control report.

Seedbed Preparation

Fertilizer shall be applied to the site at a rate of 13.8 pounds per 1,000 square feet. The composition of the fertilizer shall be 10-10-10 (N-P₂O₅-K₂O) or equivalent.

Limestone shall be applied to the site at a rate of 138 pounds per 1,000 square feet.

Seeding

The composition and amount of temporary seed applied to a site shall be determined by the following table:

Seed	Pounds / 1,000 S.F.	Recommended Seeding Dates
Winter Rye	2.57	Aug-15 to Oct-1
Oats	1.84	Apr-1 to Jul-1 Aug-15 to Sep-15
Annual Ryegrass	0.92	Apr-1 to Jul-1
Sudangrass	0.92	May-15 to Aug-15
Perennial	0.92	Aug-15 to Sep-15

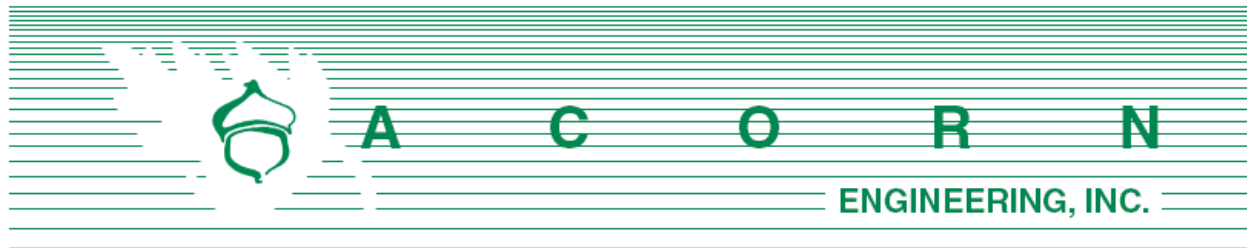
Mulching

Mulch shall be applied at a rate of 70 lbs – 90 lbs per 1,000 square feet. The mulch shall be installed at a minimum depth of 4 inches. The seeded area shall be mulched immediately after seed is applied. Mulching during the winter season shall be double the normal amount.

Conclusion

Please refer to the Maine Erosion and Sediment Control BMP manual for additional information pertaining to temporary seeding and mulching.





Chief Keith Gautreau
 City of Portland Fire Department
 380 Congress St.
 Portland, ME 04101

June 17, 2022

Subject: Lambert Woods Development – Fire Department Checklist
 Section L of Application

On behalf of Maine Cooperative Partners, LLC, the design team is pleased to respond to the Portland Fire Department Site Review Checklist.

1. Name, address, telephone number of applicant

Maine Cooperative Development Partners
 6 City Center, Fl. 3
 Portland, Maine 04101
 (207) 415-3870

2. Name, address, telephone number of architect

Kaplan Thompson Architects
 102 Exchange Street, Fl. 2
 Portland, ME 04101
 (207) 842-2888

3. Proposed uses of any structures [NFPA and IBC classification]

NFPA: Apartment Building IBC: R-2

4. Square footage of all structures, including decks [total and per story]

Community Flats (10)		
Ground	3,016	sf
2 nd Floor	3,404	sf
3 rd Floor	3,404	sf
Total	9,824	sf



Rowhouse (5)		
Ground	2,515	sf
2 nd Floor	2,467	sf
3 rd Floor	2,432	sf
Total	7,414	sf

Townhomes (3)		
Ground	2,759	sf
2 nd Floor	2,432	sf
Total	5,191	sf

5. Elevation of all structures

The proposed building heights are consistent with the R3 PRUD Zoning and do not exceed the maximum allowance of 35'.

6. Proposed fire protection of all structures

All buildings will be serviced with a private fire service. Fire flows and requirements for system storage or booster pumping are subject to the fire professional design which will be performed prior the request for a building permit.

7. Hydrant locations

There is not an existing hydrant along the length of Washington Ave. The site anticipates the addition of a new hydrant within the development located 450' from the furthest proposed structure. Hydrant flow data from the Portland Water District once received may be made available to the Fire Department upon request.

8. Water main size and location

Water services of 6" and 8" are proposed for the north and south parcels respectively. A domestic meter pit and above ground backflow enclosure are located along the access drive as well. Each building will be served via a fire and domestic service that tap into the service extending through the site.

9. Access to all structures [min. 2 sides]

Access to the structures is provided from the access drive and mews section. A grass paver drive aisle has been provided for emergency access circulation



10. Code summaries will be provided by the Architects upon request.

NFPA 1 – Chapter 18 Fire Department Access and Water Supply

18.2 Fire Department Access:

The north and south parcels can be accessed from the paved driveways. The drive aisles reduce from 22' to 16' in the mews section with a grass paver drive aisle provided at the end of the mews to allow for complete site circulation for emergency access scenarios. The following pavement street widths to the site are as follows:

- Washington Avenue: 21-22 feet
- Access Driveways: 22 feet

Per NFPA 1 – Chapter 18.2.3.2.2.1, all first story floors shall be located not more than 450 feet from a Fire Department access road.

City of Portland Technical Manual – Section 3 Public Safety

3.4.1 Every dead-end roadway more than one hundred fifty (150') feet in length shall provide a turnaround at the closed end. Turnarounds shall be designed to facilitate future street connectivity and shall always be designed to the right (refer to Figure I-5).

Response: The site has been designed to accommodate the turning movements required from a 40' ladder truck maneuvering the site.

3.4.2 Where possible, developments shall provide access for Fire Department vehicles to at least two sides of all structures. Access may be from streets, access roads, emergency access lanes, or parking areas.

Response: As depicted on the site plan, the proposed site layout is compact with multiple access points via the parking lot, public right-of-way, or mews section.

3.4.3 Building setbacks, where required by zoning, shall be adequate to allow for emergency vehicle access and related emergency response activities and shall be evaluated based on the following factors:

- *Building Height.*
- *Building Occupancy.*
- *Construction Type.*
- *Impediments to the Structures.*
- *Safety Features Provided.*



Response: The proposed development layout has contemplated emergency access conditions and provides for safe and efficient access along a circuitous route through the site for emergency vehicles.

3.4.4. Fire Dept. access roads shall extend to within 50' of an exterior door providing access to the interior of the structure.

Response: The building will be provided with exterior doors that will be within 50' of a Fire Department access route.

3.4.5. Site access shall provide a minimum of nine (9) feet clearance height to accommodate ambulance access.

Response: The proposed site maintains the required clearance height of nine feet in all cases.

3.4.6. Elevators shall be sized to accommodate an 80 x 24-inch stretcher.

Response: Elevators are not proposed for this project.

3.4.7. All structures are required to display the assigned street number. Numbers shall be clearly visible from the public right of way.

Response: The applicant is currently working with the City's Public Works Division to assign street addresses and numbering to meet City Standards.

Thank you for your review. Please let me know if you have any additional questions or comments.

Sincerely,



Sam Lebel, P.E.
Project Manager
Acorn Engineering, Inc.



CITY OF PORTLAND WASTEWATER CAPACITY APPLICATION

Portland Dept. of Public Works -
Water Resources
212 Canco Road
Portland, Maine 04103



Bradley Roland, P.E.
Water Resources Division
Department of Public Works
212 Canco Road
Portland, ME 04103

Date: 6/14/22

1. Please, Submit Utility, Site, and Locus Plans.

Site Address: 165 Lambert Street and 622 Auburn Street

Chart Block Lot Number: 385-A-1, 386-C-1, 385-D-8, 386-B-12, 386-B-15

Proposed Use: Residential
Previous Use: Undeveloped
Existing Sanitary Flows: 0 GPD
Existing Process Flows: 0 GPD
Description and location of City sewer that is to
receive the proposed building sewer lateral.
Washington Street (10" SS)

Site Category
Commercial (see part 4 below)
Industrial (complete part 5 below)
Governmental
Residential
Other (specify)

☐
☐
☐
☒
☐

Clearly, indicate the proposed connections, on the submitted plans.

2. Please, Submit Contact Information.

City Planner's Name: Charles Tetelman Phone: 207-874-8719
Owner/Developer Name: Maine Cooperative Development Partners
Owner/Developer Address: P.O. Box 15235, Portland, ME 04112
Phone: _____ Fax: _____ E-mail: liztrice@gmail.com
Engineering Consultant Name: Acorn Engineering
Engineering Consultant Address: 65 Hanover Street, Portland, ME 04010
Phone: 207-775-2655 Fax: _____ E-mail: slebel@acorn-engineering.com

Note: Consultants and Developers should allow +/- 15 days, for capacity status, prior to Planning Board Review.

3. Please, Submit Domestic Wastewater Design Flow Calculations.

Estimated Domestic Wastewater Flow Generated: 29,700 GPD
Peaking Factor/ Peak Times: Diurnal
Specify the source of design guidelines: (i.e. "Handbook of Subsurface Wastewater Disposal in Maine,"
"Plumbers and Pipe Fitters Calculation Manual," Portland Water District Records, Other (specify)
Handbook of Subsurface Wastewater Disposal in Maine

Note: Please submit calculations showing the derivation of your design flows, either on the following page, in the space provided, or attached, as a separate sheet.

4. Please, Submit External Grease Interceptor Calculations.

Total Drainage Fixture Unit (DFU) Values: N/A
Size of External Grease Interceptor: _____
Retention Time: _____
Peaking Factor/ Peak Times: _____

Note: In determining your restaurant process water flows, and the size of your external grease interceptor, please use The Uniform Plumbing Code. Note: In determining the retention time, sixty (60) minutes is the minimum retention time. Note: Please submit detailed calculations showing the derivation of your restaurant process water design flows, and please submit detailed calculations showing the derivation of the size of your external grease interceptor, either in the space provided below, or attached, as a separate sheet.

5. Please, Submit Industrial Process Wastewater Flow Calculations

Estimated Industrial Process Wastewater Flows Generated: N/A GPD
Do you currently hold Federal or State discharge permits? Yes No
Is the process wastewater termed categorical under CFR 40? Yes No
OSHA Standard Industrial Code (SIC): _____
(<http://www.osha.gov/oshstats/sicser.html>)
Peaking Factor/Peak Process Times: _____

Note: On the submitted plans, please show where the building's domestic sanitary sewer laterals, as well as the building's industrial-commercial process wastewater sewer laterals exits the facility. Also, show where these building sewer laterals enter the city's sewer. Finally, show the location of the wet wells, control manholes, or other access points; and, the locations of filters, strainers, or grease traps.

Note: Please submit detailed calculations showing the derivation of your design flows, either in the space provided, or attached, as a separate sheet.

M. Calculation of Wastewater Flowrate

The proposed project will include the development of a site that is currently undeveloped. The lot is proposed to be developed with 18 buildings consisting of 165 residential units. The units will be split into two separate parcels with 8 buildings with 74 units located in the north parcel, and 10 buildings with 91 units located in the south parcel. Based upon Section 4 of the Maine Subsurface Wastewater Disposal Rules, the project anticipates the following daily flows:

Estimate of Design Flows			
Classification of Water Demand	Number of Units	Gallons per Day per Unit	Total Gallons per Day
<i>Existing - None</i>			
<i>Proposed – North Parcel</i>			
Multiple family dwelling unit (Studio)	2	120	240
Multiple family dwelling unit (1-bedroom)	30	120	3,600
Multiple family dwelling unit (2-bedroom)	20	180	3,600
Multiple family dwelling unit (3-bedroom)	22	270	5,940
<i>Proposed – South Parcel</i>			
Multiple family dwelling unit (Studio)	3	120	360
Multiple family dwelling unit (1-bedroom)	34	120	4,080
Multiple family dwelling unit (2-bedroom)	30	180	5,400
Multiple family dwelling unit (3-bedroom)	24	270	6,480
Total Existing			0



Total Proposed – North Parcel	13,380
Total Proposed – South Parcel	16,320
Net Change	+29,700 GPD
*Values based on STATE OF MAINE: SUBSURFACE WASTEWATER DISPOSAL RULES, most recent edition	

As seen above, the project anticipates an increase in daily flow rate of approximately 29,700 gallons per day. Please see attached for the formal application template.



N. Lighting

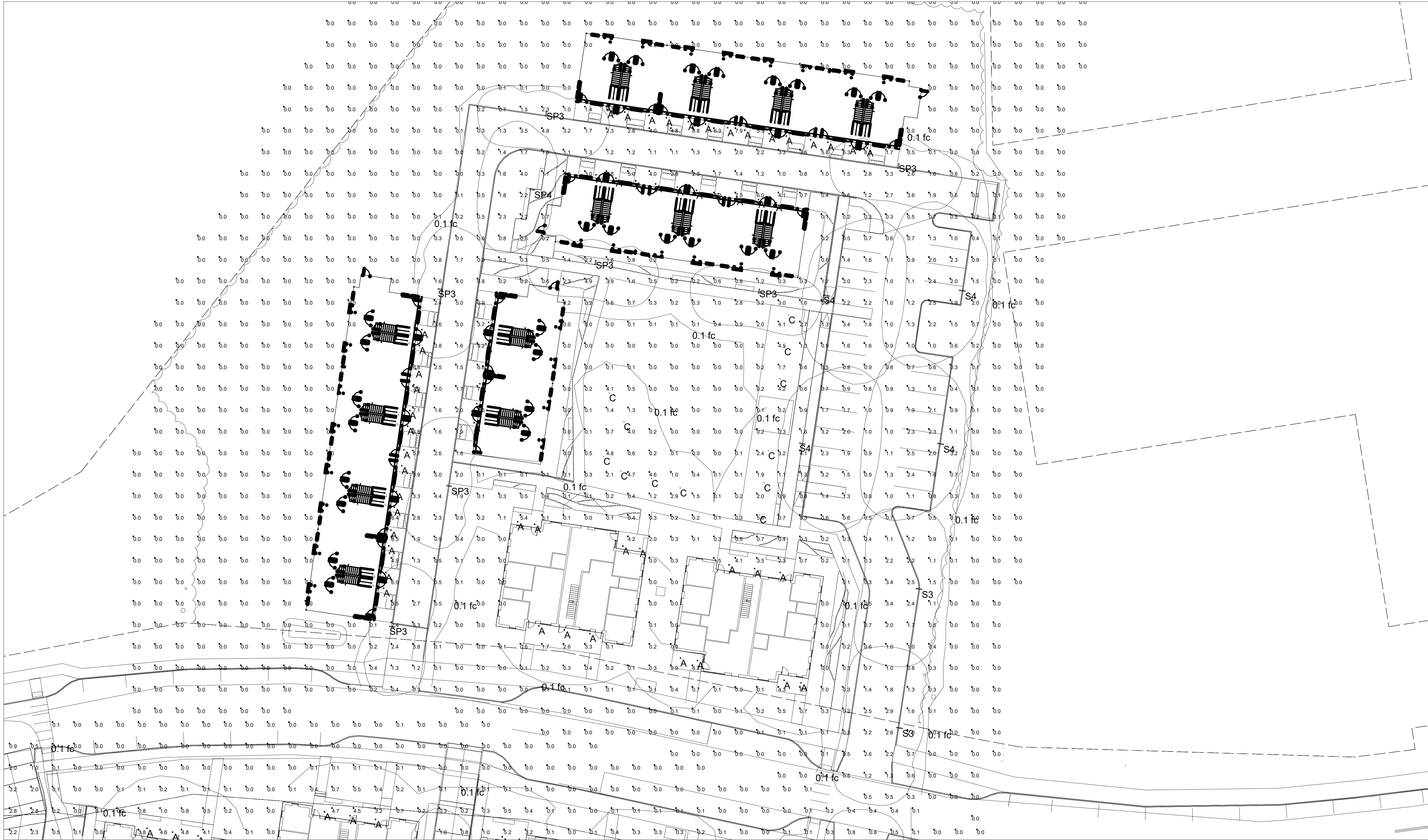
See attached photometric plans and cut sheets prepared for the project. At this time, the lighting program illuminates the site through a combination of light poles, lighted bollards, and down lighting at the building entrances. The parking lot areas will be illuminated with pole lighting to create a safe environment for pedestrians and vehicle circulation. The mews and open space feature lighting at the pedestrian scale with down lighting at the building entrances and bollards throughout the open space located in the center of both sites. Additionally, the lighting was designed as not to trespass over the property line to the abutting properties.



Luminaire Schedule (note fixture catalogue numbers are not complete)						
Type	Qty	Lum. Lumens	LLF	Lum. Watts	Mounting Height	Description
A	126	1145	0.900	12.89	8	LBSE-6RD-RM-30K8
C	21	731	0.870	10.886	10	AR-LED-x53-WFL-12
S3	5	3863	0.900	46.1	16	K4X-T3-MO-5030
S4	11	4297	0.900	45.9	16	K4X-T4-MO-5030
SP3	14	2563	0.900	32.7	12	MK4-T3-MO-3030
SP4	2	2886	0.900	32.7	12	MK4-T4-MO-3030

Calculation Summary					
Label	Avg	Max	Min	Avg/Min	Max/Min
north	0.65	8.3	0.0	N.A.	N.A.
south	0.75	8.1	0.0	N.A.	N.A.
north park	1.45	3.4	0.3	4.83	11.33
south park 1	1.69	3.6	0.3	5.63	12.00
south park 2	1.53	4.1	0.2	7.65	20.50

- NOTES:
- 1) EXACT MOUNTING DETAILS TO BE DETERMINED AT JOBSITE BY OTHERS.
 - 2) CALCULATIONS MAY or MAY NOT SHOW THE EFFECT OF SHADOWING CAUSED BY BUILDINGS AND OBJECTS WITHIN THE CALCULATED SPACE OR IN THE SITE AREA.
 - 3) READINGS SHOWN ARE INITIAL HORIZONTAL FOOTCANDLES ON A FLAT SITE WITHOUT REFLECTIONS OR OBSTRUCTIONS UNLESS OTHERWISE INDICATED.
 - 4) THIS CALCULATION IS BASED ON LIMITED INFORMATION SUPPLIED BY OTHERS TO SWANEY LIGHTING ASSOCIATES AND STANDARD ASSUMPTIONS OF THE SPACE AND/OR SITE.
 - 5) CONFORMANCE TO CODES AND OTHER LOCAL REQUIREMENTS AS DETERMINED BY THE AHJ ARE THE RESPONSIBILITY OF THE OWNER AND/OR THE OWNER'S REPRESENTATIVE.
 - 6) THIS LAYOUT DRAWING MUST BE COORDINATED WITH THE SITE LOCATION FOR CORRECT FIXTURE ORIENTATION.
 - 7) DOCUMENTS PRINTED OR PLOTTED FROM ELECTRONIC FILES MAY APPEAR AT OTHER THAN THE DESIRED OR ASSUMED GRAPHIC SCALES. IT IS THE RESPONSIBILITY OF THE RECIPIENT TO VERIFY THAT THE PRINTED OR PLOTTED-TO-SCALE DRAWING IS PRINTED TO SCALE.



PLAN VIEW

LAMBERT WOODS
PORTLAND, ME
PARTIAL SITE LIGHTING LAYOUT

ACETO LA
SCALE NOT TO SCALE



NOTICE: THIS DRAWING IS THE EXCLUSIVE PROPERTY OF SWANEY LIGHTING ASSOCIATES. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF SWANEY LIGHTING ASSOCIATES. THIS DRAWING IS TO BE USED FOR NO PURPOSE OTHER THAN AS DETAILED HEREIN. IT IS NOT TO BE USED FOR ANY OTHER PURPOSE, AND IT IS NOT TO BE USED AS A BASIS FOR ANY OTHER DESIGN OR CONSTRUCTION. ANY REPRODUCTION OR TRANSMISSION OF THIS DRAWING WITHOUT THE WRITTEN PERMISSION OF SWANEY LIGHTING ASSOCIATES IS STRICTLY PROHIBITED. THE INTENT OF THIS DRAWING IS TO SUGGEST THE BEST UTILIZATION OF THE FIXTURES SHOWN. THE ACTUAL PERFORMANCE OF THE FIXTURES WILL VARY BASED ON THE ACTUAL SITE CONDITIONS. THE PERFORMANCE SHOWN IN THIS FILE IS NOT THE RESPONSIBILITY OF THE MANUFACTURER. IT'S USE FOR ANY OTHER PURPOSE IS NOT AUTHORIZED BY SWANEY LIGHTING ASSOCIATES.

Luminaire Schedule (note fixture catalogue numbers are not complete)					
Type	Lum. Lumens	LLF	Lum. Watts	Mounting Height	Description
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Calculation Summary					
Label	Avg	Max	Min	Avg/Min	Max/Min
north	0.65	8.3	0.0	N.A.	N.A.
south	0.75	8.1	0.0	N.A.	N.A.
north park	1.45	3.4	0.3	4.83	11.33
south park 1	1.69	3.6	0.3	5.63	12.00
south park 2	1.53	4.1	0.2	7.65	20.50

- NOTES:
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PLAN VIEW

LAMBERT WOODS
PORTLAND, ME
PARTIAL SITE LIGHTING LAYOUT

GENERATED FOR:
ACETO LA
SCALE: NOT TO SCALE



NOTICE: THIS DRAWING IS THE EXCLUSIVE PROPERTY OF SWANEY LIGHTING ASSOCIATES. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF SWANEY LIGHTING ASSOCIATES. THIS DRAWING IS TO BE USED FOR NO PURPOSE OTHER THAN AS DETAILED HEREIN. IT IS THE RESPONSIBILITY OF THE USER TO OBTAIN ALL NECESSARY INFORMATION AND TO VERIFY THE ACCURACY OF THE INFORMATION PROVIDED. SWANEY LIGHTING ASSOCIATES ASSUMES NO LIABILITY FOR ANY ERRORS OR OMISSIONS. THE USER SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY INFORMATION AND FOR THE PROPER USE OF THIS DRAWING. ANY VARIATION IN THE PERFORMANCE OF THE SYSTEM FROM THAT SHOWN IN THIS DRAWING IS NOT THE RESPONSIBILITY OF SWANEY LIGHTING ASSOCIATES.

LBSE-RD

EDGE-LIT ROUND FIXED CCT DIRECT J-BOX MOUNT DOWNLIGHT

DATE:	LOCATION:
TYPE:	PROJECT:
CATALOG #:	

FEATURES

- 4", 6", and 8" aperture, delivering 750-1750 lumens
- Low surface profile of 1/2"
- Quick snap installation with no housing required
- Installs directly to most 3-1/2" and 4" J-Boxes
- Fixed CCT (3000K or 3500K, 80+ CRI) options
- Universal 120-277V, ideal for commercial applications
- All models standard with 0-10V/Triac/ELV dimming



LITEBOX[®]
edge-lit



SERVICE PROGRAMS



SPECIFICATIONS

CONSTRUCTION

- Durable cast aluminum low profile trim with 1/2" surface profile
- Suitable for New Construction or remodel, IC or Non-IC applications
- Eliminates the need for a recessed housing, ideal for areas with limited plenum space
- Optional non-conductive Decorative Color Trim accessories available in White, Black, Silver, and Brushed Oil Rubbed Bronze

OPTICS

- Utilizes the latest Edge-Lit LED technology
- Integral diffuse polycarbonate lens provides uniform light distribution
- Light distribution is free of distracting bright spots
- Visually comfortable with low glare

ELECTRICAL

- Edge-Lit LED array with 3 SDCM color consistency
- Long LED life: Maintains 80% of lumen output at 54,000 hours of operation, L80 at >54,000 hours (TM-21)
- Available in Fixed CCT in 3000K or 3500K, 80+ CRI
- High efficiency integral driver with universal 120V-277V, 50/60Hz

ELECTRICAL (CONTINUED)

- All models have flicker-free dimming with 120-277V 0-10V Dim to Off or 120V Triac or ELV phase cut to 5%
- See Additional Information section for a list of recommended dimmers
- EMI: Meets Class A (<24dba) noise rating, FCC CFR 47 Part 15 Class B, ≥0.9 Power Factor, <20% THD

INSTALLATION

- Installs directly to most common 3-1/2" or 4" octagonal and round junction boxes with a minimum 1-1/2" depth including fire rated (by others)
- Metal plate mounts to the J-Box and accepts snap-in spring clips for a secure fit

CERTIFICATIONS

- cETLus listed to UL1598
- Can be used in direct contact with insulation (IC Rated)
- Suitable for wet locations, covered ceiling
- Suitable for use in clothes closets when installed in accordance to N.E.C. 410.16
- ENERGY STAR[®] certified

WARRANTY

- 5 year warranty

KEY DATA	
Lumen Range	783-1973
Wattage Range	10.4-20.0
Efficacy Range (LPW)	75-99
Reported Life (Hours)	L80 / >54,000
Input Current (mA)	87-167 (120V)

DATE:	LOCATION:
TYPE:	PROJECT:
CATALOG #:	



ORDERING GUIDE

Example: LBSE-4RD-35K8-WH

CATALOG #

HOUSING

LBSE			
Model/CCT Configuration	Aperture/Shape/Function	CCT/CRI	Trim Color
LBSE Edge-Lit Surface, Fixed CCT, 120-277V with 0-10V/Triac/ELV dimming	4RD 4" Round, Direct J-Box Mount, 750 Lumens	30K8 3000K, 80+ CRI	WH White
	6RD 6" Round, Direct J-Box Mount, 1100 Lumens	35K8 3500K, 80+ CRI	
	8RD 8" Round, Direct J-Box Mount, 1750 Lumens		

Accessories

- ☐ **LBSE-4RD-T-WH** Trim Accessory, 4" Round, White
- ☐ **LBSE-4RD-T-BL** Trim Accessory, 4" Round, Black
- ☐ **LBSE-4RD-T-BBZ** Trim Accessory, 4" Round, Brushed Oil Rubbed Bronze
- ☐ **LBSE-4RD-T-SVR** Trim Accessory, 4" Round, Silver

- ☐ **LBSE-6RD-T-WH** Trim Accessory, 6" Round, White
- ☐ **LBSE-6RD-T-BL** Trim Accessory, 6" Round, Black
- ☐ **LBSE-6RD-T-BBZ** Trim Accessory, 6" Round, Brushed Oil Rubbed Bronze
- ☐ **LBSE-6RD-T-SVR** Trim Accessory, 6" Round, Silver

- ☐ **LBSE-8RD-T-WH** Trim Accessory, 8" Round, White
- ☐ **LBSE-8RD-T-BL** Trim Accessory, 8" Round, Black
- ☐ **LBSE-8RD-T-BBZ** Trim Accessory, 8" Round, Brushed Oil Rubbed Bronze
- ☐ **LBSE-8RD-T-SVR** Trim Accessory, 8" Round, Silver

- ☐ **LBSES-C-12** Extension Cable, LBSE/LBSES, 12"
- ☐ **LBSES-C-24** Extension Cable, LBSE/LBSES, 24"

LBSE-RD

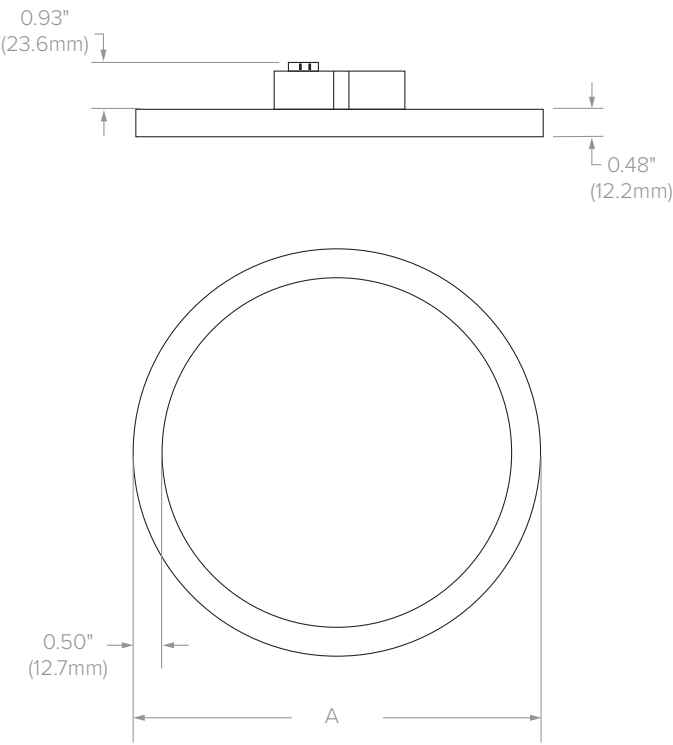
EDGE-LIT ROUND FIXED CCT DIRECT J-BOX MOUNT DOWNLIGHT

DATE:	LOCATION:
TYPE:	PROJECT:
CATALOG #:	

PERFORMANCE DATA TABLE

Nominal Aperture	Nominal Lumens	Cat #	CCT	CRI	Delivered Lumens	Watts	LPW
4"	750	LBSE-4RD-30K8-WH	3000K	80	783	10.4	75
		LBSE-4RD-35K8-WH	3500K		846	10.4	81
6"	1100	LBSE-6RD-30K8-WH	3000K	80	1144	12.9	89
		LBSE-6RD-35K8-WH	3500K		1237	12.9	96
8"	1750	LBSE-8RD-30K8-WH	3000K	80	1825	20.0	91
		LBSE-8RD-35K8-WH	3500K		1973	20.0	99

DIMENSIONS



Dimensional Data	
Aperture (Cat Logic)	"A"
4" (4RD)	ø4.61" (117.1mm)
6" (6RD)	ø6.00" (152.4mm)
8" (8RD)	ø8.00" (203.2mm)

LBSE-RD

EDGE-LIT ROUND FIXED CCT DIRECT J-BOX MOUNT DOWNLIGHT

DATE:	LOCATION:
TYPE:	PROJECT:
CATALOG #:	

PHOTOMETRY

LBSE-4RD-30K8-WH

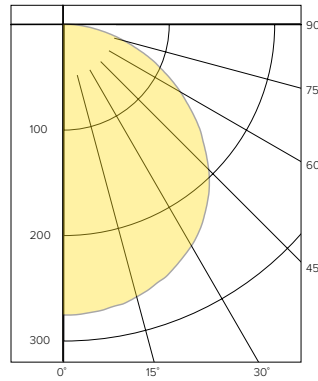
LUMINAIRE DATA

Test No.	R20.00827-01
Description	4" Downlight, 3000K, 80 CRI
Delivered Lumens	783
Watts	10.4W
Efficacy	75.0
Mounting	Surface
Spacing Criterion	1.3

ZONAL LUMEN SUMMARY

Zone	Lumens	% Luminaire
0-40	342	43.6
0-60	611	78.0
0-90	783	100.0
0-180	783	100.0

POLAR GRAPH



CANDELA DISTRIBUTION

Degree	Candela
0	260
5	259
15	253
25	239
35	217
45	184
55	142
65	98
75	55
85	15
90	0

LUMINANCE DATA*

Vertical Angle	Average
45°	48544
55°	46342
65°	43318
75°	39448
85°	32315

*Candela/Square Meter

LBSE-6RD-30K8-WH

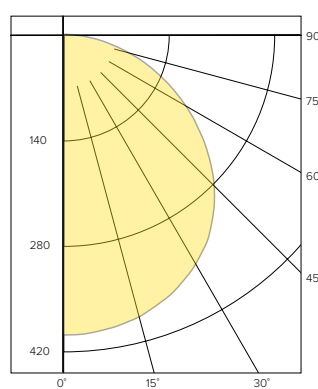
LUMINAIRE DATA

Test No.	R20.00832-01
Description	6" Downlight, 3000K, 80 CRI
Delivered Lumens	1144
Watts	12.9W
Efficacy	89
Mounting	Surface
Spacing Criterion	1.3

ZONAL LUMEN SUMMARY

Zone	Lumens	% Luminaire
0-40	499	43.6
0-60	891	77.9
0-90	1144	100.0
0-180	1144	100.0

POLAR GRAPH



CANDELA DISTRIBUTION

Degree	Candela
0	380
5	379
15	369
25	348
35	317
45	268
55	207
65	144
75	80
85	23
90	0

LUMINANCE DATA*

Vertical Angle	Average
45°	23513
55°	22408
65°	21066
75°	19135
85°	16235

*Candela/Square Meter

LBSE-8RD-30K8-WH

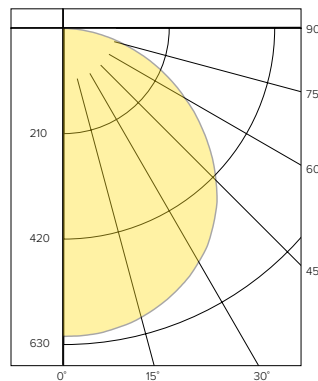
LUMINAIRE DATA

Test No.	R20.00834-01
Description	8" Downlight, 3000K, 80 CRI
Delivered Lumens	1826
Watts	20W
Efficacy	92
Mounting	Surface
Spacing Criterion	1.3

ZONAL LUMEN SUMMARY

Zone	Lumens	% Luminaire
0-40	798	43.7
0-60	1422	77.9
0-90	1826	100.0
0-180	1826	100.0

POLAR GRAPH



CANDELA DISTRIBUTION

Degree	Candela
0	608
5	607
15	592
25	558
35	505
45	427
55	331
65	228
75	127
85	38
90	0

LUMINANCE DATA*

Vertical Angle	Average
45°	24287
55°	23187
65°	21736
75°	19752
85°	17413

*Candela/Square Meter

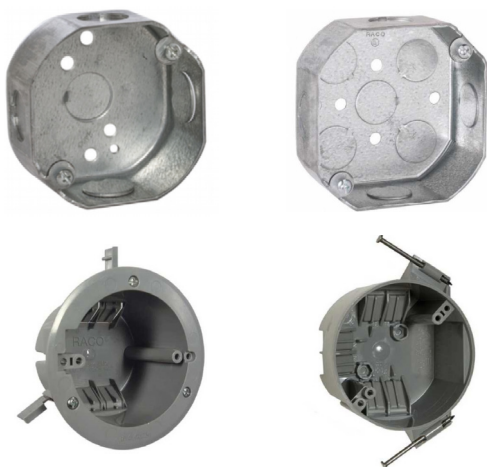
ADDITIONAL INFORMATION

Dimming Compatibility

For more details and recommended dimmer list, see Dimming Compatibility Information at www.currentlighting.com/prescolite.

J-Box Compatibility

LITEBOX® Edge-Lit Direct J-Box Mount downlights are compatible with many standard 3-1/2" and 4" octagonal and round J-Boxes with a 1-1/2" minimum depth. Fire rated J-Boxes may also be used.



DATE:	PROJECT:	TYPE:
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CATALOG NUMBER LOGIC:



*Accommodates up to 2 lens/shielding media.

CATALOG NUMBER LOGIC

Example: CY - AR - LED - TR - x53 - SP - BZW - 9 - 11 - C - INC - MT - WC

MATERIAL

(Blank) - Aluminum B - Brass S - Stainless Steel

SERIES

CY - Catenary

FIXTURE

AR - ArtiStar

SOURCE

LED - Chip on Board Technology

HOUSING

TR - Integral Driver

LED TYPE

x52 - 10W LED/2700K x53 - 10W LED/3000K x54 - 10W LED/4000K

OPTICS

SP - Spot (15°) FL - Flood (35°) WFL - Wide Flood (60°)

FINISH (See page 2 for full-color swatches)

Standard Finishes (BZP, BZW, BLP, BLW, WHP, WHW, SAP, VER)

Premium Finish (ABP, AMG, AQW, BCM, BGE, BPP, CAP, CMG, CRI, CRM, HUG, MDS, NBP, OCP, RMG, SDS, SMG, TXF, WCP, WIR)

Also available in RAL Finishes

Brass Finishes (MAC, POL, MIT)

Stainless Steel Finishes (MAC, POL)

LENS TYPE*

9 - Clear (Standard)

12 - Soft Focus 13 - Rectilinear

SHIELDING*

11 - Honeycomb Baffle

CAP STYLE

C - Flush Lens

D - 45° Less Weephole (Internal use only)

E - 90° Less Weephole (Internal use only)

F - 90° Flush Lens

CONTROL TYPE

INC - Dimming Driver (For Use with Incandescent Dimmer - 120V only)

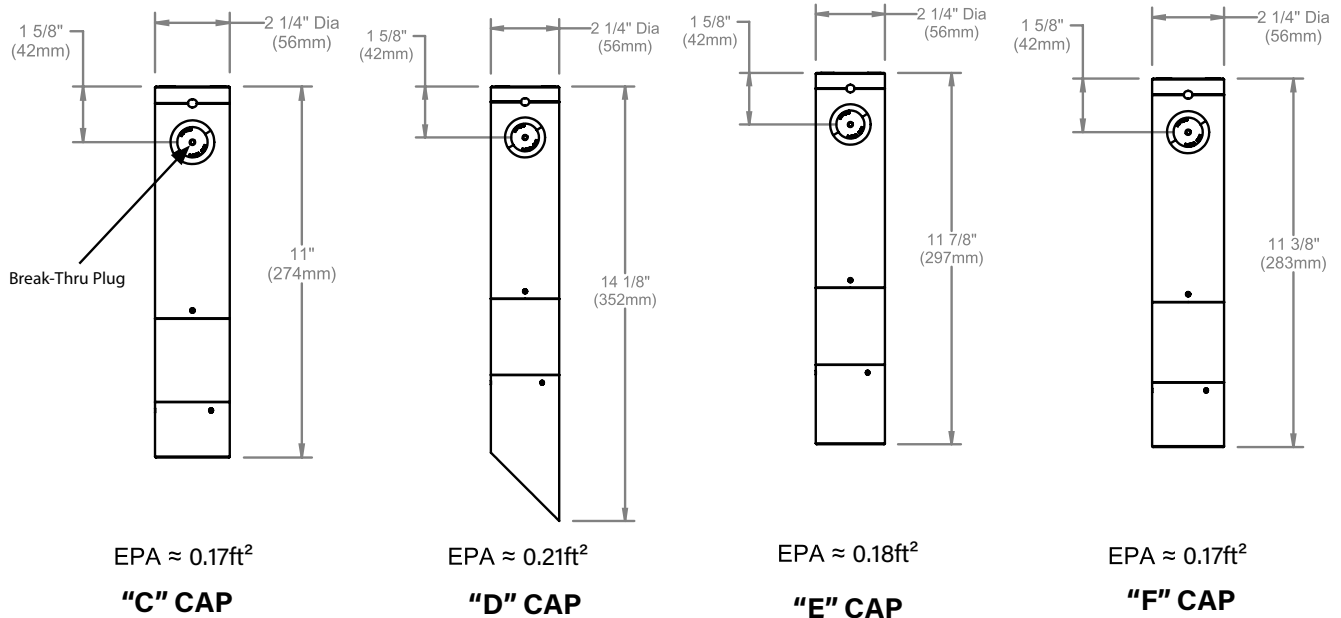
INPUT VOLTAGE

MT - 120-277 VAC Input

OPTION

WC - Supplemental Wire Clamp

DATE: PROJECT: TYPE:



* EPA shown includes fixture body

* Fixture Weight (LIST BELOW)

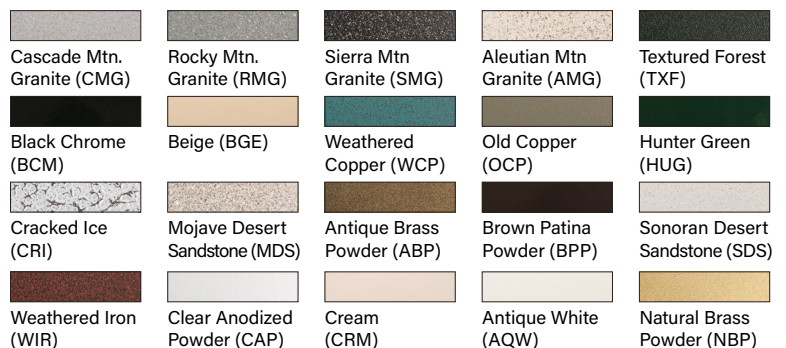
	"C" CAP	"D" CAP	"E" CAP	"F" CAP
ALUMINUM	2.72IBS	2.84IBS	2.58IBS	2.74IBS
BRASS	6.52IBS	6.89IBS	6.51IBS	6.58IBS
STAINLESS	6.19IBS	6.54IBS	6.37IBS	6.25IBS

STANDARD FINISHES



[Click Here](#) to view larger, full-color swatches of all available finishes on our website.

PREMIUM FINISHES



B-K LIGHTING

MADE IN THE USA

559.438.5800 | INFO@BKLIGHTING.COM | BKLIGHTING.COM

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01/19/2022 SKU - 1335
SUB-2814-00

DATE:	PROJECT:	TYPE:
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Accessories (Configure separately)

SPECIFICATIONS

ELECTRICAL	WATTAGE	10W LED
	WIRING	PVC coated, 18AWG, 150V, 60°C rated and certified to UL1838 standard. Anti-Wicking Connector prevents "wicking" through conductor insulation.
	DRIVER	For use with [1] 350mA, Class A, constant current driver. 120-277VAC (nominal) primary input voltage. 50/60Hz. >0.9 Power Factor, 0.25A input current, .20%THD (nominal at 120VAC full load). Output over-voltage, over-current, and short circuit protection with auto recovery. INC Driver - For use with Incandescent Standard TRIAC or ELV dimmers. 1-100% range, 120V Only. (Only Available with x64-x66).
PHYSICAL	MATERIALS	Furnished in copper-free aluminum (6061-T6), brass (360) or stainless steel (304).
	BODY	Unibody design is fully machined from solid billet and provides enclosed, water-proof wireway and integral heat sink for maximum component life. High temperature, silicone 'O' Ring provides water-tight seal.
	CAP	Fully machined and accommodates up to two (2) lens or louver media.
	LENS	Shock-resistant, tempered glass lens is factory adhered to fixture cap and provides hermetically sealed optical compartment.
	LED	Integrated solid state system and modular design with electrical quick disconnects is scalable for field upgrade and maintenance. High power, forward throw source complies with ANSI C78.377 binning requirements and exceeds ENERGY STAR® lumen maintenance requirements. LM-80 certified components. Integral, constant current driver. 12VAC/VDC input. 50/60Hz. Proprietary input control scheme achieves power factor correction and eliminates inrush current. Output, overvoltage, open-circuit, and short circuit protected. Inrush current limited to <250mA (non-dimming). Conforms to Safety Std. C22.2 No. 250.13-12.
	OPTICS	Interchangeable, color-coded OPTIKIT modules permit field changes to optical distribution.
	BREAK-THRU PLUG	To create watertight seal, factory-installed break-thru plug must be used with round jacketed cable with a diameter of .130" min to .450" max (by others).
	INSTALLATION	Machined aluminum clamp for use with 1/4" O.D. stainless steel aircraft cable (by others).
	COLOR MANAGEMENT	Chip On Board technology delivers natural white light. Exact color point conformity exceeds ANSI C78.377 standard. Module exceeds 80 CRI (RA>80, R9.16). Color point uniformity 2 SDCM color control for 2700K-4000K CCT.
	HARDWARE	Tamper-resistant, stainless steel hardware.
	OPTION	Supplemental wire support clamp provides extra strain relief.
	FINISH	StarGuard, our 15-stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating and is RoHS compliant. Powder coat or metal finish options available for brass material and metal finish option only for stainless steel material.
	WARRANTY	5-year limited warranty.
  	CERTIFICATION & LISTING	UL tested to IESNA LM-79. UL Listed. Certified to CAN/CSA/ ANSI Standards. RoHs compliant. Suitable for indoor or outdoor use and in wet locations. IP66 Rated. Made in USA with sustainable processes.

B-K LIGHTING

MADE IN THE USA

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01/19/2022 SKU - 1335
SUB-2814-00

LAMP & DRIVER DATA (x52, x53, x54)

DATE:

PROJECT:

TYPE:

DRIVER ELECTRICAL DATA

Type	LED Type	AC Input Range	Frequency Hz	Power Factor At Full Load (Efficiency)	THD	InRush Current	Operating Current	Operation Ambient Temperature	Dimmer Type	Dimmer Range
INC	x52 - x54	120-277VAC	50/60	> 0.9	<20%	n/a	350mA	-30° C ~ 90°C	TRIAC/ELV (120V)	10-100%

LM79 DATA

BK No.	LUMENS (Source)	CCT (Typ.)	CRI (Ra. Typ.)	Input Watts (Typ.)
x52	1180	2700K	80	10
x53	1230	3000K	80	10
x54	1280	4000K	80	10

L70 DATA

Minimum Rated Life (hrs.) 70% of initial lumens (L70)
50,000
50,000
50,000

OPTICAL DATA

Beam Type	Angle	CBCP
Spot	20°	2680
Flood	40°	1744
Wide Flood	60°	640

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FEATURES

- Integral Motion Sensor
- Staggered twin mounting
- ANSI C136.31-2010 4G Rated
- IES Type II, III and IV distributions
- 3000K , 4000K, 5000K CCT
- Integral thermal protection



SPECIFICATIONS

CONSTRUCTION

- Housing shroud is made of fabricated 5052-H32 aluminum alloy with a rear mounting interface that is made of fabricated 304 stainless steel
- Housing mounting interface is a stamped silicone gasket
- Luminaire housing is free of any visible heat fins, hardware or fasteners
- Bracketry and hardware is made of stainless steel
- Base is made of cast aluminum #356 alloy and heat treated to a T-6 condition
- Shaft is extruded aluminum 6061 alloy and heat treated to a T-6 condition
- Anchor bolts are hot dip galvanized steel. Eight galvanized hex nuts and flat washers, and a bolt circle template are provided. Anchor bolt for poles are 3/4" x 24" x 3"
- Luminaire finish consist of a five stage pretreatment regimen with a polymer primer sealer, oven dry off, and top coated with a thermoset super TGIC polyester powder coat finish
- Luminaire finish meets the AAMA 605.2 performance specification which includes passing a 3000 hour salt spray test for corrosion resistance

LED/OPTICS

- LEDs are mounted to a metal printed circuit board assembly (MCPCB) with a uniform conformal coating over the panel surface and electrical features
- Optical lenses is made of clear injection molded PMMA acrylic
- Each MCPCB and optic are sealed to an extruded 6063-T6 aluminum alloy heat spreader and sealed with a continuous one piece injection molded silicone rubber gasket. IP66

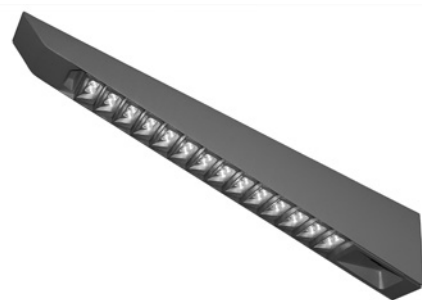
LED/OPTICS (CONTINUED)

- Patent Pending design of optical array is independently shielding each LED optic across the length of the aperture
- Optical surfaces are painted white unless the optional fixture finish (FO) or matte black finish (MO) is selected
- **Optional matte black finish optics (MO) are required to meet UO classification with zero percent uplight**
- Optional fixture finish optical surfaces (FO) do not exceed BUG ratings of the standard white finish and will be greater than or equal to the delivered lumens of the optional matte black optical surface finish (MO)

INSTALLATION

- Integral pole mount luminaires require assembly of fixture(s) to the pole, mounting hardware, anchor bolts and anchor bolt template is included. See page 6 for additional considerations specific to the integral pole
- Tenon mount luminaires require assembly of fixture(s) to the tenon adapter, mounting hardware is included. Tenon adapter secures to the tenon with eight 5/16-18 stainless steel set screws
- Side mount luminaires are supplied with hardware compatible with AAL mountings.
- Twin mounted staggered height fixtures are configured separately
- Service access to the optical array and driver assembly is via a tool-less internal latch and have an audible click.
- Optical array has to hang freely in an open service position for inspection of internal wire connections. Once in service position, the optical array is able to be removed for service by lifting the assembly up off the rear hinge and disconnecting the wiring plugs.
- Driver assembly is mounted to a prewired internal tray with quick disconnects for removal

KICK™



Mini Small

RELATED PRODUCTS

Ø [K5](#)

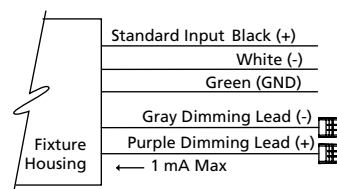
Ø [KM5](#)

Ø [KB6](#)

ELECTRICAL

- Drivers are in direct contact with the aluminum housing across the entire surface area of the widest face for maximum thermal transfer
- Luminaires have integral surge protection that is U.L. recognized and have a surge current rating of 10,000 Amps using the industry standard 8/20uSec wave and surge rating of 372J. Surge protection device is wired in series
- Drivers are U.L. recognized
- Drivers are not compatible with current sourcing dimmers, consult factory for current list of known compatible dimming systems approved dimmers include Lutron Diva AVTV, Lutron Nova NFTV and NTFTV
- Luminaire are capable of operating at 100% brightness in a 40°C environment. Both driver and optical array have integral thermal protection that will dim the luminaire upon detection of temperatures in excess of 85°C

- **Luminaires not configured with a control system or ANSI C136 receptacle option are provided with 0-10 purple and gray dimming leads**



continued on page 3

KEY DATA	
LUMEN RANGE	1,9090–3,576
WATTAGE RANGE	24–33
EFFICACY RANGE (LPW)	77–115
WEIGHT	8.95 lbs 4.05 kg
EPA	0.56

DATE: 6/14/22 LOCATION: _____

TYPE: _____ PROJECT: _____

CATALOG #: _____

ORDERING GUIDE

Example: KM41-T2-FO-2050-MCPCR-SF-347-PS412-125-SBC-BLT

CATALOG # _____

Model (4" wide luminaire)	Optics (Distribution)	Optics Finish	Light Engine ¹	Control
KM41 Single Fixture	T2 IES Type II	WO Standard White Finish	2030 3000K CCT, CRI 70, 24 Watts	MCPCR Multi-Channel 7-Pin Photocell Receptacle
KM42 Two Fixtures 180° Apart	T3 IES Type III	FO Optics in Fixture Finish	2040 4000K CCT, CRI 70, 24 Watts	SCP Motion Sensor + Photocell ²
KM43 Three Fixtures 90° Apart	T4 IES Type IV	MO Optics in Matte Black Finish	2050 5000K CCT, CRI 70, 24 Watts	SWPM SiteSync Pre-commissioned + Motion Sensor ³
KM44 Four Fixtures 90° Apart			3030 3000K CCT, CRI 70, 33 Watts	SCPREMOTE Handheld Commissioning Tool ²
			3040 4000K CCT, CRI 70, 33 Watts	
			3050 5000K CCT, CRI 70, 33 Watts	

Fuse (may choose one)	Voltage	Mounting	Mounting Options	Fixture Finish
SF 120, 277, 347 Volt Input	120-277V 120-277V	<u>Integral Pole</u>	<u>Twin mount at staggered heights</u>	<u>Standard Color</u>
DF 208, 240, 480 Volt Input	347 347 VAC input	Square Straight Aluminum, 10.5" Ø Bolt Circle	Mounting holes for a fixture at 180°, KM41-...PS4... only, may choose one	BLS Black Gloss Smooth
	480 480 VAC input	PS410-125 10' Luminaire Height	TS8 8' from bottom	BLT Black Matte Textured
		PS412-125 12' Luminaire Height	TS10 10' from bottom	DBS Dark Bronze Gloss Smooth
		PS414-125 14' Luminaire Height	TS12 12' from bottom	DBT Dark Bronze Matte Textured
		PS416-125 16' Luminaire Height	TS14 14' from bottom	GTT Graphite Matte Texture
		PS418-125 18' Luminaire Height	TS16 16' from bottom	LGS Light Grey Gloss Smooth
		PS420-125 20' Luminaire Height	TS18 18' from bottom	LGT Light Grey Matte Textured
		<u>Tenon Mount</u>	<u>Base Options</u>	PSS Platinum Silver Gloss Smooth
		TA23 Slips over a 2 3/8" / 60mm Ø x 4" / 102mm tall tenon	SBC Standard Base Cover	VGT Verde Green Matte Textured
		<u>Side Mount</u>	<u>Pole Accessories(may choose one)</u>	WHS White Gloss Smooth
		SMK Mounts to the side of a square pole, KM41 only	GFI GFCI receptacle, 24" from top of pole	WHT White Matte Textured
		<u>Wall Mount</u>	RBC Duplex receptacle box with clear cover, wiring device(s) not included	CC Custom Color ⁴
		WMK KM41 only		

Notes:

- 595nm monochromatic amber and or custom lumen package available by request
- Handheld commissioning tool is required to separately configure or adjust any number of SCP sensors
- Specify group and zone at time of order. See www.hubbellighting.com/sitesync for more details. Order at least one SiteSync interface accessory SWUSB or SWTAB. Each option contains SiteSync License, GUI, and Bridge Node
- Consult factory for custom color, marine and corrosive finish

SPECIFICATIONS (CONTINUED)

MODEL	HEIGHT OVERALL	POLE	SHAFT SECTION	WT	MAXIMUM ALLOWABLE EPA (MPH)							
					85	90	100	110	120	130	140	150
KM4X-PS410-125	10' 7.5" / 3.24m	10'	4" SQ x .125"	28 lbs	15.4	13.5	10.4	8.1	6.4	5.0	4.0	3.1
KM4X-PS412-125	12' 7.5" / 3.85m	12'	4" SQ x .125"45	32 lbs	11.8	10.2	7.6	5.7	4.3	3.2	2.3	1.6
KM4X-PS414-125	14' 7.5" / 4.46m	14'	4" SQ x .125"	37 lbs	9.1	7.7	5.5	3.9	2.6	1.7	0.95	0.33
KM4X-PS416-125	16' 7.5" / 5.07m	16'	4" SQ x .125"	42 lbs	6.9	5.7	3.8	2.3	1.3	0.46	-	-
KM4X-PS418-125	18' 7.5" / 5.68m	18'	4" SQ x .125"	48 lbs	4.9	3.9	2.2	0.95	0.01	-	-	-
KM4X-PS420-125	20' 7.5" / 6.29m	20'	4" SQ x .125"	53 lbs	3.2	2.2	0.75	-	-	-	-	-

* - Consult factory for thicker shaft profiles and or custom heights not shown above.

CONTROLS

- Wireless enabled fixtures shall support bi-directional radio frequency (RF) communications utilizing IEEE 802.15.4 operating in the 2.4GHZ ISM band.
- Up to 1000' wireless range may be reduced by physical obstructions between lighting fixtures.
- Motion Sensor shall use passive infrared (PIR) sensing technology that reacts to changes in infrared energy (moving body heat) within the coverage area. Careful consideration must be given to obstructions that may block the sensor's line of sight.
- Factory default settings for SCP option shall be:
 - High mode: 10V
 - Low mode: 1V
 - Ramp-up rate: disabled
 - Fade-down rate: disabled
 - Photocell: Off
 - Sensitivity: Full
 - Time Delay: Fade to low: 5 minutes
 - Time Delay: Fade to off: 1 hour

CERTIFICATIONS

- Luminaire is listed with UL for outdoor, wet location use, UL1598, UL 8750 and Canadian CSA Std. C22.2 no.250
- ANSI C136.31-2010 4G Vibration tested and compliant
- IEC 66262 Mechanical Impact Code IK10
- IDA approved, 3000K and warmer CCTs only
- This product qualifies as a "designated country construction material" per FAR 52.225-11 Buy American-Construction Materials under Trade Agreements effective 6/06/2020. [See Buy American Solutions](#)

WARRANTY

- See [HLI Standard Warranty](#) for additional information

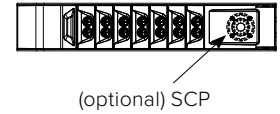
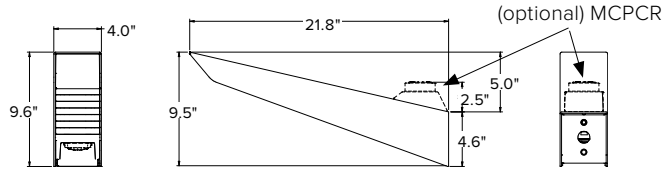
DELIVERED LUMENS

System Watts	Optical Finish	Distribution	Ordering Code	3000K 70CRI					4000K 70CRI					5000K 70CRI				
				Lumen	Bug Rating			Efficacy (Lm/W)	Lumen	Bug Rating			Efficacy (Lm/W)	Lumen	Bug Rating			Efficacy (Lm/W)
					B	U	G			B	U	G			B	U	G	
24	Standard White	Type 2	T2	2507	1	2	1	106	2613	1	2	1	111	2647	1	2	1	112
		Type 3	T3	2447	1	1	1	104	2555	1	1	1	108	2589	1	1	1	110
		Type 4	T4	2561	1	1	1	109	2670	1	1	1	113	2704	1	1	1	115
	Fixture Match	Type 2	T2-FO	1909	1	2	1	81	2058	1	2	1	87	2015	1	2	1	85
		Type 3	T3-FO	1930	1	1	1	82	2061	1	1	1	87	2038	1	1	1	86
		Type 4	T4-FO	2174	1	1	1	92	2343	1	1	1	99	2295	1	1	1	97
	Matte Black	Type 2	T2-MO	1909	1	0	0	81	2058	1	0	0	87	2015	1	0	0	85
		Type 3	T3-MO	1930	1	0	0	82	2081	1	0	0	88	2038	1	0	0	86
		Type 4	T4-MO	2174	1	0	0	92	2343	1	0	0	99	2295	1	0	0	97
33	Standard White	Type 2	T2	3315	1	2	1	101	3455	1	2	1	105	3500	1	2	1	106
		Type 3	T3	3242	1	2	1	99	3379	1	2	1	103	3423	1	2	1	104
		Type 4	T4	3387	1	1	1	103	3530	1	1	1	107	3576	1	1	1	109
	Fixture Match	Type 2	T2-FO	2535	1	2	1	77	2716	1	2	1	83	2676	1	2	1	81
		Type 3	T3-FO	2563	1	2	1	78	2746	1	2	1	83	2706	1	2	1	82
		Type 4	T4-FO	2886	1	1	1	88	3093	1	1	1	94	3047	1	1	1	93
	Matte Black	Type 2	T2-MO	2535	1	0	1	77	2716	1	0	1	83	2676	1	0	1	81
		Type 3	T3-MO	2563	1	0	0	78	2746	1	0	0	83	2706	1	0	0	82
		Type 4	T4-MO	2886	1	0	1	88	3093	1	0	1	94	3047	1	0	1	93

DIMENSIONS

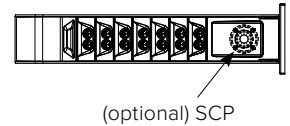
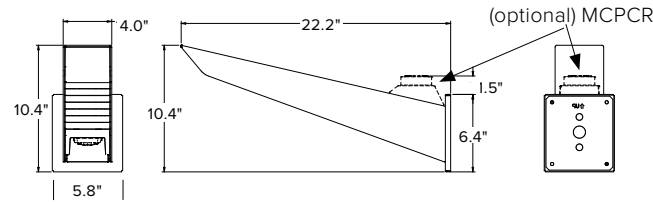
SIDE MOUNTED LUMINAIRE (S)

MODEL	KM4X-...-SMK
OVERALL HEIGHT	9.6" / 244mm
OVERALL LENGTH	21.8" / 554mm
OVERALL WIDTH	4" / 102mm
WEIGHT	8.95 lbs.
EPA	0.56

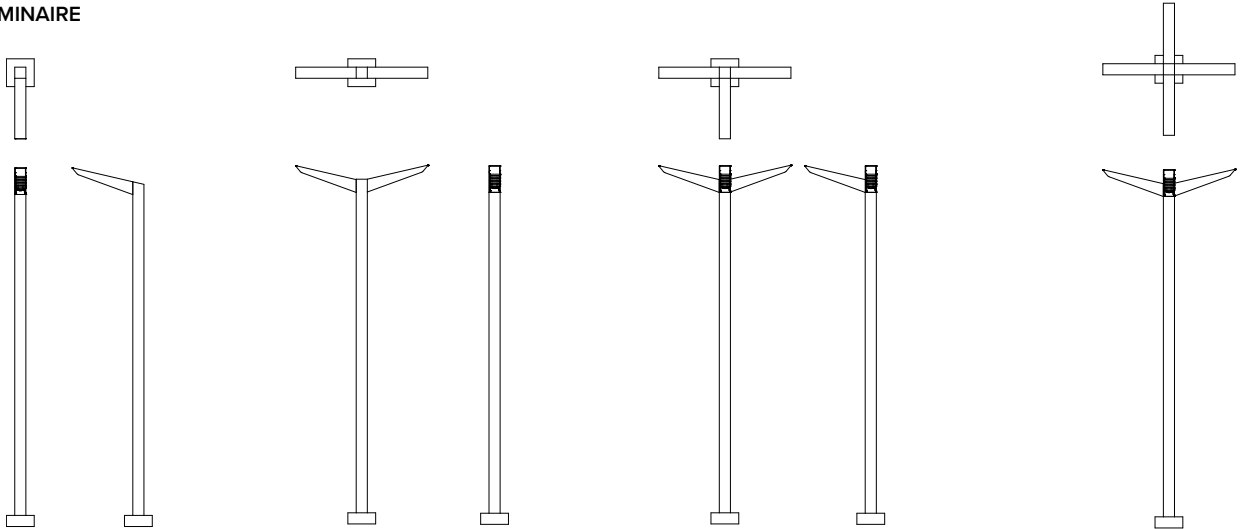


WALL MOUNTED LUMINAIRE (S)

MODEL	KM41-...-WMK
OVERALL HEIGHT	10.4" / 264mm
OVERALL LENGTH	22.2" / 564mm
OVERALL WIDTH	5.8" / 147mm
WEIGHT	10 lbs.



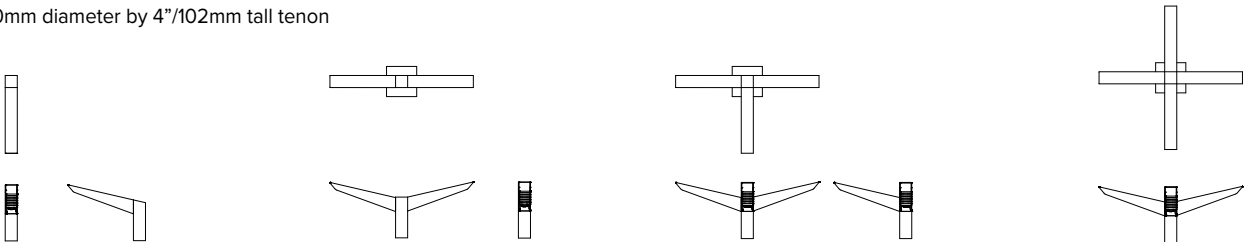
INTEGRAL POLE LUMINAIRE



MODEL	KM41-...-PS4XX-125	KM42-...-PS4XX-125	KM43-...-PS4XX-125	KM44-...-PS4XX-125
OVERALL LENGTH	25.8" / 655MM	10" / 254MM	25.8" / 655MM	47.5" / 1206MM
OVERALL WIDTH	10" / 254MM	47.5" / 1206MM	47.5" / 1206MM	47.5" / 1206MM
WEIGHT	8.95 LBS.	8.95 LBS.	8.95 LBS.	8.95 LBS.
EPA*	0.56	1.12	1.44	1.44

TENON MOUNT LUMINAIRE

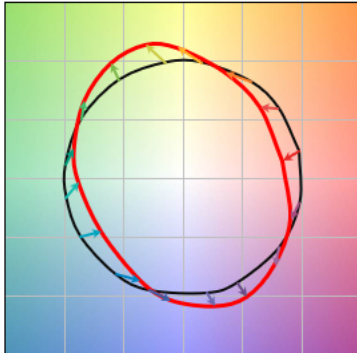
Slips over a 2 3/8"/60mm diameter by 4"/102mm tall tenon



MODEL	KM41-...-TA23	KM42-...-TA23	KM43-...-TA23	KM44-...-TA23
OVERALL HEIGHT	13.5" / 343MM	13.5" / 343MM	13.5" / 343MM	13.5" / 343MM
OVERALL LENGTH	25.8" / 655MM	10" / 254MM	25.8" / 655MM	47.5" / 1206MM
OVERALL WIDTH	4" / 102MM	47.5" / 1206MM	47.5" / 1206MM	47.5" / 1206MM
WEIGHT	8.95 LBS.	8.95 LBS.	8.95 LBS.	8.95 LBS.
EPA*	0.87	1.44	1.62	1.62

TM-30 DATA

COLOR VECTOR GRAPHIC

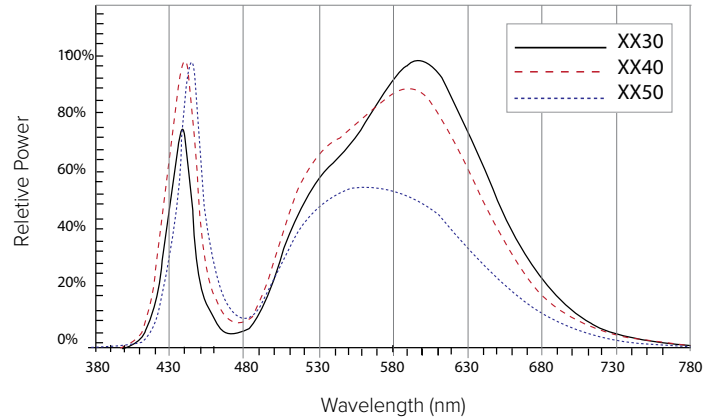


— Reference Illuminant — Test Source

TEST SOURCE

VALUE	ORDERING CODE		
	XX30	XX40	XX50
Rf	69	69	71
Rg	99	99	98
CCT(K)	3122	3852	5020
Duv	0.001	0.0004	0.0005
CIE Ra	74	73	74

SPECTRAL POWER DISTRIBUTION COMPARISON



ELECTRICAL CHARACTERISTICS

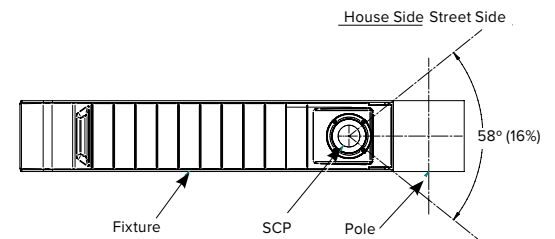
ORDERING CODE	LED CURRENT (MA)	SYSTEM WATTAGE (W)	LINE INPUT		INPUT		MIN. POWER FACTOR	MAX THD (%)	MIN. POWER	INRUSH CURRENT PEAK				DIMMING	
					AMPS AC					(A)		T@50% (MS)		DIMMING RANGE (V)	SOURCE/ SINK CURRENT (MA)
			VAC	HZ	120	277				120	277	120	277		
					20XX	500				24	120-277	50/60	0.2		
30XX	700	33	120-277	0.3	0.1										

TM-21 LIFETIME CALCULATION (500MA)

AMBIENT ENVIRONMENT °C	PROJECTED LUMEN MAINTENANCE (KHRS)					REPORTED L70
	25	50	60 (TM-21)	75	100	
25	98%	95%	94%	93%	90%	>60Khrs.
40	98%	96%	95%	93%	90%	

SENSOR DETECTION RANGE

COVERAGE DIAMETER	SCP	SENSOR MOUNTING HEIGHT										RATIO
		8'	10'	12'	14'	16'	18'	20'	25'	30'	35'	
		20'	25'	30'	35'	40'	45'	50'	62.5'	75'	87.5'	100'



FEATURES

- Integral Motion Sensor
- Staggered twin mounting
- ANSI C136.31-2010 4G Rated
- IES Type II, III and IV distributions
- 3000K , 4000K, 5000K CCT
- Integral thermal protection



SPECIFICATIONS

CONSTRUCTION

- Housing shroud is made of fabricated 5052-H32 aluminum alloy with a rear mounting interface that is made of fabricated 304 stainless steel
- Housing mounting interface is a stamped silicone gasket
- Luminaire housing is free of any visible heat fins, hardware or fasteners
- Bracketry and hardware is made of stainless steel
- Base is made of cast aluminum #356 alloy and heat treated to a T-6 condition
- Shaft is extruded aluminum 6061 alloy and heat treated to a T-6 condition
- Anchor bolts are hot dip galvanized steel. Eight galvanized hex nuts and flat washers, and a bolt circle template are provided. Anchor bolt for poles are 3/4" x 24" x 3"
- Luminaire finish consist of a five stage pretreatment regimen with a polymer primer sealer, oven dry off, and top coated with a thermoset super TGIC polyester powder coat finish
- Luminaire finish meets the AAMA 605.2 performance specification which includes passing a 3000 hour salt spray test for corrosion resistance

LED/OPTICS

- LEDs are mounted to a metal printed circuit board assembly (MCPCB) with a uniform conformal coating over the panel surface and electrical features
- Optical lenses is made of clear injection molded PMMA acrylic
- Each MCPCB and optic are sealed to an extruded 6063-T6 aluminum alloy heat spreader and sealed with a continuous one piece injection molded silicone rubber gasket. IP66

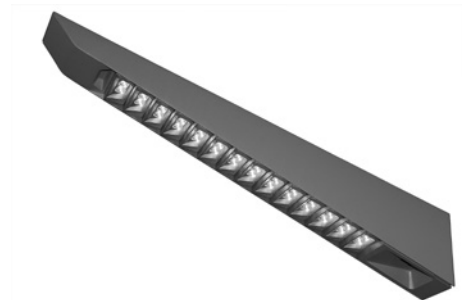
LED/OPTICS (CONTINUED)

- Patent Pending design of optical array is independently shielding each LED optic across the length of the aperture
- Optical surfaces are painted white unless the optional fixture finish (FO) or matte black finish (MO) is selected
- **Optional matte black finish optics (MO) are required to meet UO classification with zero percent uplight**
- Optional fixture finish optical surfaces (FO) do not exceed BUG ratings of the standard white finish and will be greater than or equal to the delivered lumens of the optional matte black optical surface finish (MO)

INSTALLATION

- Integral pole mount luminaires require assembly of fixture(s) to the pole, mounting hardware, anchor bolts and anchor bolt template is included. See page 6 for additional considerations specific to the integral pole
- Tenon mount luminaires require assembly of fixture(s) to the tenon adapter, mounting hardware is included. Tenon adapter secures to the tenon with eight 5/16-18 stainless steel set screws
- Side mount luminaires are supplied with hardware compatible with AAL mountings.
- Twin mounted staggered height fixtures are configured separately
- Service access to the optical array and driver assembly is via a tool-less internal latch and have an audible click.
- Optical array has to hang freely in an open service position for inspection of internal wire connections. Once in service position, the optical array is able to be removed for service by lifting the assembly up off the rear hinge and disconnecting the wiring plugs.
- Driver assembly is mounted to a prewired internal tray with quick disconnects for removal

KICK™



Kick Small

RELATED PRODUCTS

θ [K5](#)

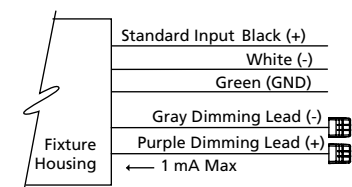
θ [KM5](#)

θ [KB6](#)

ELECTRICAL

- Drivers are in direct contact with the aluminum housing across the entire surface area of the widest face for maximum thermal transfer
- Luminaires have integral surge protection that is U.L. recognized and have a surge current rating of 10,000 Amps using the industry standard 8/20uSec wave and surge rating of 372J. Surge protection device is wired in series
- Drivers are U.L. recognized
- Drivers are not compatible with current sourcing dimmers, consult factory for current list of known compatible dimming systems approved dimmers include Lutron Diva AVTV, Lutron Nova NFTV and NTFTV
- Luminaire are capable of operating at 100% brightness in a 40°C environment. Both driver and optical array have integral thermal protection that will dim the luminaire upon detection of temperatures in excess of 85°C

- **Luminaires not configured with a control system or ANSI C136 receptacle option are provided with 0-10 purple and gray dimming leads**



continued on page 3

KEY DATA	
LUMEN RANGE	3,820–7,691
WATTAGE RANGE	46–64
EFFICACY RANGE (LPW)	79–120
WEIGHT	15 lbs 6.8 kg
EPA	1.03

DATE: 6/14/22	LOCATION:
TYPE:	PROJECT:
CATALOG #:	

ORDERING GUIDE

Example: K41-T2-FO-5040-MCPCR-SF-347-PS412-125-SBC-BLT

CATALOG #

Model (4" wide luminaire)	Optics (Distribution)	Optics Finish	Light Engine ¹	Control
K41 Single Fixture	T2 IES Type II	WO Standard White Finish	5030 3000K CCT, CRI 70, 46 Watts	MCPCR Multi-Channel 7-Pin Photocell Receptacle
K42 Two Fixtures 180° Apart	T3 IES Type III	FO Optics in Fixture Finish	5040 4000K CCT, CRI 70, 46 Watts	WIR wiScape Connectivity Ready
K43 Three Fixtures 90° Apart	T4 IES Type IV	MO Optics in Matte Black Finish	5050 5000K CCT, CRI 70, 46 Watts	WIRSC wiScape + Motion Sensor
K44 Four Fixtures 90° Apart			7030 3000K CCT, CRI 70, 64 Watts	SCP Motion Sensor + Photocell ²
			7040 4000K CCT, CRI 70, 64 Watts	SWP SiteSync Pre-commissioned ³
			7050 5000K CCT, CRI 70, 64 Watts	SWF SiteSync Field Commission ³
				SWPM SiteSync Pre-commissioned + Motion Sensor ³
				SWFM SiteSync Field Commission + Sensor ³
				SCPREMOTE Handheld Commissioning Tool ²
				SWUSB SiteSync loaded on USB flash drive (Windows® operating system only ⁴
				SWTAB SiteSync Window® based Tablet ⁴
				SWBRG SiteSync Wireless Bridge Node ⁴
				SW7PR SiteSync 7 Pin on fixture module On/Off/Dim, Daylight Sensor 120-480VAC

Fuse (may choose one)	Voltage	Mounting	Mounting Options	Fixture Finish
SF 120, 277, 347 Volt Input	120-277V 120-277V	<u>Integral Pole</u>	<u>Twin mount at staggered heights</u>	<u>Standard Color</u>
DF 208, 240, 480 Volt Input	347 347V	PS410-125 10' Luminaire Height	Mounting holes for a fixture at 180°, K41...PS4... only, may choose one	BLS Black Gloss Smooth
	480 480V	PS412-125 12' Luminaire Height		BLT Black Matte Textured
		PS414-125 14' Luminaire Height	TS8 8' from bottom	DBS Dark Bronze Gloss Smooth
		PS416-125 16' Luminaire Height	TS10 10' from bottom	DBT Dark Bronze Matte Textured
		PS418-125 18' Luminaire Height	TS12 12' from bottom	GTT Graphite Matte Texture
		PS420-125 20' Luminaire Height	TS14 14' from bottom	LGS Light Grey Gloss Smooth
		<u>Tenon Mount</u>	TS16 16' from bottom	LGT Light Grey Matte Textured
		TA23 Slips over a 2 3/8" / 60mm Ø x 4" / 102mm tall tenon	TS18 18' from bottom	PSS Platinum Silver Gloss Smooth
		<u>Side Mount</u>	<u>Base Options</u>	VGT Verde Green Matte Textured
		SMK Mounts to the side of a square pole, K41 only	SBC Standard Base Cover	WHS White Gloss Smooth
		<u>Wall Mount</u>	<u>Pole Accessories(may choose one)</u>	WHT White Matte Textured
		WMK K41 only	GFI GFCI receptacle, 24" from top of pole	CC Custom Color ⁵
			RBC Duplex receptacle box with clear cover, wiring device(s) not included	

Notes:

- 595nm monochromatic amber and or custom lumen package available by request
- Handheld commissioning tool is required to separately configure or adjust any number of SCP sensors
- Specify group and zone at time of order. See www.hubbellighting.com/sitesync for more details. Order at least one SiteSync interface accessory SWUSB or SWTAB. Each option contains SiteSync License, GUI, and Bridge Node
- When ordering with SiteSync, one of the following interface options must be chosen and ordered separately. Each option contains the SiteSync License, GUI and Bridge Node
- Consult factory for custom color, marine and corrosive finish

SPECIFICATIONS (CONTINUED)

MODEL	HEIGHT OVERALL	POLE	SHAFT SECTION	WT	MAXIMUM ALLOWABLE EPA (MPH)							
					85	90	100	110	120	130	140	150
K4X-PS410-125	10' 7.5" / 3.24m	10'	4" SQ x .125"	28 lbs	15.4	13.5	10.4	8.1	6.4	5.0	4.0	3.1
K4X-PS412-125	12' 7.5" / 3.85m	12'	4" SQ x .125"45	32 lbs	11.8	10.2	7.6	5.7	4.3	3.2	2.3	1.6
K4X-PS414-125	14' 7.5" / 4.46m	14'	4" SQ x .125"	37 lbs	9.1	7.7	5.5	3.9	2.6	1.7	0.95	0.33
K4X-PS416-125	16' 7.5" / 5.07m	16'	4" SQ x .125"	42 lbs	6.9	5.7	3.8	2.3	1.3	0.46	-	-
K4X-PS418-125	18' 7.5" / 5.68m	18'	4" SQ x .125"	48 lbs	4.9	3.9	2.2	0.95	0.01	-	-	-
K4X-PS420-125	20' 7.5" / 6.29m	20'	4" SQ x .125"	53 lbs	3.2	2.2	0.75	-	-	-	-	-

* - Consult factory for thicker shaft profiles and or custom heights not shown above.

CONTROLS

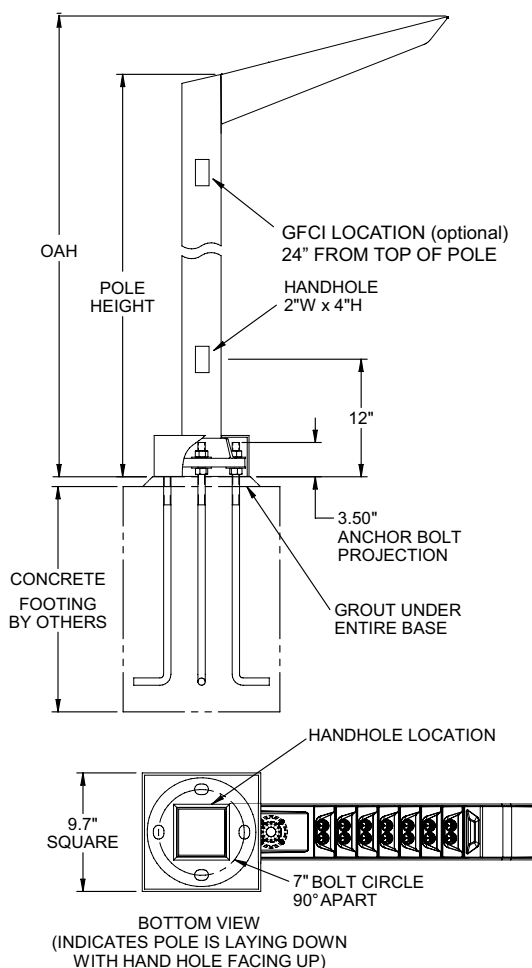
- Wireless enabled fixtures shall support bi-directional radio frequency (RF) communications utilizing IEEE 802.15.4 operating in the 2.4GHZ ISM band.
- Up to 1000' wireless range may be reduced by physical obstructions between lighting fixtures.
- Motion Sensor shall use passive infrared (PIR) sensing technology that reacts to changes in infrared energy (moving body heat) within the coverage area. Careful consideration must be given to obstructions that may block the sensor's line of sight.
- Factory default settings for SCP option shall be:
 - High mode: 10V
 - Low mode: 1V
 - Ramp-up rate: disabled
 - Fade-down rate: disabled
 - Photocell: Off
 - Sensitivity: Full
 - Time Delay: Fade to low: 5 minutes
 - Time Delay: Fade to off: 1 hour

CERTIFICATIONS

- Luminaire is listed with UL for outdoor, wet location use, UL1598, UL 8750 and Canadian CSA Std. C22.2 no.250
- ANSI C136.31-2010 4G Vibration tested and compliant
- IEC 66262 Mechanical Impact Code IK10
- IDA approved, 3000K and warmer CCTs only
- This product qualifies as a "designated country construction material" per FAR 52.225-11 Buy American-Construction Materials under Trade Agreements effective 6/06/2020. [See Buy American Solutions](#)

WARRANTY

- See [HLI Standard Warranty](#) for additional information



DELIVERED LUMENS

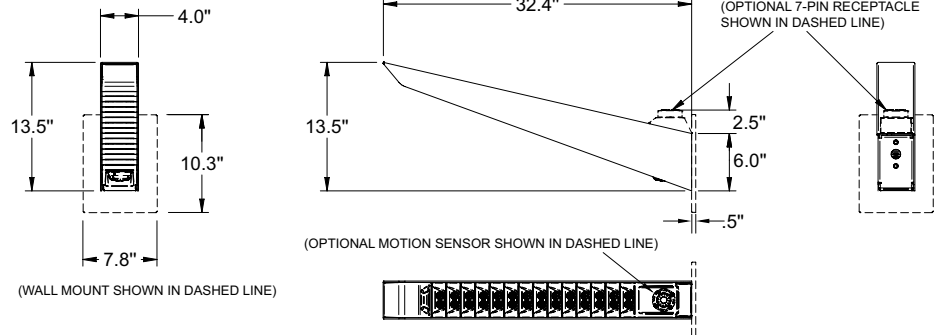
System Watts	Optical Finish	Distribution	Ordering Code	3000K 70CRI					4000K 70CRI					5000K 70CRI				
				Lumen	Bug Rating			Efficacy (Lm/W)	Lumen	Bug Rating			Efficacy (Lm/W)	Lumen	Bug Rating			Efficacy (Lm/W)
					B	U	G			B	U	G			B	U	G	
46	Standard White	Type 2	T2	4999	1	2	1	108	5234	2	2	1	114	5239	1	2	1	113
		Type 3	T3	4895	1	2	1	106	5125	1	2	1	112	5130	1	2	1	111
		Type 4	T4	5207	1	2	1	113	5451	1	2	1	118	5456	1	2	1	118
	Fixture Match	Type 2	T2-FO	3820	1	2	1	83	4010	2	2	1	87	4003	1	2	1	87
		Type 3	T3-FO	3863	1	2	1	84	4044	1	2	1	88	4048	1	2	1	88
		Type 4	T4-FO	4297	1	2	1	93	4524	1	2	1	98	4503	1	2	1	98
	Matte Black	Type 2	T2-MO	3820	1	0	1	83	4000	1	0	1	87	4003	1	0	1	87
		Type 3	T3-MO	3863	1	0	1	84	4045	1	0	1	88	4048	1	0	1	88
		Type 4	T4-MO	4297	1	0	1	93	4499	1	0	1	98	4503	1	0	1	98
64	Standard White	Type 2	T2	6536	2	2	2	102	6775	2	2	2	106	6932	2	2	2	108
		Type 3	T3	6554	1	2	1	102	6795	1	2	1	106	6952	1	2	1	108
		Type 4	T4	7250	2	2	1	113	7516	2	2	2	117	7691	2	2	2	120
	Fixture Match	Type 2	T2-FO	5292	2	2	2	83	5486	2	2	2	85	5614	2	2	2	87
		Type 3	T3-FO	5456	1	2	1	79	5646	1	2	1	82	5788	1	2	1	84
		Type 4	T4-FO	5780	2	2	1	90	5992	2	2	2	94	6131	2	2	2	96
	Matte Black	Type 2	T2-MO	5281	1	0	1	83	5475	2	0	1	86	5602	2	0	1	88
		Type 3	T3-MO	5442	1	0	1	85	5656	1	0	1	88	5773	1	0	1	90
		Type 4	T4-MO	5767	2	0	1	90	5979	2	0	1	93	6117	2	0	1	96

DIMENSIONS

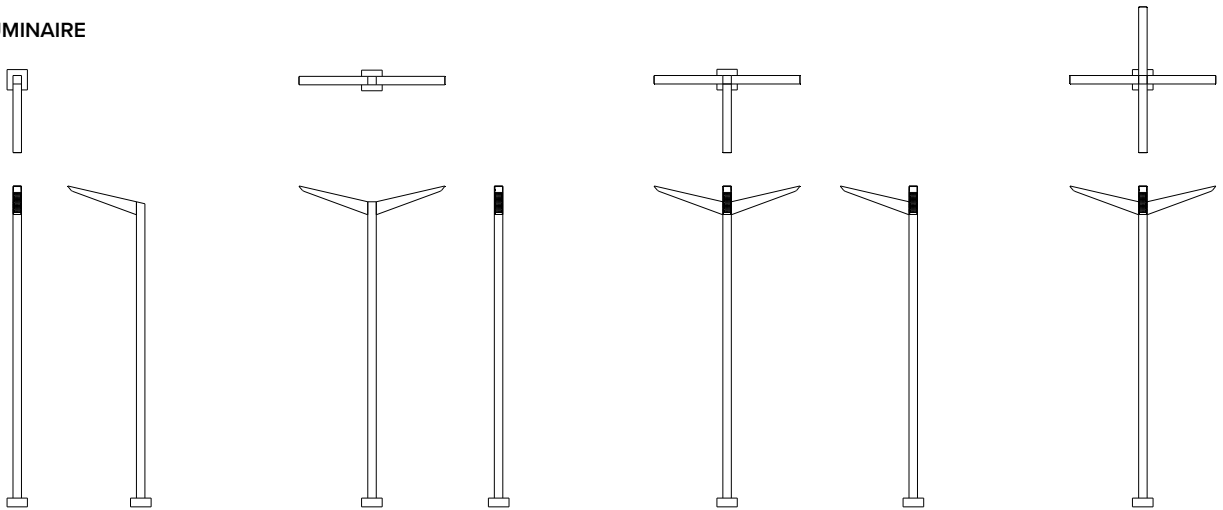
SIDE MOUNTED LUMINAIRE

Mounts to the side of 4"/102mm square pole.

MODEL	K41-...-SMK
OVERALL HEIGHT	13.5" / 343mm
OVERALL LENGTH	32.4" / 823mm
OVERALL WIDTH	4" / 102mm
WEIGHT	15 lbs.
EPA	1.03



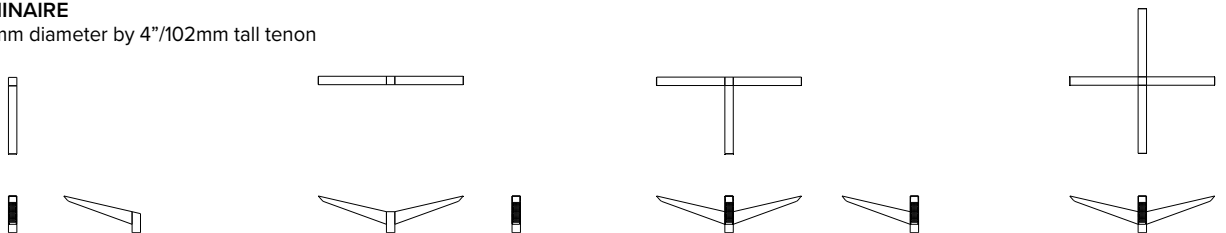
INTEGRAL POLE LUMINAIRE



MODEL	K41-...-PS4XX-125	K42-...-PS4XX-125	K43-...-PS4XX-125	K44-...-PS4XX-125
OVERALL LENGTH	36.4" / 925MM	10" / 254MM	36.4" / 925MM	68.9" / 1750MM
OVERALL WIDTH	10" / 254MM	68.9" / 1750MM	68.9" / 1750MM	68.9" / 1750MM
WEIGHT	15 LBS.	30 LBS.	45 LBS.	60 LBS.
EPA*	1.03	2.06	2.61	2.61

TENON MOUNT LUMINAIRE

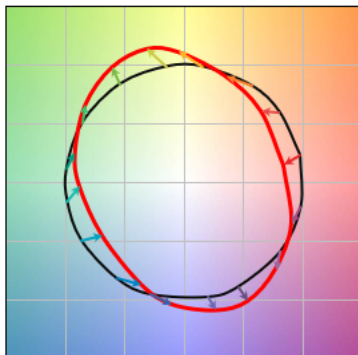
Slips over a 2 3/8"/60mm diameter by 4"/102mm tall tenon



MODEL	K41-...-TA23	K42-...-TA23	K43-...-TA23	K44-...-TA23
OVERALL HEIGHT	17.5" / 445MM	17.5" / 445MM	17.5" / 445MM	17.5" / 445MM
OVERALL LENGTH	36.4" / 925MM	10" / 254MM	36.4" / 925MM	68.9" / 1750MM
OVERALL WIDTH	4" / 102MM	68.9" / 1750MM	68.9" / 1750MM	68.9" / 1750MM
WEIGHT	18.5 LBS.	33.5 LBS.	48.5 LBS.	63.5 LBS.
EPA*	1.33	2.42	2.61	2.61

TM-30 DATA

COLOR VECTOR GRAPHIC

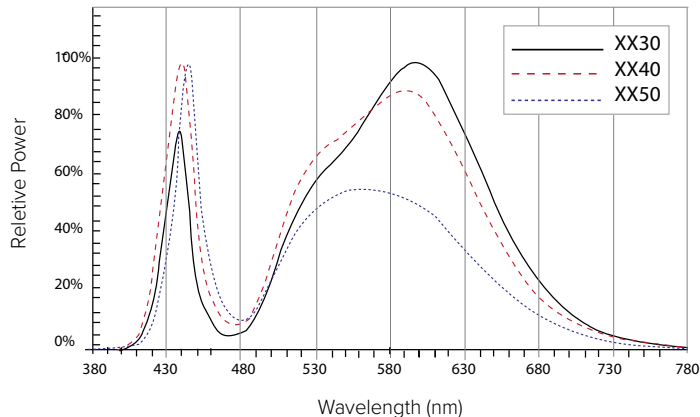


— Reference Illuminant — Test Source

TEST SOURCE

VALUE	ORDERING CODE		
	XX30	XX40	XX50
Rf	69	69	71
Rg	99	99	98
CCT(K)	3122	3852	5020
Duv	0.001	0.0004	0.0005
CIE Ra	74	73	74

SPECTRAL POWER DISTRIBUTION COMPARISON



ELECTRICAL CHARACTERISTICS

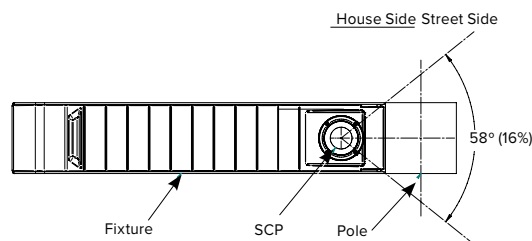
ORDERING CODE	LED CURRENT (MA)	SYSTEM WATTAGE (W)	INPUT				MIN. POWER FACTOR	MAX THD (%)	DIMMING RANGE (V)	SOURCE/ SINK CURRENT (MA)	INRUSH CURRENT PEAK								
			AMPS AC								HZ	(A)				T@50% (MS)			
			120	277	347	480						120	277	347	480	120	277	347	480
50XX	500	46	0.4	0.17	0.1	0.10	50/60	>0.9	20	0-10	1	15	32	41	63	50	155		
70XX	700	64	0.5	0.23	0.2	0.13													

TM-21 LIFETIME CALCULATION (500MA)

LUMEN PACKAGE	AMBIENT ENVIRONMENT °C	PROJECTED LUMEN MAINTENANCE (KHRS)					REPORTED L70
		25	50	60 (TM-21)	75	100	
2,500	25	98%	95%	94%	92%	90%	>60Khrs.
	40	98%	96%	95%	93%	91%	

SENSOR DETECTION RANGE

		SENSOR MOUNTING HEIGHT							RATIO
		8'	10'	12'	14'	16'	18'	20'	
COVERAGE DIAMETER	SCP	20'	25'	30'	35'	40'	45'	50'	1:2.5
	WIRSC	16'	20'	24'	28'	32'	36'	40'	1:2



*June 13, 2022***LAMBERT WOODS**

Architectural Narrative

We are proposing three different building types on the site for both the North and South side of Washington Avenue. The three-story Community Flats buildings are arranged along Washington Avenue to create an activated street frontage and help establish a strong connection between the North and the South sides of the site. The three-story Rowhouse buildings are arranged between the community flats buildings and the two-story townhouses to form the two large community greenspaces. The intent is to gradually decrease the scale of the buildings from the center of the site to the southwestern and northeastern extents of the property, where the shorter buildings are close to the current residential neighborhoods.

Our approach to the roof form of the height-limited Community Flats building is to develop a series of low-pitched roof planes that undulate across the facade of the buildings and are occasionally tipped down to denote the entrances below. This undulating roof form carries across the site from building to building, which establishes a language that is reflected in the Townhouses and Rowhouses where roofs are occasionally tipped up to highlight corners and connections. The Townhouse entrances are highlighted by a simple entry canopy that matches the pitch of the larger Community Flats buildings. The Rowhouse has a more elaborate series of similarly pitched entrance canopies that dance along the facade to individualize the unit entries as well as to help reduce the scale of the overall building.

We intend to use common siding materials and alter their installation methods to help break up the facades by a change in texture, spacing, and orientation. There are shared cladding materials between buildings that reinforce their connection and establish the rhythm of textural and material changes at the unit entrances. We've also altered the heights of the windows at various locations in reference to the undulating roof forms.

The Community Flats buildings provide exterior deck spaces on the upper levels, which add visual interest and provide a recessed area for a specific cladding treatment. The entry spaces are clad with a locally sourced natural Eastern White Cedar in locations where the building is experienced in close proximity.

The building's architectural design details, along with the careful attention to landscape design and public circulation spaces, will provide a welcoming and interactive neighborhood experience for this unique site.

**Phil Kaplan***Maine Licensed Architect, AIA*

Kaplan Thompson Architects

P. Utilities

The proposed project will include installation of multiple utility services to the proposed buildings.

Water:

Based on the City archive plans, there is an existing 12" water main within Washington Ave along the project's frontage. It is proposed to connect into the existing 12" main with two 6" (or 8") services to feed into the North and South sides of the development. Two (2) above-ground double-check backflow assemblies and two (2) meter pits are proposed. Each structure will be served via a domestic and fire service. Additionally, a public fire hydrant is proposed at this time with an additional 6" connection to the main and is subject to approval from Portland Water District. Ability to serve confirmation will be submitted upon receipt.

Sewer:

A new 8" PVC lateral will be installed throughout the site on both sides of the road to accept the wastewater from each unit and will both tap the existing manhole in Washington Ave.

Stormwater:

Stormwater management for the development will be provided by under drained sand filters and porous pavement. Additionally, runoff from a portion of Washington Ave. will be redirected to a detention area with plantings to provide attenuation. Please refer to the Grading & Drainage plans as well as the Stormwater Management Report for more information.

Electric/Communications:

It is proposed to install a new utility pole on the north site and to route electric and communications from an existing pole for the south site. The services will be provided with underground primaries to transformers located throughout both parcels. New conduits are proposed for telephone, fiber, and cable that will run down from the existing and proposed utility poles on Washington Street. See the Sheet C-20, Utility Plan, for more information.

Ability to serve letters have been sent out to the respective utility companies in accordance with the City of Portland Code of Ordinances Chapter 14 Land Use, Section 14-527(g)(7). Responses from the utility companies are forthcoming.



Q. Construction Management Plan

Project Address: 165 Lambert Street and 622 Auburn Street

Project Description:

The proposed project includes the construction of eighteen (18) stand-alone residential buildings to be occupied by 165 units. The project will include the construction of parking lots and stormwater management features.

Project Team Summary:

Owner:	Maine Cooperative Development Partners
General Contractor:	Penobscot General Contractors
Civil & Environmental Engineer:	Acorn Engineering, Inc.
Architect:	Kaplan Thompson Architects
Structural Engineer:	Structural Integrity Consulting Engineers
Geotechnical Engineer:	Summit Geoengineering Services

The Owner/GC and all subcontractors will work with the City of Portland and adjacent landowners to minimize any project impacts.

The GC will remain responsible for enforcement of all compliance with 1) all contract plans and specifications in their scope of work and 2) all site working conditions and safety requirements, day and night, for both persons and property, in each case for the duration of their work. These include OSHA, NIOSH, U.S. EPA, local ordinance and any other applicable governmental regulations. Both the Owner/GC and any subcontractors will remain responsible for safeguarding the general public.

The GC shall review all permits and conditions associated with the project. Refer to the Civil/Site Plan Set, Sheet C-03 Construction Management Plan for visual representation of the measures to be taken during construction.

The following outline has been developed in accordance with the City of Portland Construction Management Plan General Template and shall be referenced by the GC during construction.

A. Construction Management Principles

The control of noise, vibrations, ground movement, truck traffic, and other construction related factors will be of utmost importance. Care shall be taken to minimize these effects in the best interest of neighbors and the general public. GC to ensure that work hours conform to the City of Portland's Ordinance.

B. Development Review of Construction Management Plan

Logistics and safety program shall be submitted at or prior to the preconstruction meeting by the GC with all pertinent information required by the Maine Department of Transportation's Traffic Control Plan Standard Specification 652.3.3.



C. Performance Guarantees, Inspection Fees, Preconstruction Meeting, and Permits

Guarantees and fees will be paid at the time of the respective application. Sections 14-530 and 13-532 will be complied with all necessary permits will be obtained prior to work.

1. Street Opening and Street Occupancy Permits:

Required permits regarding street opening and occupancy will be obtained from the Department of Public Works. The requests shall conform to the approved Construction Management Plan.

2. Blasting:

Although not anticipated, if blasting occurs, it shall conform to Article VIII. In Chapter 14 of the City Code and Section 3.7 in the City's Technical Manual.

3. Building Code:

Employ the best practices, as applicable, of Chapter 33 Safeguards During Construction, from the 2009 International Building Code.

D. Construction Administration and Communication

The Contractor will work closely with adjacent abutters, businesses, and all parties informed, as far in advance as possible, of scheduled work, particularly work anticipated to cause significant noise, vibrations, or dust. Communication in order to comply with all agreements, ordinances, and special permits will be of the utmost importance. Contractor and Subcontractor contact information shall be posted somewhere along the project's street frontage. Additional signage necessary for communication shall be provided but will be temporary and removed upon completion of the project.

E. Construction Schedule

The GC shall submit a construction timeline at or prior to the preconstruction meeting. Construction may occur during the daytime hours as defined in Section 17-18. Construction Activities for Building permit and City Code Section 25-129, Noise, dust and debris. Between September 1 and May 31, the following year, no person shall engage in construction activities generating noise exceeding 50 decibels, between the hours of 7 pm and 7 am of the following day within 500 feet of any buildings. From June 1 to August 31, construction activity may continue until 8 pm. No construction activity shall begin before 8 am on a Saturday, Sunday, or legal holiday. Extended hours or night work may be requested for special circumstances and street utility work if needed. These requests will be subject to approval by the Public Works Authority. Deliveries will be scheduled between 7 am and 5 pm.



The estimated timeframe of the proposed project is outlined below:

<u>Project Start Date:</u>	Spring 2023
<u>Project End Date:</u>	Spring 2025

A more detailed work schedule shall be provided by the GC at or before the pre-construction meeting with the City.

F. Security

1. The Construction Management Plan, Sheet C-03, depicts all proposed fencing and other barriers, with the intent of separating pedestrian and vehicle circulation from the construction site. Construction entrances per detail shall be installed.
2. Structures undergoing construction, alteration, or demolition operations, including those in underground locations, shall comply with NFPA 1 Chapter 16. *Safeguarding Construction, Alteration, and Demolition Operations.*
3. Fire Safety Program: Prior to construction, an overall construction and demolition fire safety program shall be developed. Essential items to be emphasized include the following:
 - Good Housekeeping
 - On-site security
 - Installation of new fire protection systems as construction progresses
 - Preservation of existing systems during demolition
 - Organization and training of an on-site fire brigade
 - Development of a pre-fire plan with the local fire department
 - Rapid communication
 - Consideration of special hazards resulting from previous occupancies
 - Protection of existing structures and equipment from exposure fires resulting from construction, alteration, and demolition operations.
4. Blasting, if required, shall conform with all measures of Article VIII. Regulation of Explosives in the Land Use Code and Section 3.7 Standards for Blasting and Regulation of Explosives in Portland's Technical Manual.
5. Temporary security lighting shall be shown on the Construction Management Plan, and all fixtures shall be full cutoffs.

G. Construction Permitting and Traffic Control Plans

1. Construction Activity in Public Streets

Construction activity in the public right-of-way shall be compliant with Chapter 25 Article VII of the City Code. At no time will it be permissible for construction activity including delivery vehicle to close or block streets or affect public safety access without prior notice and approval of the Department of Public Works.



2. Sewer and Stormwater

Sewer and stormwater system connections are controlled by Chapters 24 and 32 of the City code of Ordinance. Required permits for new connections and/or abandonment of existing connections are available through the Street Opening Clerk at the Department of Public Works. Rules and Regulations for these utility systems are available through the City Engineer's office of the Department of Public Works and in Section II of the Technical Manual.

3. Traffic Control Plans

Construction activity that impacts the existing public street system must be controlled to protect the safety of the construction workers and all modes of the traveling public. The contractor shall submit a satisfactory "Maintenance of Traffic" (MOT) plan prior to any street opening permit approval. This document shall contain all pertinent information from the Maine Department of Transportation's Traffic Control Plan Standard Specification 652.3.3.

The MOT will address the work required for utility connections in Washington Street. Traffic will be channelized utilizing drums and cones. Proper signage will be installed prior to the through work zone. Alternating traffic will be controlled with flaggers. Trenches will be patched with pavement daily.

The MOT plan shall provide for the safe passage of the public through or along the construction work zone. It may be permissible to close a portion of Washington Street during utility connections and/or detour a mode of traffic when absolutely necessary for safety. All requests shall be subject to City approval. MOT plans shall employ the appropriate techniques and devices as called for in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD). In addition:

- Construction speed signing may be used as needed to slow traffic.
- Traffic Control signs shall not be placed where they would create any obstructions to bicycles or pedestrians.
- Flaggers will be utilized when necessary.

All existing modes of travel in the work zone area shall be accommodated if impacted by the activity. The safe passage of pedestrians, bicyclists, transit providers, and motorists are of equal importance when planning and laying out the work zone; no pre-existing travel mode may be eliminated without the express approval of the Department of Public Works. The MOT should also address on-street parking impacts, including deliveries and parking for adjoining businesses and property owners, analysis of roadway capacity or diversion capacity if street closure or change to roadway capacity is required, and coordination with other on-going or future construction or utility projects in the vicinity.

- Traffic control bicycle and pedestrian facilities or routes through work zones shall be maintained until the bicycle and pedestrian facilities or



routes are ready for safe operation. Traffic control will not be removed to allow auto travel at the expense of bicycle and pedestrians.

- Barrier systems utilized to separate the construction activity from the public street and /or sidewalk shall not inhibit sight distances, particularly for visibility of pedestrians and bicyclists.
- ADA compliance in all capacities shall be maintained.

Use of public parking spaces or the blockage of any portion of sidewalk for the purpose of construction activity shall require an occupancy permit and appropriate fee as assessed by the Department of Public Works.

H. Site Management and Controls

1. Regular trash and debris shall be managed appropriately, and its removal shall comply with all local, state, and federal regulations.
2. Street cleaning and sweeping shall be followed as outlined in the erosion and sedimentation control notes and report. Damage to the street shall be avoided and shall be the responsibility of the contractor.
3. Dust shall be controlled and shall comply with Section 25-129 and the erosion and sedimentation control notes, plan, and details.
4. Noise shall be controlled and shall comply with Section 17-18 and Section 25-129.
5. Rodent Control shall be provided, if applicable, by a professional exterminator and shall be consistent with Chapter 22 of the City Code.
6. Snow and Ice Removal shall be provided. Pursuant to Section 25-173, the Contractor shall ensure a safe means of travel within the work zone by the following steps:
 - a. Snow/ice removal or commence automatically from 1" or greater of snow or ice
 - b. Remove snow as needed within the work zone, including parking spaces. Driveways and site lines shall not be blocked by piles of snow.
 - c. Clear all walks and ramps within the work zone
 - d. Sand or salt as needed
 - e. Clear all basin or drainage to help snow melt
 - f. The above steps shall be carried out Sunday-Saturday including holidays.

I. Erosion & Sedimentation Control

1. The Contractor shall install all erosion and sedimentation controls as depicted on the approved Construction Management Plan, C-03, and the approved erosion and sedimentation control report, prior to the pre-construction meeting for inspection by the City. The Contractor shall regularly inspect the control measures, no less than weekly and after storm events (0.5" or more in 24 hours). Additionally,



- temporary or permanent stormwater management systems shall be inspected and maintained to ensure working order. The Contractor shall document all inspection activities and corrective actions and be prepared to provide these documents for inspection by the City, Maine Department of Environmental Protection (MDEP) or the U.S. Environmental Protection Agency (EPA) upon request.
2. Due to the existing, sparse landscaping on site, no protection during construction will be necessary.
 3. Stored materials shall be identified and avoid being located under/near trees.

J. Construction Staging Area

1. The Contractor shall submit a plan with locations depicted for the location of material staging areas, the location of on-site temporary construction trailers, the location of on-site truck delivery holding areas, the location of on-site truck washing stations, masonry mixing stations, the general location of the construction security fence and the general location of temporary construction dumpsters. This plan shall be submitted at or prior to the pre-construction meeting. Any open storage areas shall be shown on the plan.
2. Delivery Truck Holding Areas On-Site: The majority of materials delivered to the site will be scheduled such that they are able to be off-loaded immediately. On days when the construction activities require multiple truck deliveries, these deliveries will be carefully scheduled so that there is always adequate on-site area for the holding of trucks until they can be unloaded. Once at the site all vehicles will be brought within the fence line and will make every attempt to avoid queuing on public streets. If, for any reason, on-site holding of trucks is not feasible, an off-site location must be designated and shown on the submitted plan referenced above in J.1.
3. All deliveries for materials shall comply with the City's noise requirements.

K. Parking During Construction

1. Adequate parking for construction workers shall be provided on site or arrangements for off-street parking at an off-site location shall be provided.
2. Truck Routes and Volumes: The following quantities are estimated as part of the reconstruction:
 - Gravel & Stone – 3,640 CY. Earthwork subcontractor(s) pit to project site.
 - Hot Mix Asphalt – 460 Tons. Paving subcontractor pit to project site.

L. Dewatering Plans

1. A basic dewatering plan for any construction work is required and shall be submitted by the Contractor. The plan must cover construction sites where



groundwater is not expected but the impact of rainwater may require dewatering. The plan must include operating procedures, equipment to be used, including filters, erosion and sediment control measures, or other methods of removing sediment from approved discharges.

2. For construction work that will require frequent dewatering of groundwater from site, a dewatering plan must be prepared by the Contractor and approved by the Department of Public Works. Groundwater and/or soil testing may be required to determine course of action if treatment is necessary. Approval for all discharges to City infrastructure is required. The proposed plan must address the following:
 - Project duration, discharge location, storage equipment on-site, dewatering schematic, and emergency contact.
 - General requirements include trained staff on-site for all approved discharges and required site log for documentation of all discharges.
 - Storage and/or treatment process should include proper settling time and maintain proper use of filtering medium as required.
 - Contingency/maintenance plan for all dewatering equipment devices and filtration mediums.

Any water that is removed from an excavation must be pumped from a perforated device buried in crush stone prior discharge and/or prior to storage and treatment. There will be no discharge allowed during precipitation events.

M. Special Measures as Necessary

Buckthorn Shrubs, an invasive species, have been identified within the project parcel. Measures to remove the species are to be implemented to mitigate more spread. The Buckthorn shrub is troublesome to remove and can take up to two years to kill if herbicides are not used. Uprooting measures can be implemented and have been shown to kill the plant where trees are below an inch in diameter, however it has not shown to be effective on larger shrubs.

Given the project location in relation to wetlands and waterbodies, the use of herbicides is not recommended. The following provides the steps for removal of the Buckthorn Shrub without the use of herbicides. The removal process begins by cutting the shrub down to a stump less than 6 inches off the ground, and then cover the stump with an opaque material (buckthorn baggie, black plastic bag, tin can, etc.). This method could take up to a year or two to kill the plant and prevent it from growing.

Please note, no matter what method of removal is implemented that the species can spread if composted, therefore proper disposal of the plant reminiscences is critical. In the event herbicides are to be used the contractor shall consult with the Maine Board of Pesticide Control and the Maine Natural Areas Program prior.



R. Solid Waste Disposal

The property management company or Owner shall be responsible for locating the solid waste and recyclable material to the spaces allocated for solid waste storage as noted on the Site Plans (C-10, C-11).

The solid waste containers will be fully enclosed and screened from the public view. A private hauler will be contracted with for removal.



Traffic Impact Study

Date: September 27, 2022

To: **Sam Lebel, PE, Project Manager**
Acorn Engineering, Inc.

From: Jacob Sirois
Engineer 1
Barton & Loguidice, LLC.

John Q. Adams, P.E., PTOE
Associate, Senior Transportation Engineer
Barton & Loguidice, LLC.

Re: **Proposed Lambert Woods Development**
Washington Street Extension, Portland, Maine
B&L #2491.001.001

Introduction

Lambert Woods Residential development is proposed a 165-unit affordable housing complex on Washington Avenue Extension in the City of Portland (refer to Image 1 for the location of the proposed project). The proposed apartment complex will be accessed via five (5) proposed driveways; two (2) on the north side of Washington Avenue Extension, and three (3) on the south side. The program for this affordable housing development will have all 165-units income and rent restricted

This traffic impact study will evaluate and measure the level of impact on traffic operations and safety resulting with the development of the proposed project. Site generated trip projections are provided for “key” peak hour time periods throughout a typical week; road safety conditions were determined based upon a review of MaineDOT’s latest road safety data and intersection sight distance was field reviewed and measured to ensure safe and acceptable sight distance is provided at the proposed entrances on Washington Avenue Extension.

Image 1 Proposed Development Site



Site Access

The site will be accessed from Washington Avenue Extension, with portions of the site located on both the north and south sides of the roadway. Access to the site via the area roadway network will generally be from Auburn Street located east of the site, Riverside Street and Washington Avenue located west and south of the site and Blackstrap Road to the north. Washington Avenue in the area of the project is a two-lane bi-directional roadway with 12-ft. travel lanes and 8-ft. shoulders and a posted speed limit of 25 mph. A review of Maine DOT Traffic Volume information indicates that this section of Washington Avenue Extension has an AADT of 3,190 vehicles.

Site Trip Generation

Daily and peak hour trip generation was determined for the proposed project based upon trip tables presented in the eleventh edition of the Institute of Transportation Engineers (ITE) “**TRIP GENERATION MANUAL**”. The ITE publication provides numerous land use categories and the average volume of trips generated by each category.

Site trip estimates for the Lambert Woods Residential Development Apartment Project are based upon LUC #223 – Affordable Housing, which is described in the ITE publication as all multi-family housing that is rented at below market rate. Calculation of the total trips generated per each corresponding time period are summarized below in Table 1.1.

Table 1.1 ITE Trip Generation Calculations						
Land Use	Affordable Housing - Income Limits - LUC 223					
Time Period	Dwelling Units	Trip Generation Rate Trips/Dwelling Units	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	165	4.81	794	50% / 50%	397	397
AM Weekday Peak Hour (Street)	165	0.36	60	29% / 71%	17	43
PM Weekday Peak Hour (Street)	165	0.46	76	59% / 41%	45	31
AM Weekday Peak Hour (Generator)	165	0.36	60	26% / 74%	16	44
PM Weekday Peak Hour (Generator)	165	0.50	83	58% / 42%	48	35
Saturday Peak Hour*	165	0.50	83	59% / 41%	49	34

*Saturday Peak Hour assumed to be similar to the PM Peak Hour of Generator

It should be noted that above in Table 1.1 (LUC 223) we have assumed the Saturday peak hour rate to be similar to the weekday PM peak hour rate. This land use code, 223 Affordable Housing, is a new use that has been added to the current edition (11th) of the ITE Trip generation Manual and has very limited data for the Saturday peak hour time period. In fact, there is only one data point shown for Saturday for which the rate is based on which in our judgement is not reliable. In comparison, the weekday AM and PM peak hour time periods, which had 6 to 10 data points, give a higher confidence in their accuracy. Additionally, the Saturday peak hour rate (1.28 trips per dwelling unit) was abnormally higher than the rates for the weekday AM and PM peak hours, which ranged from 0.36 to 0.50 trips per dwelling unit. This specific issue was discussed with the City Transportation Systems Engineer, Jeremiah Bartlett, PE, PTOE, and he was in agreement with our concerns and conclusions to use the weekday PM peak hour rate in lieu of the Saturday peak hour rate provided in the ITE Trip Generation Manual. This methodology should provide a more accurate estimation of expected trip generation.

As presented in the preceding table, this development will generate 60 trips during the Weekday AM peak hour, 83 trips during the Weekday PM peak hour, and 83 trips during the Saturday peak hour. This indicates that a Maine DOT Traffic Movement Permit will not be required as the development will not generate the minimum threshold of 100 new peak hour trips.

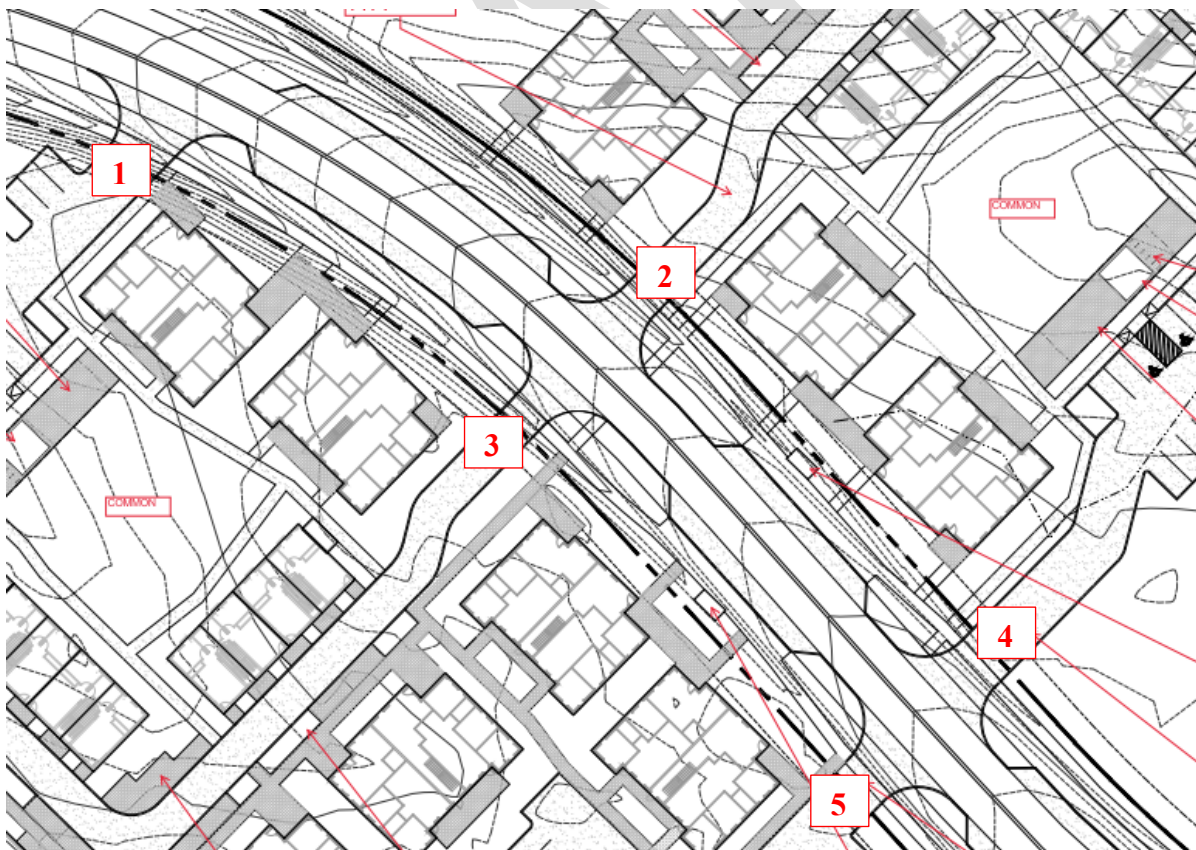
Vehicle Sight Distance

The Maine Department of Transportation's Highway Entrance and Driveway Rules require the following sight distances for a non-mobility roadway:

Sight Distance Standards	
Speed Limit	Sight Distance
25 mph	200 feet
30 mph	250 feet
35 mph	305 feet
40 mph	360 feet
45 mph	425 feet
50 mph	495 feet

The section of Washington Avenue Extension fronting the proposed driveways is presently posted at 25mph, which requires a sight distance of 200-feet. MaineDOT's Rules and Regulations require sight distance to be measured in accordance with the following procedures: *"Sight distance is measured to and from the point on the centerline of the proposed access that is located 10-feet from the edge of traveled way. The height of the hypothetical person's view is considered to be 3½ feet above the pavement and the height of the object being viewed is considered to be 4¼ feet above the pavement."*

The proposed driveway entrances are numbered and sight distances are listed below.



Driveway #1

Looking Left: 360'

Looking Right: 370' – Can be increased to 440' with minor clearing – See circled branch in photograph.

Driveway #2

Looking Left: 450'

Looking Right: 400'

Driveway #3

Left: 280' – can be increased to 330' with minor clearing – See circled branch in photograph

Right: Can see through intersection (600')

Driveway #4

Left: Can see through intersection (425')

Right: 450'

Driveway #5

Left: 375'

Right: can see through intersection (425')

Our field measurements looking both left and right from of each of the proposed site driveway entrances directly onto Washington Avenue Extension indicate existing sight distances are in excess of the requirements based on a posted speed limit of 25mph. See photos below.

Driveway #1 Looking Right Out of Entrance

Driveway #1 Looking Left Out of Entrance



Driveway #2 Looking Right Out of Entrance



Driveway #2 Looking Left Out of Entrance



Driveway #3 Looking Right Out of Entrance

Driveway #3 Looking Left Out of Entrance



Driveway #4 Looking Right Out of Entrance



Driveway #4 Looking Left Out of Entrance



Driveway #5 Looking Right Out of EntranceDriveway #5 Looking Left Out of Entrance

Existing Road Safety Conditions

The Maine Department of Transportation's (MaineDOT) Accident Records Section provided the latest three-year (2019 through 2021) crash data in the vicinity of the proposed project for a distance of approximately 2.60 miles. The defined study area is shown in Appendix A. Their report is presented as follows:

2019 -2021 Traffic Accident Summary

<u>Location</u>	<u>Total Crashes</u>	<u>Critical Rate Factor</u>
1. Washington Avenue Ext @ Auburn Street	1	0.25
2. Auburn Street @ Garsoe Drive	1	0.25
3. Auburn Street @ Summit Street	2	0.58
4. Eugene Street @ Gray Road	3	0.72
5. Washington Avenue @ Riverside Street	3	1.02
6. Lambert Street @ Summit Street	1	0.63
7. Lambert Street @ Washington Avenue and Washington Avenue East	5	2.60
8. Auburn Street btw. Falmouth City Line and Garsoe Drive	1	0.13
9. Gray Road btw. Eugene Street and Falmouth City Line	1	0.63
10. Washington Avenue btw. Lester Drive and Road INV 3210279	1	0.20
11. Washington Avenue Extension btw. Lambert Street and Auburn Street	1	0.29

The MaineDOT considers any roadway intersection or segment a high crash location if both of the following criteria are met:

- **8 or more accidents in a three-year period**
- **A Critical Rate Factor greater than 1.00**

As the data in the chart shows, there are no identified high crash locations within the study area.

Location 7, Lambert Street at Washington Avenue Extension was previously reported as a high crash location during the 3- year period from 2016-2018, with **8** crashes and a CRF of **3.35**. The collision diagram prepared for this historic 3-year period shows 6 out of the 8 crashes were “*angle*” movement crashes, with 4 of the “*angle*” crashes caused by vehicles entering the intersection from the Washington Avenue Extension approach, striking vehicles traveling northbound on Lambert Street. The remaining two (2) “*angle*” movement crashes were caused by vehicles entering the intersection from the Washington Avenue approach. The remaining two (2) crashes shown on the 2016-2018 HCL collision diagram involve a pedestrian hit and run on the Washington Avenue approach, and a sideswipe crash involving a vehicle crossing the centerline while entering Washington Avenue Extension from the northern Lambert Street approach. The historic HCL collision diagram is attached in the appendix for reference. Out of the eight (8) crashes, four (4) were property damage only, three (3) were minor injury or “*Type C*”, and the crash involving the pedestrian caused a Type B injury.

During the most recent 3-year period (2019-2021) five (5) crashes occurred at the intersection. MaineDOT’s Public Crash Query Tool indicates that four (4) of the crashes were intersection movement crashes (“*angle crashes*”), with a property damage only injury classification. One crash was a rear-end/sideswipe type crash, with property damage only. Refer to the image on the following page.

**MaineDOT Public Crash Query Tool – Lambert Street @ Washington Avenue/Washington Avenue
Extension
2019 – 2021 Crash Report**

Location: **LAMBERT ST**

Int of LAMBERT ST WASHINGTON AV WASHINGTON AV EX, PORTLAND

<i>Report #/Police Dept.</i>	<i>Injury Level</i>	<i>Crash Date/Time</i>	<i>Type of Crash</i>	<i>MDOT ID</i>
19-253/ FALMOUTH POLICE DEPARTMENT		1/3/2019 11:07 AM	Intersection Movement	2019-202
19-000796/ PORTLAND POLICE DEPARTMENT		3/6/2019 10:46 AM	Rear End / Sideswipe	2019- 44671
19-001562/ PORTLAND POLICE DEPARTMENT		5/23/2019 8:48 PM	Intersection Movement	2019- 52839
20-000007/ PORTLAND POLICE DEPARTMENT		1/2/2020 8:09 AM	Intersection Movement	2020-85
21-002526/ PORTLAND POLICE DEPARTMENT		11/8/2021 4:18 PM	Intersection Movement	2021- 30652

Existing traffic control is provided at the intersection via four-way stop control, with stop signs on all approaches and an overhead flashing beacon with red indications on all approaches.

Existing Conditions

Manual turning-movement traffic counts were conducted at the sites study intersections to establish “peak” travel conditions. The weekday count at Auburn Street at Washington Avenue Extension/Garsoe Drive were collected on October 7th of 2021, and the weekday AM and PM traffic count data for Lambert Street at Washington Avenue/Washington Avenue Extension were collected on October 5th of 2021.

From a summary of the data, peak hour times were established for all “peak” commuter travel periods. All vehicular traffic entering each of the sites study intersections was recorded in 15 minute intervals. At Washington Avenue Extension and Auburn/Garsoe, vehicular traffic was recorded between the hours of 6:00 AM and 6:00 PM. The vehicular traffic data recorded at the intersection of Lambert Street at Washington Avenue/Washington Avenue Extension was recorded between 7:00 and 9:00 AM, and again between 3:00 PM and 6:00 PM. From a summary of the data, peak hour times were established for all “peak” commuter travel periods. The morning peak hour at the Auburn Street intersection occurs between 7:30 and 8:30 AM, and the morning peak hour for the intersection at Lambert Street falls between 7:15 and 8:15 AM. The evening peak hours occurs between 4:30 and 5:30 at Auburn Streets intersection, and 4:00 to 5:00 at the Lambert Street intersection. Copies of the peak hour summary reports are attached in the appendix for reference.

Traffic data collected during the weeks of our counts requires an adjustment to the 6th highest week to reflect “peak” travel conditions for analysis. MaineDOT provides weekly mean factors for adjusting traffic data to this time-period. MaineDOT utilizes highway classifications of I, II or III for all State and Local roadways. The classifications for the roadways are provided in MaineDOT’s Count Book. MaineDOT’s Count Book classifies Lambert Street and Auburn Street as a Group II Roadway which is defined as: *Urban roadways or roads that typically see commuter traffic and experience minimal fluctuation from week to week throughout the typical year.* The weekday traffic movement counts taken on these Group I roadways require a seasonal adjustment factor of 1.024. The seasonal adjustment factors are only applied to the major streets through volumes at each of the study intersections.

Because Washington Avenue Extension presently serves as solely an undeveloped connector roadway, the traffic volumes entering/exiting the Washington Avenue Extension approaches were balanced to the higher recorded entering/exiting traffic volume.

Site Trip Distribution

It is our opinion that the observed travel patterns on Washington Avenue Extension are not representative of proposed Lambert Woods site trip distributions, given that Washington Avenue Extension is presently undeveloped and solely used as connector road. From an analysis of the north and south directional splits of the recorded traffic movement data on Auburn Street and Lambert Street, it is in our opinion that during the morning peak hour 60% of the site-generated trips, at the study intersections, will travel south, while the remaining 40% travel north. During the PM peak hour, we have assumed that 60% of site-generated trips, at the study intersections, travel north while 40% travel south.

An evaluation of the west and east direction splits on Washington Avenue Extension was performed using the AADT’s on Auburn Street, Washington Street and Lambert Street. MaineDOT’s Public Map Viewer shows that Auburn Street between Washington Avenue Extension and Longview Drive has an AADT of 8165. The AADT on Washington Avenue between Summit Street and Stonecrest Drive is 4054, and the AADT on Lambert Street between Washington Avenue and Summit Street is 1382.

Applying the AADT directional splits, 60% of the site-generated trips were assigned eastbound on Washington Avenue Extension and the remaining 40% were assigned westbound, where 30% will continue westbound onto Washington Avenue, and 10% of the site-generated trips will travel north or south on Lambert Street. The trips entering the site are assigned to the same distribution pattern.

The site generated traffic following these distributional splits are presented in Figure 3 and Figure 4 in the Appendix.

Future Traffic

This traffic study has been prepared based on a projected build-out year of 2024. MaineDOT's historical traffic data (2016 through 2019) provides insufficient data points on Auburn Street and Lambert Street. To accurately estimate future travel conditions at the sites study intersections, therefore the recorded 2021 traffic volumes were increased by an assumed annual growth rate of 1% per year to project 2024 peak hour travel conditions.

The 2024 Pre-Development traffic for the sites study intersections are presented in Figure 1 and Figure 2 in the Appendix. The 2024 Post-Development traffic are shown in Figures 5 and Figure 6, which include the proposed site generated trips.

Capacity Analysis

Capacity Analyses of both Pre- and Post-development traffic conditions were performed for Washington Avenue Extension it's intersections at Auburn Street and Lambert Street.

During the post-development analysis, two different scenarios were reviewed; the first scenario was for the 2024 post-development with a single lane on the Washington Avenue Extension approach at the intersection with Auburn Street and Garsoe Drive. The second analysis evaluated the 2024 post-development condition with a left-turn and right-turn lane on the Washington Avenue Extension approach at the intersection with Auburn Street and Garsoe Drive.

Intersection Performance Analysis Levels of Service rankings are similar to the academic grading system, where an "A" is very good with little delay and "F" represents very poor conditions.

Level of Service Criteria for Unsignalized Intersections

<u>Level of Service</u>	<u>Total Control Delay (sec/veh)</u>
A	Up to 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

SimTraffic Analysis

Table 2.1 on the following page presents the results of the capacity analysis completed for the intersection of Washington Street Extension at Auburn Street/Garsoe Drive. The analysis results are based on the average of five (5) 60-minute runs, using Synchro inputs and SimTraffic output reports.

Table 2.1
SimTraffic Level of Service Summary
2024 Pre- and Post-Development Conditions

	2024 Pre-Development				2024 Post-Development Single Lane on Wash. Ext. @ Auburn				2024 Post-Development LT & RT Lane on Wash. Ext. @ Auburn St			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
<u>Intersection/Approach</u>	<u>Delay (sec.)</u>	<u>LOS</u>	<u>Delay (sec.)</u>	<u>LOS</u>	<u>Delay (sec.)</u>	<u>LOS</u>	<u>Delay (sec.)</u>	<u>LOS</u>	<u>Delay (sec.)</u>	<u>LOS</u>	<u>Delay (sec.)</u>	<u>LOS</u>
1. Lambert Street & Washington Avenue/Washington Avenue Ext.												
- Washington Avenue – LTR	7.2	A	7.3	A	7.2	A	7.5	A	7.2	A	7.5	A
- Washington Avenue Ext. – LTR	5.9	A	5.5	A	5.7	A	5.1	A	5.8	A	5.1	A
- Lambert Street NB – LTR	6.9	A	7.7	A	6.5	A	7.7	A	6.5	A	7.7	A
- Lambert Street SB – LTR	8.6	A	6.4	A	8.6	A	6.6	A	8.6	A	6.6	A
- Overall Intersection	7.4	A	6.8	A	7.3	A	6.8	A	7.3	A	6.8	A
2. Auburn Street & Washington Avenue Ext./Garsoe Drive												
- Washington Avenue Ext. – LTR	21.5	C	150.8	F	20.8	C	164.2	F	19.4	C	171.6	F
- Garsoe Drive – LTR	10.1	B	16.6	C	11.0	B	14.5	B	11.5	B	15.2	C
- Auburn Street NB – LTR	1.3	A	1.9	A	1.5	A	2.4	A	1.5	A	2.4	A
- Auburn Street SB – LTR	2.2	A	2.8	A	2.3	A	2.9	A	2.3	A	3.0	A
- Overall Intersection	5.0	A	25.9	D	5.6	A	28.2	D	5.4	A	29.4	D
3. Lambert Woods South/North Ent. & Washington Avenue Ext.												
- Washington Ave. Ext. EB – LTR					1.7	A	2.0	A	1.7	A	4.4	A
- Washington Ave. Ext. WB – LTR					0.4	A	0.6	A	0.4	A	0.6	A
- Lambert Woods Entrance – LTR					3.8	A	4.5	A	3.8	A	21.9	C
- Lambert Woods Entrance – LTR					4.6	A	4.9	A	4.7	A	5.1	A
- Overall Intersection					1.3	A	1.5	A	1.3	A	3.2	A

As shown in the prior LOS summary table, the post-development LOS at the western study intersection of Washington Avenue, Lambert Street and Washington Avenue Extension, the intersection experiences minimal change throughout the peak hours with the overall grade staying at a Level of Service A.

At the study intersection of Washington Avenue Extension, Auburn Street and Garsoe Drive, during both post-development conditions the level of service during the AM peak hour remains similar throughout all approaches, staying at an average LOS A. During the PM peak hour, the LOS of the approaches on Auburn Street and Garsoe Drive remain similar to the pre-development conditions. During the pre-development conditions, with a left and right-turn lane, the LOS on the Washington Avenue Extension approach at Auburn Street is shown to be **151** seconds. The post-development delay for the same conditions is shown to be **172** seconds. For the proposed single lane approach on Washington Avenue Extension, when compared to the post-development condition with a left- and right-turn lane on the approach, there is no significant change to the LOS grade; under the single lane approach condition, the delay is reduced to **164** seconds.

Traffic Assessment – Lambert Woods Residential Development; 165-unit residential complex

Overall, the analysis shows that keeping the right-turn and left-turn lane configuration on the Washington Avenue extension Approach at Auburn Street offers no significant advantage to the Level of Service and delay.

The following table, Table 2.2, presents the SimTraffic queue results.

Table 2.2
Queue Length Summary
2024 Pre- and Post-Development Conditions

Intersection/Approach	2024 Pre-Development		2024 Post-Development Single Lane on Wash. Ext. @ Auburn		2024 Post-Development LT & RT Lane on Wash. Ext. @ Auburn St	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)
1. Lambert Street & Washington Avenue/Washington Avenue Ext.						
- Washington Avenue – EB LTR	84	80	85	84	85	84
- Washington Avenue Ext. – WB LTR	85	79	88	83	88	83
- Lambert Street – NB LTR	61	72	58	72	58	72
- Lambert Street – SB LTR	98	61	98	63	98	64
3. Auburn Street & Washington Avenue Ext./Garsoe Drive						
- Washington Avenue Ext. – EB LTR			168	573		
- Washington Avenue Ext. – EB LT	133	729			150	603
- Washington Avenue Ext. – EB R	45	162			78	218
- Garsoe Drive – WB LTR	54	51	56	48	56	48
- Auburn Street – NB LTR	37	72	49	94	46	87
- Auburn Street – SB LTR	10	44	15	55	14	54
3. Lambert Woods South/North Ent. & Washington Avenue Ext.						
- Washington Ave. Ext. – EB LTR			9	19	9	59
- Washington Ave. Ext. – WB LTR			12	22	12	22
- Lambert Woods Entrance – NB LTR			42	36	42	46
- Lambert Woods Entrance – SB LTR			41	36	41	36

The queue summary shows that the traffic conditions at the intersection of Lambert Street at Washington Avenue and Washington Avenue Extension are not significantly impacted by the additional site generated trips.

At the intersection of Auburn Street at Washington Avenue Extension and Garsoe Drive, the SimTraffic simulation shows pre-development queues, for the left-turning vehicles, are **133**-feet in the AM and **729**-feet in the PM. Assuming 25-feet for vehicle length and spacing, this would result in a 5 passenger car queue in the AM and a 29 passenger car queue in the PM. To conform that the simulation results represent real traffic conditions, we conducted field observations of the vehicle queues and delay times in the AM and PM peak hours, at the intersection, which will be further discussed in the next section.

Field Observations

A field review of the existing queue lengths on the Washington Avenue Extension approach at Auburn Street was performed during the PM Peak Hour on September 6, 2022 and the AM peak hour on September 7, 2022. Each of the studies were performed for 30 minutes during each of the identified peak

hours. The PM peak hour was studied from 4:30 – 5:00 and the AM peak hour was studied from 7:40 – 8:10. Additionally, delay times were measured from when a vehicle entered the front of the queue to when they entered the intersection.

The field observations indicate the following:

Washington Avenue Ext. Approach @ Auburn Street Field Measurements				
Time Period	AM Peak Hour		PM Peak Hour	
	Queue (Ft.)	Delay (Sec.)	Queue (Ft.)	Delay (Sec.)
Maximum	6	65	10	51
Average	2	15	3	23

The existing traffic observations on the Washington Avenue indicates that during the AM peak hour a maximum of 6 vehicles are queued, and a maximum of 10 vehicles are in the queue during the PM peak hour. This would result in a 150-foot queue in the AM peak hour (assuming 25-foot per vehicle), and a 250-foot queue during the PM peak hour. Given that the SimTraffic queue results were significantly larger than the observed field conditions during the PM peak hour, we have calibrated our traffic models to better represent the observed field conditions. The next section in this capacity analysis will use the calibrated traffic models to re-evaluate the pre- and post-development conditions at the intersection of Auburn Street at Washington Avenue Extension and Garsoe Drive.

Traffic Model Calibrations

To better represent the observed field conditions, we reviewed both the Synchro inputs and Synchro/SimTraffic outputs. Our review indicated that when the calibrated, the Synchro Model reporting option is shown to be better representative of the observed field conditions. The PM peak hour Synchro model was calibrated, and the same calibration was applied to all other models. Note that the pre-development traffic represents 2024 conditions, therefore the projected queues are expected to be slightly higher than the observed current queues.

The calibrated Synchro Level of Service is summarized for the intersection of Washington Avenue Extension at Auburn Street and Garsoe Drive in the following table, Table 2.3 (the calibrated Synchro reports are included within the Appendix for reference).

Table 2.3
Calibrated Synchro Level of Service Summary
2024 Pre- and Post-Development Conditions

	2024 Pre-Development				2024 Post-Development Single Lane on Wash. Ext. @ Auburn				2024 Post-Development LT & RT Lane on Wash. Ext. @ Auburn St			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Intersection/Approach	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
2. Auburn Street & Washington Avenue Ext./Garsoe Drive												
- Washington Avenue Ext. – EB	30.2	D	159.8	F	37.4	E	231.0	F	31.9	D	218.1	F
- Garsoe Drive – WB	13.9	B	17.1	C	14.4	B	17.8	C	14.3	B	17.7	C
- Auburn Street – NB	0.5	A	0.4	A	0.7	A	0.7	A	0.7	A	0.7	A
- Auburn Street – SB	0.1	A	0.4	A	0.1	A	0.4	A	0.1	A	0.4	A
- Overall Intersection	5.2	A	23.7	C	7.0	A	36.1	E	6.0	A	34.1	D

The calibrated Synchro analysis shows that when compared to the post-development left- and right-turn approach, the single lane approach only operates with 13 more seconds of delay in the PM peak hour, and 5 more second during the AM peak hour.

The following table, Table 2.4 presents the queue results for the calibrated Synchro analysis.

Queue Length Summary
2024 Pre- and Post-Development Conditions

	2024 Pre-Development		2024 Post-Development Single Lane on Wash. Ext. @ Auburn		2024 Post-Development LT & RT Lane on Wash. Ext. @ Auburn St	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Intersection/Approach	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)	Queue (Ft.)
- Washington Avenue Ext. – EB	73	262	103	331	88	323
- Garsoe Drive – WB	7	6	7	6	7	6
- Auburn Street – NB	1	1	2	2	2	2
- Auburn Street – SB	0	1	0	1	0	1

During the 2024 pre-development conditions, the 95th percentile traffic queues are shown to be 3 vehicles (passenger cars) long in the AM and 11 vehicles long in the PM, which is more in line with the observed traffic queues. The post-development queues on Washington Avenue Extension are estimated to be 4 vehicles long in the AM peak hour and 13 vehicles long in the PM peak hour. The post-development analysis for the left- and right-turn lane configuration show that queues only slightly decrease in the AM peak hour, estimating 4 vehicles in the AM peak hour and 13 vehicles in the PM peak hour.

Traffic Signal Warrant

A traffic signal warrant was performed at the intersection of Auburn Street, Washington Avenue Extension and Garsoe Drive using 12-hour traffic data taken between the hours of 6:00AM and 6:00PM on October 7, 2021. The traffic data was adjusted to represent average conditions, the 26th highest week as reported in MaineDOT's 2018 Weekly Group Mean Factors.

Traffic Assessment – Lambert Woods Residential Development; 165-unit residential complex

Our analysis utilized MUTCD's "rural" condition, or condition "C" which is to be used when *the major street speed exceeds 40 mph or in an isolated community with a population of less than 10,000*. Based on field observations, vehicles on Auburn Street generally exceed 40 mph. We will be following this traffic study up with a speed analysis for the area of Auburn Street fronting Washington Avenue Extension.

Our analysis using condition "C" shows that a traffic signal warrant is met at the intersection of Auburn Street, Washington Avenue Extension and Garsoe Drive, with Condition A – Minimum Vehicular Volume being met for 9 hours and Condition B – Interruption of Continuous Traffic being met for 11 hours. See MUTCD Table 4C.1 below.

Additionally, we ran our warrant analysis tool using the same conditions for the average condition adjusted 2021 counts, and the analysis shows that the 8-hour Interruption of Traffic Warrant is presently met. The traffic signal warrant analysis for both analyses are attached in the Appendix for reference.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%^a	80%^b	70%^c	56%^d	100%^a	80%^b	70%^c	56%^d
1.....	1.....	500	400	350	280	150	120	105	84
2 or more....	1.....	600	480	420	336	150	120	105	84
2 or more....	2 or more....	600	480	420	336	200	160	140	112
1.....	2 or more....	500	400	350	280	200	160	140	112

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%^a	80%^b	70%^c	56%^d	100%^a	80%^b	70%^c	56%^d
1.....	1.....	750	600	525	420	75	60	53	42
2 or more....	1.....	900	720	630	504	75	60	53	42
2 or more....	2 or more....	900	720	630	504	100	80	70	56
1.....	2 or more....	750	600	525	420	100	80	70	56

A potential traffic signal at the study intersection was discussed during the meeting held on August 29, 2022, which included City staff and peer reviewers; Justin Pellerin, Sean King, Jeremiah Bartlett and Thomas Errico. During this meeting, potential traffic calming and pedestrian safety measures were discussed and considered. Safety of pedestrians, especially school kids getting on and off buses, was of high importance. The general consensus of the meeting was that other forms of treatment were preferred and would be reviewed and implemented before a traffic signal would be strongly considered. Alternative traffic calming and safety measures at the intersection are preferred at this time. This is discussed in further detail in the next section.

Off Site Safety / Pedestrian Improvements

As an effort to transform Washington Avenue Extension into a residential and pedestrian centered roadway, the left-turn and right-turn lane configuration on the roadways approach at Auburn Street is

proposed to be changed to a single lane approach. Our Synchro analysis, presented in the Capacity Analysis section, shows that there is no advantages in keeping the existing lane configurations.

Items discussed as part of the meeting held on August 29, 2022, included;

1. Potential traffic signal
2. Potential HAWK signal
3. Standard crosswalk with signing
4. Crosswalk with curb extension or raised speed table with Rectangular Rapid Flashing Beacon (RRFB)

Because of our observations of traffic operations at the intersection of Washington Avenue Extension and Auburn Street, which indicated only moderate delays and queuing, a traffic signal was not seen as the best treatment option at this time. During the meeting, it was noted by City staff that personal observations show only moderate queue lengths and delay times on the Washington Avenue Extension approach at Auburn Street. Because of this, B&L was requested to study the existing traffic operations (queue lengths and vehicle delay) based on filed observations, as was presented in the capacity analysis section above.

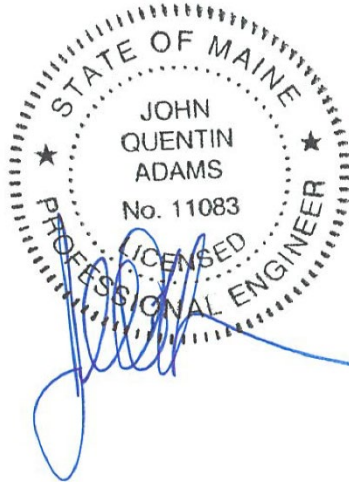
Items 2, 3 and 4, above, were discussed in detail at the meeting and the consensus was the implementation of Item 4, Crosswalk with curb extension or raised speed table with Rectangular Rapid Flashing Beacon (RRFB). It was felt that a crosswalk with curb extensions and RRFB would provide for a safe crossing of Auburn Street by pedestrians. In addition, vehicles periodically stopped for the flashing RRFB would allow vehicles to exit Washington Avenue Extension. A plan of this treatment option has been prepared by Acorn Engineering and Reviewed by Barton and Loguidice. We are in support of this design option.

Summary/Conclusions

1. The expected daily trip generation for the proposed development is estimated to be 794 weekday daily trips. The project generates a total of 60 trips during the weekday AM peak hour, 83 trips during the weekday PM, and 83 trips during the Saturday peak hour. Overall, the project will be a low volume trip generator and will be below the minimum MaineDOT threshold of 100 new peak hour trips ends that would require a Traffic Movement Permit.
2. A review of Maine DOT Crash data available for the latest three-year period (2019 – 2021) for the defined study area (see Appendix A) indicates that there are no high crash locations within the defined region.
3. Vehicle sight distance field measurements looking both left and right from each of the proposed five (5) site driveway entrances onto Washington Avenue Extension indicate existing sight distances are in excess of the requirements (200 ft.) based on a posted speed limit of 25mph.
4. A capacity analysis was performed at Washington Avenue Extension's intersections with Lambert Street and Auburn Street using SimTraffic and Synchro Reporting. The SimTraffic Report used the collected traffic data, and the Synchro Report was calibrated to represent observed peak hour conditions observed at the intersection of Washington Avenue Extension and Auburn Street during the AM and PM peak hours. The SimTraffic analysis shows that the intersection with Lambert Street is not significantly impacted by the proposed development, with the projected Level of Service remaining at an A on all approaches. Intersection queue observations and counts

at Washington Avenue Extension's approach on Auburn Street were utilized to calibrate the Synchro Report. Overall, the calibrated model shows that the intersection at Auburn Street will operate with an overall LOS A during the AM peak hour under the existing two lane approach configuration as well as under the proposed single lane approach configuration. During the PM peak hour, the intersection is projected to operate with an LOS D under the existing two-lane approach configuration, and an LOS E under the single lane approach configuration. The delay times under both conditions for Washington Avenue Extensions approach on Auburn Street are similar with the single lane alternative showing a delay time of 231 seconds and a queue length of 331-feet, and the existing left- and right-turn two lane approach showing delay times of 218 second and a queue length of 323-feet.

5. A Traffic Signal Warrant was performed at the intersection of Washington Avenue Extension, Auburn Street and Garsoe Drive. The Warrant analysis shows that under the existing average conditions, volume warrants were met, with the warrant meeting the 8-hour Interruption of Traffic condition. Under projected 2024 post-development average conditions, the 8-hour Minimum Vehicular Volume condition is also met in addition to the the Interruption of Traffic condition.
6. The majority of traffic entering the intersection at Auburn Street from the Washington Avenue Approach performs a left-turn and heads north on Auburn Street. The approach is proposed to change from a dedicated right-turn and dedicated left-turn lane configuration into a single shared left and right-turn lane approach as part of the effort to transform Washington Avenue Extension into more of a local or residential and pedestrian friendly roadway, with elements to encourage lower speeds and traffic calming. Our Synchro analysis indicates that leaving the existing two-lane Washington Avenue Extension configuration does not offer significant improvements in the Level of Service or the Queue Lengths. In addition, vehicles using this area of Portland and corresponding roadway networks have other routing options to access Portland to the east, west and south and as well as Falmouth to the north.
7. A crosswalk with curb extensions and RRFB is recommended and is being proposed to provide for safe crossing of Auburn Street by pedestrians. This crosswalk will be located on Auburn Street to the south of Washington Avenue Extension. Acorn Engineering has prepared the plan in coordination with Barton & Loguidice (B&L) and we are in support of these pedestrian safety and traffic calming improvements.



John Q. Adams, PE, PTOE, Date: 09/27/2022

APPENDIX

Appendix A - MaineDOT Crash Data

Appendix B - Traffic Movement Data

Appendix C - Traffic Figures

Appendix D - SimTraffic Report Data

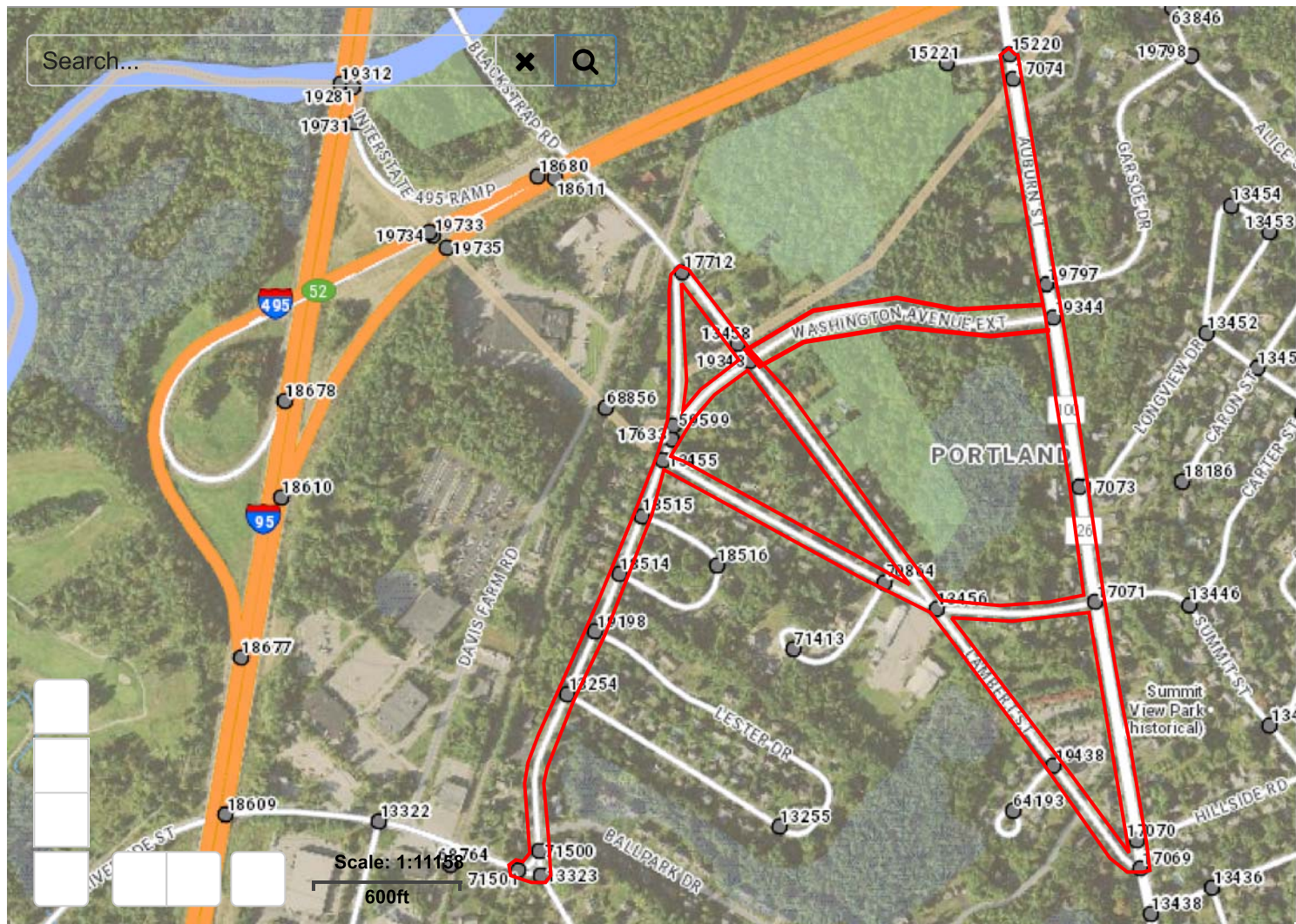
Appendix E - Synchro Report Data

Appendix F - Traffic Signal Warrant

Appendix G - Off Site Improvements

DRAFT

APPENDIX A – MAINEDOT CRASH DATA



Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland/Falmouth
Auburn St.-Washington Ave.-Lambert St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X	Start Node: 17069 End Node: 15220	Start Offset: 0 End Offset: 0	☐ Exclude First Node ☐ Exclude Last Node
Route: 0560770	Start Node: 13323 End Node: 59599	Start Offset: 0 End Offset: 0	☐ Exclude First Node ☐ Exclude Last Node
Route: 0561178	Start Node: 17633 End Node: 19343	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node
Route: 0560621	Start Node: 71501 End Node: 13323	Start Offset: 0 End Offset: 0	☐ Exclude First Node ☒ Exclude Last Node
Route: 3210279	Start Node: 71500 End Node: 71501	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node
Route: 0560425	Start Node: 17069 End Node: 13458	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☐ Exclude Last Node
Route: 0540030	Start Node: 13458 End Node: 17712	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☐ Exclude Last Node
Route: 0540035	Start Node: 59599 End Node: 17712	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node

Crash Summary I

Nodes															
Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF	
19344	0026X - 4.83	Int of AUBURN ST WASHINGTON AV EXT	2	1	0	1	0	0	0	100.0	3.836	0.09	0.36	0.00	
												Statewide Crash Rate:	0.13		
17073	0026X - 4.70	Int of AUBURN ST LONGVIEW RD	2	0	0	0	0	0	0	0.0	2.993	0.00	0.38	0.00	
												Statewide Crash Rate:	0.13		
19797	0026X - 4.86	Int of AUBURN ST GARSOE DR	2	1	0	0	1	0	0	100.0	3.764	0.09	0.36	0.00	
												Statewide Crash Rate:	0.13		
17069	0026X - 4.41	Int of AUBURN ST LAMBERT ST	2	0	0	0	0	0	0	0.0	3.643	0.00	0.37	0.00	
												Statewide Crash Rate:	0.13		
17070	0026X - 4.43	Int of AUBURN ST HILLSIDE RD	2	0	0	0	0	0	0	0.0	2.708	0.00	0.39	0.00	
												Statewide Crash Rate:	0.13		
17071	0026X - 4.61	Int of AUBURN ST SUMMIT ST	2	2	0	0	1	1	0	100.0	3.006	0.22	0.38	0.00	
												Statewide Crash Rate:	0.13		
15220	0026X - 5.04	Int of EUGENE ST GRAY RD	2	3	0	0	0	0	3	0.0	3.778	0.26	0.36	0.00	
												Statewide Crash Rate:	0.13		
17074	0026X - 5.02	TL Falmouth Portland	2	0	0	0	0	0	0	0.0	1.885	0.00	0.43	0.00	
												Statewide Crash Rate:	0.13		
13323	0560770 - 1.22	Int of RIVERSIDE ST WASHINGTON AV	2	3	0	0	1	0	2	33.3	2.396	0.42	0.41	1.03	
												Statewide Crash Rate:	0.13		
13455	0560770 - 1.56	Int of SUMMIT ST WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.416	0.00	0.46	0.00	
												Statewide Crash Rate:	0.13		
19198	0560770 - 1.42	Int of LESTER DR WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.611	0.00	0.45	0.00	
												Statewide Crash Rate:	0.13		
17633	0560770 - 1.58	Non Int WASHINGTON AV	2	0	0	0	0	0	0	0.0	0.978	0.00	0.50	0.00	
												Statewide Crash Rate:	0.13		
18514	0560770 - 1.47	Int of STONECREST DR, WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.547	0.00	0.45	0.00	
												Statewide Crash Rate:	0.13		
13254	0560770 - 1.37	Int of LESTER DR WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.671	0.00	0.45	0.00	
												Statewide Crash Rate:	0.13		
18515	0560770 - 1.52	Int of STONECREST DR WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.517	0.00	0.46	0.00	
												Statewide Crash Rate:	0.13		
59599	0560770 - 1.59	TL Falmouth Portland	2	0	0	0	0	0	0	0.0	0.338	0.00	0.56	0.00	
												Statewide Crash Rate:	0.13		
71500	0560770 - 1.24	Int of RD INV 3210279 WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.347	0.00	0.47	0.00	
												Statewide Crash Rate:	0.13		
71501	0560621 - 3.31	Int of RD INV 3210279 RIVERSIDE ST	2	0	0	0	0	0	0	0.0	2.925	0.00	0.39	0.00	
												Statewide Crash Rate:	0.13		
13456	0560425 - 0.25	Int of LAMBERT ST SUMMIT ST	2	1	0	0	0	0	1	0.0	1.089	0.31	0.49	0.00	
												Statewide Crash Rate:	0.13		
19438	0560425 - 0.10	Int of GEORGIA ST LAMBERT ST	2	0	0	0	0	0	0	0.0	1.070	0.00	0.49	0.00	
												Statewide Crash Rate:	0.13		
19343	0560425 - 0.49	Int of LAMBERT ST WASHINGTON AV WASHINGTON AV E	2	5	0	0	0	0	5	0.0	1.361	1.22	0.47	2.62	
												Statewide Crash Rate:	0.13		
13458	0560425 - 0.51	TL - Falmouth, Portland	2	0	0	0	0	0	0	0.0	0.387	0.00	0.56	0.00	
												Statewide Crash Rate:	0.13		

Crash Summary I

Nodes														
Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
17712	0540030 - 0.07	Int of BLACKSTRAP RD WASHINGTON AV EXT	2	0	0	0	0	0	0	0.0	0.972	0.00	0.50	0.00
												Statewide Crash Rate: 0.13		
Study Years:	3.00	NODE TOTALS:		16	0	1	3	1	11	31.3	46.238	0.12	0.21	0.56

Crash Summary I

Sections																	
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
17069	17070	3123986	0 - 0.02	0026X - 4.41	0.02	2	0	0	0	0	0	0	0.0	0.00053	0.00	756.09	0.00
Int of AUBURN ST LAMBERT ST				ST RTE 26											Statewide Crash Rate: 187.10		
17070	17071	3130499	0 - 0.18	0026X - 4.43	0.18	2	0	0	0	0	0	0	0.0	0.00483	0.00	445.32	0.00
Int of AUBURN ST HILLSIDE RD				ST RTE 26											Statewide Crash Rate: 187.10		
17071	17073	3938275	0 - 0.09	0026X - 4.61	0.09	2	0	0	0	0	0	0	0.0	0.00263	0.00	520.33	0.00
Int of AUBURN ST SUMMIT ST				ST RTE 26											Statewide Crash Rate: 187.10		
17073	19344	192822	0 - 0.13	0026X - 4.70	0.13	2	0	0	0	0	0	0	0.0	0.00387	0.00	470.91	0.00
Int of AUBURN ST LONGVIEW RD				ST RTE 26											Statewide Crash Rate: 187.10		
19344	19797	3118714	0 - 0.03	0026X - 4.83	0.03	2	0	0	0	0	0	0	0.0	0.00110	0.00	648.88	0.00
Int of AUBURN ST WASHINGTON AV EXT				ST RTE 26											Statewide Crash Rate: 187.10		
17074	19797	3120741	0 - 0.16	0026X - 4.86	0.16	2	1	0	0	0	0	1	0.0	0.00603	55.26	421.41	0.00
TL Falmouth Portland				ST RTE 26											Statewide Crash Rate: 187.10		
15220	17074	3122242	0 - 0.02	0026X - 5.02	0.02	2	1	0	0	0	1	0	100.0	0.00075	442.12	706.93	0.00
Int of EUGENE ST GRAY RD				ST RTE 26											Statewide Crash Rate: 187.10		
71500	13323	4046585	0 - 0.02	0560770 - 1.22	0.02	2	0	0	0	0	0	0	0.0	0.00020	0.00	651.21	0.00
Int of RD INV 3210279 WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
13254	71500	4046584	0 - 0.13	0560770 - 1.24	0.13	2	1	0	0	0	1	0	100.0	0.00218	152.72	482.69	0.00
Int of LESTER DR WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
13254	19198	3131554	0 - 0.05	0560770 - 1.37	0.05	2	0	0	0	0	0	0	0.0	0.00079	0.00	613.78	0.00
Int of LESTER DR WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
18514	19198	3120752	0 - 0.05	0560770 - 1.42	0.05	2	0	0	0	0	0	0	0.0	0.00077	0.00	616.54	0.00
Int of STONECREST DR, WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
18514	18515	3119272	0 - 0.05	0560770 - 1.47	0.05	2	0	0	0	0	0	0	0.0	0.00076	0.00	618.12	0.00
Int of STONECREST DR, WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
13455	18515	3130038	0 - 0.04	0560770 - 1.52	0.04	2	0	0	0	0	0	0	0.0	0.00059	0.00	646.20	0.00
Int of SUMMIT ST WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
13455	17633	3121333	0 - 0.02	0560770 - 1.56	0.02	2	0	0	0	0	0	0	0.0	0.00017	0.00	616.64	0.00
Int of SUMMIT ST WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 158.40		
17633	59599	2036915	0 - 0.01	0560770 - 1.58	0.01	2	0	0	0	0	0	0	0.0	0.00003	0.00	211.80	0.00
Non Int WASHINGTON AV				RD INV 05 60770											Statewide Crash Rate: 351.24		
17633	19343	3118416	0 - 0.09	0561178 - 0	0.09	2	0	0	0	0	0	0	0.0	0.00038	0.00	680.16	0.00
Non Int WASHINGTON AV				RD INV 05 61178											Statewide Crash Rate: 158.40		
71501	13323	4046587	0 - 0.02	0560621 - 3.31	0.02	2	0	0	0	0	0	0	0.0	0.00039	0.00	679.35	0.00
Int of RD INV 3210279 RIVERSIDE ST				RD INV 05 60621											Statewide Crash Rate: 158.40		
71500	71501	4046588	0 - 0.02	3210279 - 0	0.02	2	0	0	0	0	0	0	0.0	0.00013	0.00	527.14	0.00
Int of RD INV 3210279 WASHINGTON AV				RD INV 3210279											Statewide Crash Rate: 158.40		
17069	19438	3129952	0 - 0.10	0560425 - 0	0.10	2	0	0	0	0	0	0	0.0	0.00107	0.00	575.11	0.00
Int of AUBURN ST LAMBERT ST				RD INV 05 60425											Statewide Crash Rate: 158.40		
13456	19438	3122197	0 - 0.15	0560425 - 0.10	0.15	2	1	0	0	0	0	1	0.0	0.00157	211.99	524.45	0.00
Int of LAMBERT ST SUMMIT ST				RD INV 05 60425											Statewide Crash Rate: 158.40		

Crash Summary I

Sections																	
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
13456	19343	3117887	0 - 0.24	0560425 - 0.25	0.24	2	0	0	0	0	0	0	0.0	0.00121	0.00	558.70	0.00
Int of LAMBERT ST		SUMMIT ST		RD INV 05 60425											Statewide Crash Rate: 158.40		
13458	19343	3106261	0 - 0.02	0560425 - 0.49	0.02	2	0	0	0	0	0	0	0.0	0.00015	0.00	586.26	0.00
TL - Falmouth, Portland				RD INV 05 60425											Statewide Crash Rate: 158.40		
13458	17712	3106260	0 - 0.07	0540030 - 0	0.07	2	0	0	0	0	0	0	0.0	0.00054	0.00	654.92	0.00
TL - Falmouth, Portland				RD INV 05 40030											Statewide Crash Rate: 158.40		
59599	17712	2036914	0 - 0.12	0540035 - 0	0.12	2	0	0	0	0	0	0	0.0	0.00041	0.00	1324.64	0.00
TL Falmouth		Portland		RD INV 05 40035											Statewide Crash Rate: 351.24		
Study Years: 3.00				Section Totals:		1.83	4	0	0	0	2	2	50.0	0.03110	42.87	286.92	0.15
				Grand Totals:		1.83	20	0	1	3	3	13	35.0	0.03110	214.34	407.76	0.53

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	Injury Crashes				Crash Report	Crash Date	Crash Mile Point	Injury Degree
							A	B	C	PD				
17069	17070	3123986	0 - 0.02	0026X - 4.41	0	0	0	0	0	0				
17070	17071	3130499	0 - 0.18	0026X - 4.43	0	0	0	0	0	0				
17071	17073	3938275	0 - 0.09	0026X - 4.61	0	0	0	0	0	0				
17073	19344	192822	0 - 0.13	0026X - 4.70	0	0	0	0	0	0				
19344	19797	3118714	0 - 0.03	0026X - 4.83	0	0	0	0	0	0	2020-7311	03/06/2020	4.88	PD
17074	19797	3120741	0 - 0.16	0026X - 4.86	1	0	0	0	0	1				
15220	17074	3122242	0 - 0.02	0026X - 5.02	1	0	0	0	1	0	2019-73345	11/25/2019	5.03	C
71500	13323	4046585	0 - 0.02	0560770 - 1.22	0	0	0	0	0	0	2021-27975	10/16/2021	1.30	C
13254	71500	4046584	0 - 0.13	0560770 - 1.24	1	0	0	0	1	0				
13254	19198	3131554	0 - 0.05	0560770 - 1.37	0	0	0	0	0	0				
18514	19198	3120752	0 - 0.05	0560770 - 1.42	0	0	0	0	0	0				
18514	18515	3119272	0 - 0.05	0560770 - 1.47	0	0	0	0	0	0				
13455	18515	3130038	0 - 0.04	0560770 - 1.52	0	0	0	0	0	0				
13455	17633	3121333	0 - 0.02	0560770 - 1.56	0	0	0	0	0	0				
17633	59599	2036915	0 - 0.01	0560770 - 1.58	0	0	0	0	0	0				
17633	19343	3118416	0 - 0.09	0561178 - 0	0	0	0	0	0	0				
71501	13323	4046587	0 - 0.02	0560621 - 3.31	0	0	0	0	0	0				
71500	71501	4046588	0 - 0.02	3210279 - 0	0	0	0	0	0	0				
17069	19438	3129952	0 - 0.10	0560425 - 0	0	0	0	0	0	0				
13456	19438	3122197	0 - 0.15	0560425 - 0.10	1	0	0	0	0	1	2019-52225	05/20/2019	0.23	PD
13456	19343	3117887	0 - 0.24	0560425 - 0.25	0	0	0	0	0	0				
13458	19343	3106261	0 - 0.02	0560425 - 0.49	0	0	0	0	0	0				
13458	17712	3106260	0 - 0.07	0540030 - 0	0	0	0	0	0	0				
59599	17712	2036914	0 - 0.12	0540035 - 0	0	0	0	0	0	0				
Totals:					4	0	0	0	2	2				

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM											Hour of Day											PM											Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11											
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
MONDAY	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	5								
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
WEDNESDAY	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4								
THURSDAY	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	1	0	1	0	0	0	0	0	6								
FRIDAY	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3								
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2								
Totals	0	0	0	0	0	2	2	0	1	0	2	2	0	0	1	1	4	0	1	0	1	2	1	0	0	0	20								

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	18	23-Bicyclist	0
2-(Sport) Utility Vehicle	12	24-Witness	4
3-Passenger Van	1	25-Other	1
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	3	27-Farm Vehicle	0
6-Motor Home	0	Total	41
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	1		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	1		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	5	9	1	1	0	0	16
Ran Off Roadway	2	0	0	0	0	0	2
Failed to Yield Right-of-Way	5	3	0	0	0	0	8
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	1	0	0	0	0	0	1
Improper Turn	0	1	0	0	0	0	1
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	5	0	0	0	0	0	5
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	1	0	0	0	0	0	1
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	1	1	0	0	0	0	2
Total	20	14	1	1	0	0	36

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	19	14	1	1	0	0	35
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	1
Total	20	14	1	1	0	0	36

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	6	0	0	0	0	6
20-24	3	0	0	0	0	3
25-29	3	0	0	0	0	3
30-39	6	0	0	0	0	6
40-49	5	0	0	0	0	5
50-59	6	0	0	0	0	6
60-69	6	0	0	0	0	6
70-79	1	0	0	0	0	1
80-Over	0	0	0	0	0	0
Unknown	1	0	0	0	0	1
Total	37	0	0	0	0	37

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	36
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	2		
13-Motor Vehicle in Transport	32		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	1		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	1		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	1	
2-Traffic Signals (Flashing)	1	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	6	
5-Stop Signs - Other	3	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	1	
13-None	8	
14-Other	0	
Total	20	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	1	1
B	3	3
C	3	4
PD	13	0
Total	20	8

Road Character	
Road Grade	Total
1-Level	13
2-On Grade	6
3-Top of Hill	1
4-Bottom of Hill	0
5-Other	0
Total	20

Light	
Light Condition	Total
1-Daylight	10
2-Dawn	1
3-Dusk	1
4-Dark - Lighted	4
5-Dark - Not Lighted	4
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	20

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	2	2	1	5
FEBRUARY	0	0	0	0
MARCH	1	2	0	3
APRIL	0	0	1	1
MAY	2	0	0	2
JUNE	0	0	1	1
JULY	0	0	0	0
AUGUST	0	0	0	0
SEPTEMBER	0	0	0	0
OCTOBER	0	1	1	2
NOVEMBER	3	1	1	5
DECEMBER	1	0	0	1
Total	9	6	5	20

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	1	0	2	3	0	0	0	0	0	0	0	0	0	0	6
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	3	5	0	1	0	0	0	0	0	0	0	0	9
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	1	7	8	0	1	0	0	0	0	0	0	0	0	20

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	3	0	0	0	0	0	0	0	0	0	0	3
Dark - Not Lighted	4	0	0	0	0	0	0	0	0	0	0	4
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	1	0	0	0	0	0	0	0	0	0	1
Daylight	8	1	0	0	0	0	0	0	0	0	0	9
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	16	2	0	0	0	0	0	0	0	0	2	20

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I
 ☐ Section Detail
 ☒ Crash Summary II
 ☐ 1320 Public
 ☐ 1320 Private
 ☐ 1320 Summary

REPORT DESCRIPTION

Portland/Falmouth

Auburn St. - Washington Ave. - Washington Ave. Ext. - Lambert St.

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X	Start Node: 17069 End Node: 15220	Start Offset: 0 End Offset: 0	☐ Exclude First Node ☐ Exclude Last Node
Route: 0560770	Start Node: 13323 End Node: 59599	Start Offset: 0 End Offset: 0	☐ Exclude First Node ☐ Exclude Last Node
Route: 0561178	Start Node: 17633 End Node: 19343	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node
Route: 0561178	Start Node: 19343 End Node: 19344	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node
Route: 0560621	Start Node: 71501 End Node: 13323	Start Offset: 0 End Offset: 0	☐ Exclude First Node ☒ Exclude Last Node
Route: 3210279	Start Node: 71500 End Node: 71501	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node
Route: 0560425	Start Node: 17069 End Node: 13458	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☐ Exclude Last Node
Route: 0540030	Start Node: 13458 End Node: 17712	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☐ Exclude Last Node
Route: 0540035	Start Node: 59599 End Node: 17712	Start Offset: 0 End Offset: 0	☒ Exclude First Node ☒ Exclude Last Node

Crash Summary I

Nodes															
Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF	
19344	0026X - 4.83	Int of AUBURN ST WASHINGTON AV EXT	2	1	0	1	0	0	0	100.0	3.836	0.09	0.36	0.00	
												Statewide Crash Rate:	0.13		
17073	0026X - 4.70	Int of AUBURN ST LONGVIEW RD	2	0	0	0	0	0	0	0.0	2.993	0.00	0.38	0.00	
												Statewide Crash Rate:	0.13		
19797	0026X - 4.86	Int of AUBURN ST GARSOE DR	2	1	0	0	1	0	0	100.0	3.764	0.09	0.36	0.00	
												Statewide Crash Rate:	0.13		
17069	0026X - 4.41	Int of AUBURN ST LAMBERT ST	2	0	0	0	0	0	0	0.0	3.643	0.00	0.37	0.00	
												Statewide Crash Rate:	0.13		
17070	0026X - 4.43	Int of AUBURN ST HILLSIDE RD	2	0	0	0	0	0	0	0.0	2.708	0.00	0.39	0.00	
												Statewide Crash Rate:	0.13		
17071	0026X - 4.61	Int of AUBURN ST SUMMIT ST	2	2	0	0	1	1	0	100.0	3.006	0.22	0.38	0.00	
												Statewide Crash Rate:	0.13		
15220	0026X - 5.04	Int of EUGENE ST GRAY RD	2	3	0	0	0	0	3	0.0	3.778	0.26	0.36	0.00	
												Statewide Crash Rate:	0.13		
17074	0026X - 5.02	TL Falmouth Portland	2	0	0	0	0	0	0	0.0	1.885	0.00	0.43	0.00	
												Statewide Crash Rate:	0.13		
13323	0560770 - 1.22	Int of RIVERSIDE ST WASHINGTON AV	2	3	0	0	1	0	2	33.3	2.396	0.42	0.41	1.03	
												Statewide Crash Rate:	0.13		
13455	0560770 - 1.56	Int of SUMMIT ST WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.416	0.00	0.46	0.00	
												Statewide Crash Rate:	0.13		
19198	0560770 - 1.42	Int of LESTER DR WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.611	0.00	0.45	0.00	
												Statewide Crash Rate:	0.13		
17633	0560770 - 1.58	Non Int WASHINGTON AV	2	0	0	0	0	0	0	0.0	0.978	0.00	0.50	0.00	
												Statewide Crash Rate:	0.13		
18514	0560770 - 1.47	Int of STONECREST DR, WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.547	0.00	0.45	0.00	
												Statewide Crash Rate:	0.13		
13254	0560770 - 1.37	Int of LESTER DR WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.671	0.00	0.45	0.00	
												Statewide Crash Rate:	0.13		
18515	0560770 - 1.52	Int of STONECREST DR WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.517	0.00	0.46	0.00	
												Statewide Crash Rate:	0.13		
59599	0560770 - 1.59	TL Falmouth Portland	2	0	0	0	0	0	0	0.0	0.338	0.00	0.56	0.00	
												Statewide Crash Rate:	0.13		
71500	0560770 - 1.24	Int of RD INV 3210279 WASHINGTON AV	2	0	0	0	0	0	0	0.0	1.347	0.00	0.47	0.00	
												Statewide Crash Rate:	0.13		
71501	0560621 - 3.31	Int of RD INV 3210279 RIVERSIDE ST	2	0	0	0	0	0	0	0.0	2.925	0.00	0.39	0.00	
												Statewide Crash Rate:	0.13		
13456	0560425 - 0.25	Int of LAMBERT ST SUMMIT ST	2	1	0	0	0	0	1	0.0	1.089	0.31	0.49	0.00	
												Statewide Crash Rate:	0.13		
19438	0560425 - 0.10	Int of GEORGIA ST LAMBERT ST	2	0	0	0	0	0	0	0.0	1.070	0.00	0.49	0.00	
												Statewide Crash Rate:	0.13		
19343	0560425 - 0.49	Int of LAMBERT ST WASHINGTON AV WASHINGTON AV E	2	5	0	0	0	0	5	0.0	1.361	1.22	0.47	2.62	
												Statewide Crash Rate:	0.13		
13458	0560425 - 0.51	TL - Falmouth, Portland	2	0	0	0	0	0	0	0.0	0.387	0.00	0.56	0.00	
												Statewide Crash Rate:	0.13		

Crash Summary I

Nodes														
Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Annual M Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
17712	0540030 - 0.07	Int of BLACKSTRAP RD WASHINGTON AV EXT	2	0	0	0	0	0	0	0.0	0.972	0.00	0.50	0.00
												Statewide Crash Rate: 0.13		
Study Years: 3.00		NODE TOTALS:		16	0	1	3	1	11	31.3	46.238	0.12	0.21	0.56

Crash Summary I

Sections																
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section U/R Length	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
17069	17070	3123986	0 - 0.02	0026X - 4.41	0.02	2	0	0	0	0	0	0.0	0.00053	0.00	756.09	0.00
Int of AUBURN ST LAMBERT ST				ST RTE 26										Statewide Crash Rate: 187.10		
17070	17071	3130499	0 - 0.18	0026X - 4.43	0.18	2	0	0	0	0	0	0.0	0.00483	0.00	445.32	0.00
Int of AUBURN ST HILLSIDE RD				ST RTE 26										Statewide Crash Rate: 187.10		
17071	17073	3938275	0 - 0.09	0026X - 4.61	0.09	2	0	0	0	0	0	0.0	0.00263	0.00	520.33	0.00
Int of AUBURN ST SUMMIT ST				ST RTE 26										Statewide Crash Rate: 187.10		
17073	19344	192822	0 - 0.13	0026X - 4.70	0.13	2	0	0	0	0	0	0.0	0.00387	0.00	470.91	0.00
Int of AUBURN ST LONGVIEW RD				ST RTE 26										Statewide Crash Rate: 187.10		
19344	19797	3118714	0 - 0.03	0026X - 4.83	0.03	2	0	0	0	0	0	0.0	0.00110	0.00	648.88	0.00
Int of AUBURN ST WASHINGTON AV EXT				ST RTE 26										Statewide Crash Rate: 187.10		
17074	19797	3120741	0 - 0.16	0026X - 4.86	0.16	2	1	0	0	0	1	0.0	0.00603	55.26	421.41	0.00
TL Falmouth Portland				ST RTE 26										Statewide Crash Rate: 187.10		
15220	17074	3122242	0 - 0.02	0026X - 5.02	0.02	2	1	0	0	0	1	100.0	0.00075	442.12	706.93	0.00
Int of EUGENE ST GRAY RD				ST RTE 26										Statewide Crash Rate: 187.10		
71500	13323	4046585	0 - 0.02	0560770 - 1.22	0.02	2	0	0	0	0	0	0.0	0.00020	0.00	651.21	0.00
Int of RD INV 3210279 WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
13254	71500	4046584	0 - 0.13	0560770 - 1.24	0.13	2	1	0	0	0	1	100.0	0.00218	152.72	482.69	0.00
Int of LESTER DR WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
13254	19198	3131554	0 - 0.05	0560770 - 1.37	0.05	2	0	0	0	0	0	0.0	0.00079	0.00	613.78	0.00
Int of LESTER DR WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
18514	19198	3120752	0 - 0.05	0560770 - 1.42	0.05	2	0	0	0	0	0	0.0	0.00077	0.00	616.54	0.00
Int of STONECREST DR, WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
18514	18515	3119272	0 - 0.05	0560770 - 1.47	0.05	2	0	0	0	0	0	0.0	0.00076	0.00	618.12	0.00
Int of STONECREST DR, WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
13455	18515	3130038	0 - 0.04	0560770 - 1.52	0.04	2	0	0	0	0	0	0.0	0.00059	0.00	646.20	0.00
Int of SUMMIT ST WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
13455	17633	3121333	0 - 0.02	0560770 - 1.56	0.02	2	0	0	0	0	0	0.0	0.00017	0.00	616.64	0.00
Int of SUMMIT ST WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 158.40		
17633	59599	2036915	0 - 0.01	0560770 - 1.58	0.01	2	0	0	0	0	0	0.0	0.00003	0.00	211.80	0.00
Non Int WASHINGTON AV				RD INV 05 60770										Statewide Crash Rate: 351.24		
17633	19343	3118416	0 - 0.09	0561178 - 0	0.09	2	0	0	0	0	0	0.0	0.00038	0.00	680.16	0.00
Non Int WASHINGTON AV				RD INV 05 61178										Statewide Crash Rate: 158.40		
19343	19344	3106908	0 - 0.24	0561178 - 0.09	0.24	2	1	0	0	0	1	0.0	0.00246	135.75	468.27	0.00
Int of LAMBERT ST WASHINGTON AV WASHINGTON AV EXT				RD INV 05 61178										Statewide Crash Rate: 158.40		
71501	13323	4046587	0 - 0.02	0560621 - 3.31	0.02	2	0	0	0	0	0	0.0	0.00039	0.00	679.35	0.00
Int of RD INV 3210279 RIVERSIDE ST				RD INV 05 60621										Statewide Crash Rate: 158.40		
71500	71501	4046588	0 - 0.02	3210279 - 0	0.02	2	0	0	0	0	0	0.0	0.00013	0.00	527.14	0.00
Int of RD INV 3210279 WASHINGTON AV				RD INV 3210279										Statewide Crash Rate: 158.40		
17069	19438	3129952	0 - 0.10	0560425 - 0	0.10	2	0	0	0	0	0	0.0	0.00107	0.00	575.11	0.00
Int of AUBURN ST LAMBERT ST				RD INV 05 60425										Statewide Crash Rate: 158.40		

Crash Summary I

Sections																	
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
13456	19438	3122197	0 - 0.15	0560425 - 0.10	0.15	2	1	0	0	0	0	1	0.0	0.00157	211.99	524.45	0.00
Int of LAMBERT ST SUMMIT ST				RD INV 05 60425	Statewide Crash Rate: 158.40												
13456	19343	3117887	0 - 0.24	0560425 - 0.25	0.24	2	0	0	0	0	0	0	0.0	0.00121	0.00	558.70	0.00
Int of LAMBERT ST SUMMIT ST				RD INV 05 60425	Statewide Crash Rate: 158.40												
13458	19343	3106261	0 - 0.02	0560425 - 0.49	0.02	2	0	0	0	0	0	0	0.0	0.00015	0.00	586.26	0.00
TL - Falmouth, Portland				RD INV 05 60425	Statewide Crash Rate: 158.40												
13458	17712	3106260	0 - 0.07	0540030 - 0	0.07	2	0	0	0	0	0	0	0.0	0.00054	0.00	654.92	0.00
TL - Falmouth, Portland				RD INV 05 40030	Statewide Crash Rate: 158.40												
59599	17712	2036914	0 - 0.12	0540035 - 0	0.12	2	0	0	0	0	0	0	0.0	0.00041	0.00	1324.64	0.00
TL Falmouth Portland				RD INV 05 40035	Statewide Crash Rate: 351.24												
Study Years: 3.00				Section Totals:	2.07		5	0	0	0	2	3	40.0	0.03356	49.66	281.11	0.18
Grand Totals:					2.07		21	0	1	3	3	14	33.3	0.03356	208.59	401.57	0.52

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	Injury Crashes				Crash Report	Crash Date	Crash Mile Point	Injury Degree			
							A	B	C	PD							
17069	17070	3123986	0 - 0.02	0026X - 4.41	0	0	0	0	0	0							
17070	17071	3130499	0 - 0.18	0026X - 4.43	0	0	0	0	0	0							
17071	17073	3938275	0 - 0.09	0026X - 4.61	0	0	0	0	0	0							
17073	19344	192822	0 - 0.13	0026X - 4.70	0	0	0	0	0	0							
19344	19797	3118714	0 - 0.03	0026X - 4.83	0	0	0	0	0	0							
17074	19797	3120741	0 - 0.16	0026X - 4.86	1	0	0	0	0	1	2020-7311	03/06/2020	4.88	PD			
15220	17074	3122242	0 - 0.02	0026X - 5.02	1	0	0	0	1	0	2019-73345	11/25/2019	5.03	C			
71500	13323	4046585	0 - 0.02	0560770 - 1.22	0	0	0	0	0	0	2021-27975	10/16/2021	1.30	C			
13254	71500	4046584	0 - 0.13	0560770 - 1.24	1	0	0	0	1	0							
13254	19198	3131554	0 - 0.05	0560770 - 1.37	0	0	0	0	0	0							
18514	19198	3120752	0 - 0.05	0560770 - 1.42	0	0	0	0	0	0							
18514	18515	3119272	0 - 0.05	0560770 - 1.47	0	0	0	0	0	0							
13455	18515	3130038	0 - 0.04	0560770 - 1.52	0	0	0	0	0	0							
13455	17633	3121333	0 - 0.02	0560770 - 1.56	0	0	0	0	0	0							
17633	59599	2036915	0 - 0.01	0560770 - 1.58	0	0	0	0	0	0							
17633	19343	3118416	0 - 0.09	0561178 - 0	0	0	0	0	0	0							
19343	19344	3106908	0 - 0.24	0561178 - 0.09	1	0	0	0	0	1							
71501	13323	4046587	0 - 0.02	0560621 - 3.31	0	0	0	0	0	0	2019-47110	03/22/2019	0.17	PD			
71500	71501	4046588	0 - 0.02	3210279 - 0	0	0	0	0	0	0							
17069	19438	3129952	0 - 0.10	0560425 - 0	0	0	0	0	0	0							
13456	19438	3122197	0 - 0.15	0560425 - 0.10	1	0	0	0	0	1							
13456	19343	3117887	0 - 0.24	0560425 - 0.25	0	0	0	0	0	0							
13458	19343	3106261	0 - 0.02	0560425 - 0.49	0	0	0	0	0	0	2019-52225	05/20/2019	0.23	PD			
13458	17712	3106260	0 - 0.07	0540030 - 0	0	0	0	0	0	0							
59599	17712	2036914	0 - 0.12	0540035 - 0	0	0	0	0	0	0							
Totals:					5	0	0	0	2	3							

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM											Hour of Day											PM												
Day Of Week	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot									
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
MONDAY	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	5									
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
WEDNESDAY	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4									
THURSDAY	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	1	0	1	0	0	0	0	6									
FRIDAY	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	4									
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2									
Totals	0	0	0	0	0	2	2	0	2	0	2	2	0	0	1	1	4	0	1	0	1	2	1	0	0	21									

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	18	23-Bicyclist	0
2-(Sport) Utility Vehicle	13	24-Witness	4
3-Passenger Van	1	25-Other	1
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	3	27-Farm Vehicle	0
6-Motor Home	0	Total	42
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	1		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	1		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	5	9	1	1	0	0	16
Ran Off Roadway	2	0	0	0	0	0	2
Failed to Yield Right-of-Way	5	3	0	0	0	0	8
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	2	0	0	0	0	0	2
Improper Turn	0	1	0	0	0	0	1
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	5	0	0	0	0	0	5
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	1	0	0	0	0	0	1
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	1	1	0	0	0	0	2
Total	21	14	1	1	0	0	37

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	20	14	1	1	0	0	36
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	1
Total	21	14	1	1	0	0	37

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	6	0	0	0	0	6
20-24	3	0	0	0	0	3
25-29	3	0	0	0	0	3
30-39	6	0	0	0	0	6
40-49	6	0	0	0	0	6
50-59	6	0	0	0	0	6
60-69	6	0	0	0	0	6
70-79	1	0	0	0	0	1
80-Over	0	0	0	0	0	0
Unknown	1	0	0	0	0	1
Total	38	0	0	0	0	38

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	37
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	2		
13-Motor Vehicle in Transport	32		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	1		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	1		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	1		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	1	
2-Traffic Signals (Flashing)	1	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	6	
5-Stop Signs - Other	3	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	1	
13-None	9	
14-Other	0	
Total	21	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	1	1
B	3	3
C	3	4
PD	14	0
Total	21	8

Road Character	
Road Grade	Total
1-Level	14
2-On Grade	6
3-Top of Hill	1
4-Bottom of Hill	0
5-Other	0
Total	21

Light	
Light Condition	Total
1-Daylight	11
2-Dawn	1
3-Dusk	1
4-Dark - Lighted	4
5-Dark - Not Lighted	4
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	21

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	2	2	1	5
FEBRUARY	0	0	0	0
MARCH	2	2	0	4
APRIL	0	0	1	1
MAY	2	0	0	2
JUNE	0	0	1	1
JULY	0	0	0	0
AUGUST	0	0	0	0
SEPTEMBER	0	0	0	0
OCTOBER	0	1	1	2
NOVEMBER	3	1	1	5
DECEMBER	1	0	0	1
Total	10	6	5	21

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	1	0	2	3	0	0	0	0	0	0	0	0	0	0	6
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	3	5	0	1	0	0	0	0	0	0	0	0	9
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	2	2	0	0	0	0	0	0	0	0	0	0	0	0	4
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	2	7	8	0	1	0	0	0	0	0	0	0	0	21

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	3	0	0	0	0	0	0	0	0	0	0	3
Dark - Not Lighted	4	0	0	0	0	0	0	0	0	0	0	4
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	1	0	0	0	0	0	0	0	0	0	1
Daylight	8	1	0	0	0	0	0	0	0	0	0	9
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	1	0	0	0	0	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	16	2	0	0	0	0	1	0	0	0	2	21

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 19343 HIGH NODE: 0000

REGION: 1

U/R: URBAN

DESCRIPTION: Jct of Washington Ave & Lambert St

RTE # / RD #: 0560425 DATE DRAWN: 9/9/2019 DRAWN BY: Michelle

STUDY FROM: 1/1/2016

STUDY TO: 12/31/2018

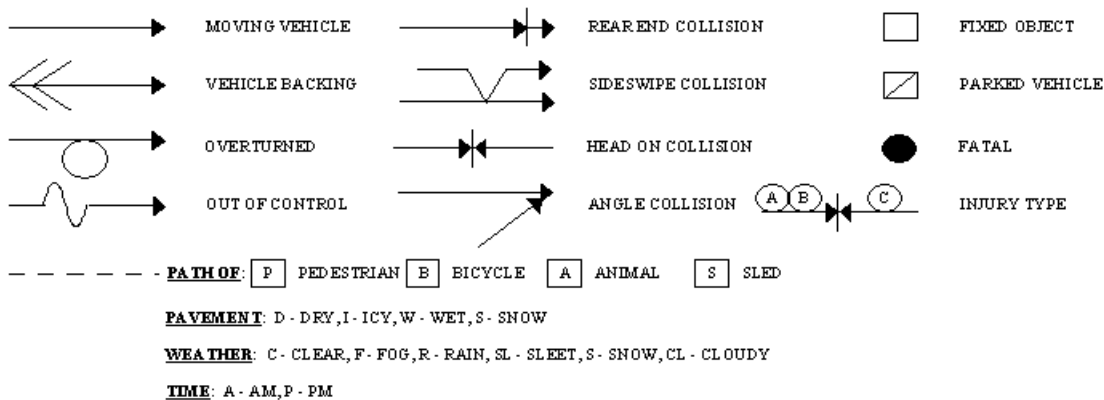
CRASH RATE: 1.68

CRF: 3.35

% INJURY: 50

TOTAL CRASHES: 8

LEGEND





pole

Washington Ave Ext

Portland

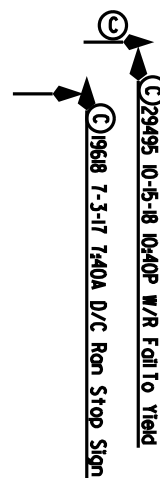
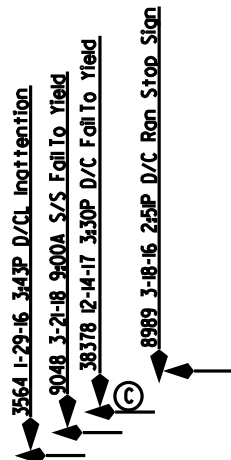
Node: I9343

Study Period: 2016-2018

of Crashes: 8 / CRF: 3.35

Prepared by Office of Safety (MP 9/9/19)

Lambert St



2471 1-22-18 11:31A
W/CL Hit & Run

Lambert St

 = Flashing Light

Washington Ave
Page 487



Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I - Single Node ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Jct of Washington Ave & Lambert St

REPORT PARAMETERS

Year 2016, Start Month 1 through Year 2018 End Month: 12

Route: **0560425**

Start Node: **19343**

Start Offset: **0**

☐ Exclude First Node

End Node: **19343**

End Offset: **0**

☐ Exclude Last Node

Crash Summary I

Nodes																
Node	Route - MP	Node Description			U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	Percent Annual M	Crash Rate	Critical Rate	CRF		
19343	0560425 - 0.49	Int of LAMBERT ST	WASHINGTON AV	WASHINGTON AV E	2	8	0	0	1	3	4	50.0	1.586	1.68	0.50	
						Statewide Crash Rate: 0.15										
Study Years:	3.00	NODE TOTALS:				8	0	0	1	3	4	50.0	1.586	1.68	0.50	3.35

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM											Hour of Day											PM											Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11											
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
MONDAY	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5								
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1								
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2								
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
Totals	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	2	0	1	0	0	1	0	0	0	0	0	8								

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	7	23-Bicyclist	0
2-(Sport) Utility Vehicle	3	24-Witness	3
3-Passenger Van	1	25-Other	1
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	3	27-Farm Vehicle	0
6-Motor Home	0	Total	19
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	1		

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	7	0	0	0	0	8
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	3	0	0	0	0	0	3
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	2	0	0	0	0	0	2
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	0	0	0	0	0	0	0
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	0	0	0	0	0	0	0
Failed to Keep in Proper Lane	1	0	0	0	0	0	1
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	7	7	0	0	0	0	14

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	7	7	0	0	0	1	15
Physically Impaired or Handicapped	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	7	7	0	0	0	1	15

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	0	0	0	0	0	0
20-24	1	0	0	0	0	1
25-29	2	0	0	0	0	2
30-39	3	0	0	0	0	3
40-49	2	0	0	0	0	2
50-59	3	0	0	0	0	3
60-69	1	0	0	0	0	1
70-79	1	0	0	0	0	1
80-Over	1	0	0	0	0	1
Unknown	1	0	0	1	0	2
Total	15	0	0	1	0	16

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	14
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	13		
14-Parked Motor Vehicle	1		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post Pole or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	0	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	8	
5-Stop Signs - Other	0	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	0	
14-Other	0	
Total	8	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	1	1
C	3	5
PD	4	0
Total	8	6

Road Character	
Road Grade	Total
1-Level	7
2-On Grade	1
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	8

Light	
Light Condition	Total
1-Daylight	5
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	2
5-Dark - Not Lighted	1
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	8

Crash Summary II - Characteristics**Crashes by Year and Month**

Month	2016	2017	2018	Total
JANUARY	1	0	1	2
FEBRUARY	0	0	0	0
MARCH	2	0	0	2
APRIL	0	0	0	0
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	0	1	0	1
AUGUST	0	0	0	0
SEPTEMBER	0	0	0	0
OCTOBER	0	0	1	1
NOVEMBER	0	0	0	0
DECEMBER	1	1	0	2
Total	4	2	2	8

Report is limited to the last 10 years of data.

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	8	0	0	0	0	0	0	0	0	0	0	8

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	0	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	1	0	0	0	0	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	1	0	0	0	0	0	0	0	0	0	1	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	1	0	0	0	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4	0	0	0	0	0	1	1	0	0	2	8

APPENDIX B – TRAFFIC MOVEMENT DATA

Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

Portland Auburn, Washington & Garsoe
October 7, 2021
Sunny
Count by Jen Gilbert & Amy Bedard

File Name : Portland Auburn & Washington 10-7-21
Site Code : 01007211
Start Date : 10/7/2021
Page No : 1

Groups Printed- Passenger Car - Truck - Semi - Bus - Bicycle

	Auburn St From North				Garsoe Dr From East				Auburn St From South				Washington Ave Ext From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
06:00 AM	13	45	0	58	0	0	0	0	0	18	0	18	1	0	9	10	86
06:15 AM	18	60	0	78	1	0	2	3	0	34	1	35	0	0	10	10	126
06:30 AM	26	64	0	90	4	0	0	4	0	46	2	48	2	0	8	10	152
06:45 AM	48	68	0	116	2	0	0	2	0	49	2	51	1	0	26	27	196
Total	105	237	0	342	7	0	2	9	0	147	5	152	4	0	53	57	560
07:00 AM	30	81	1	112	4	1	1	6	1	61	2	64	4	2	24	30	212
07:15 AM	48	114	1	163	4	1	1	6	1	82	2	85	5	0	26	31	285
07:30 AM	25	99	0	124	7	1	2	10	3	65	2	70	6	2	39	47	251
07:45 AM	56	111	1	168	6	2	7	15	0	79	3	82	6	0	31	37	302
Total	159	405	3	567	21	5	11	37	5	287	9	301	21	4	120	145	1050
08:00 AM	36	113	2	151	6	0	0	6	3	79	7	89	2	1	32	35	281
08:15 AM	35	108	0	143	4	0	4	8	2	79	2	83	2	1	34	37	271
08:30 AM	31	94	2	127	4	1	1	6	1	54	4	59	7	1	42	50	242
08:45 AM	25	96	0	121	1	0	4	5	0	82	1	83	2	0	25	27	236
Total	127	411	4	542	15	1	9	25	6	294	14	314	13	3	133	149	1030
09:00 AM	24	83	2	109	4	0	1	5	3	64	2	69	4	0	24	28	211
09:15 AM	22	80	2	104	1	1	3	5	0	57	3	60	4	2	16	22	191
09:30 AM	15	70	2	87	3	0	1	4	3	52	3	58	4	0	21	25	174
09:45 AM	12	76	1	89	3	2	0	5	2	60	4	66	4	0	19	23	183
Total	73	309	7	389	11	3	5	19	8	233	12	253	16	2	80	98	759
10:00 AM	17	66	2	85	3	0	1	4	2	57	0	59	2	1	16	19	167
10:15 AM	17	62	1	80	1	0	1	2	2	64	0	66	7	1	20	28	176
10:30 AM	19	80	2	101	4	1	1	6	2	64	2	68	2	2	31	35	210
10:45 AM	25	79	3	107	0	1	0	1	2	73	3	78	3	0	18	21	207
Total	78	287	8	373	8	2	3	13	8	258	5	271	14	4	85	103	760
11:00 AM	25	73	1	99	2	0	7	9	3	62	3	68	4	0	32	36	212
11:15 AM	15	62	2	79	3	2	3	8	3	63	1	67	4	1	19	24	178
11:30 AM	25	84	2	111	3	0	2	5	3	66	1	70	4	1	22	27	213
11:45 AM	26	79	2	107	3	1	2	6	3	73	0	76	0	0	24	24	213
Total	91	298	7	396	11	3	14	28	12	264	5	281	12	2	97	111	816
12:00 PM	28	84	2	114	0	0	2	2	4	75	3	82	4	0	34	38	236
12:15 PM	23	72	2	97	2	1	3	6	5	76	2	83	3	0	19	22	208
12:30 PM	23	82	5	110	1	0	0	1	1	85	8	94	3	0	22	25	230
12:45 PM	19	74	1	94	3	0	1	4	2	83	5	90	2	4	24	30	218
Total	93	312	10	415	6	1	6	13	12	319	18	349	12	4	99	115	892
01:00 PM	18	77	2	97	3	1	4	8	0	65	3	68	3	1	28	32	205
01:15 PM	21	65	3	89	2	0	2	4	1	68	2	71	3	1	21	25	189
01:30 PM	22	75	0	97	2	1	2	5	0	78	3	81	6	0	14	20	203
01:45 PM	31	63	4	98	1	0	1	2	3	81	2	86	1	2	23	26	212
Total	92	280	9	381	8	2	9	19	4	292	10	306	13	4	86	103	809
02:00 PM	22	51	2	75	1	1	0	2	0	91	1	92	4	1	31	36	205

Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Auburn & Washington 10-7-21

Site Code : 01007211

Start Date : 10/7/2021

Page No : 2

Groups Printed- Passenger Car - Truck - Semi - Bus - Bicycle

	Auburn St From North				Garsoe Dr From East				Auburn St From South				Washington Ave Ext From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:15 PM	25	77	3	105	2	1	0	3	1	68	3	72	3	0	19	22	202
02:30 PM	36	70	2	108	2	2	4	8	2	88	1	91	2	0	29	31	238
02:45 PM	35	78	3	116	3	0	5	8	1	96	3	100	2	0	32	34	258
Total	118	276	10	404	8	4	9	21	4	343	8	355	11	1	111	123	903
03:00 PM	29	86	0	115	4	1	1	6	0	109	1	110	6	1	31	38	269
03:15 PM	38	82	3	123	1	1	4	6	3	99	3	105	5	1	26	32	266
03:30 PM	27	99	4	130	1	0	2	3	2	113	2	117	2	1	35	38	288
03:45 PM	36	72	2	110	1	1	6	8	5	102	5	112	4	0	41	45	275
Total	130	339	9	478	7	3	13	23	10	423	11	444	17	3	133	153	1098
04:00 PM	39	94	8	141	3	2	2	7	2	131	4	137	3	2	50	55	340
04:15 PM	23	95	3	121	3	1	5	9	1	105	3	109	1	1	44	46	285
04:30 PM	38	102	5	145	4	0	2	6	1	109	3	113	3	3	40	46	310
04:45 PM	35	115	5	155	1	1	0	2	4	127	1	132	8	1	34	43	332
Total	135	406	21	562	11	4	9	24	8	472	11	491	15	7	168	190	1267
05:00 PM	47	108	2	157	6	1	1	8	4	114	3	121	4	0	36	40	326
05:15 PM	25	120	3	148	5	1	1	7	1	133	1	135	2	2	23	27	317
05:30 PM	28	112	7	147	4	0	4	8	2	105	2	109	6	1	27	34	298
05:45 PM	21	95	6	122	1	0	5	6	4	84	3	91	2	0	27	29	248
Total	121	435	18	574	16	2	11	29	11	436	9	456	14	3	113	130	1189

Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Auburn & Washington 10-7-21

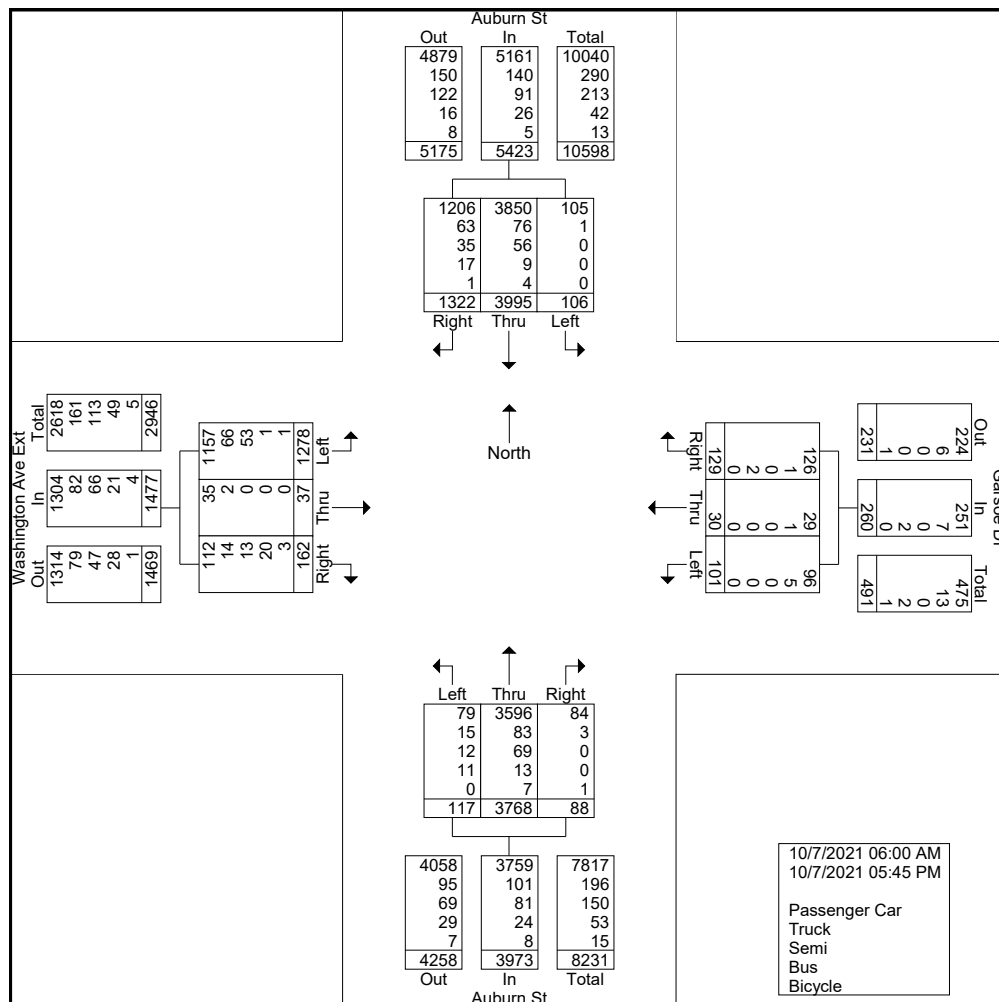
Site Code : 01007211

Start Date : 10/7/2021

Page No : 3

Groups Printed- Passenger Car - Truck - Semi - Bus - Bicycle

	Auburn St From North				Garsoe Dr From East				Auburn St From South				Washington Ave Ext From West				
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Grand Total	1322	3995	106	5423	129	30	101	260	88	3768	117	3973	162	37	1278	1477	11133
Apprch %	24.4	73.7	2		49.6	11.5	38.8		2.2	94.8	2.9		11	2.5	86.5		
Total %	11.9	35.9	1	48.7	1.2	0.3	0.9	2.3	0.8	33.8	1.1	35.7	1.5	0.3	11.5	13.3	
Passenger Car	1206	3850	105	5161	126	29	96	251	84	3596	79	3759	112	35	1157	1304	10475
% Passenger Car	91.2	96.4	99.1	95.2	97.7	96.7	95	96.5	95.5	95.4	67.5	94.6	69.1	94.6	90.5	88.3	94.1
Truck	63	76	1	140	1	1	5	7	3	83	15	101	14	2	66	82	330
% Truck	4.8	1.9	0.9	2.6	0.8	3.3	5	2.7	3.4	2.2	12.8	2.5	8.6	5.4	5.2	5.6	3
Semi	35	56	0	91	0	0	0	0	0	69	12	81	13	0	53	66	238
% Semi	2.6	1.4	0	1.7	0	0	0	0	0	1.8	10.3	2	8	0	4.1	4.5	2.1
Bus	17	9	0	26	2	0	0	2	0	13	11	24	20	0	1	21	73
% Bus	1.3	0.2	0	0.5	1.6	0	0	0.8	0	0.3	9.4	0.6	12.3	0	0.1	1.4	0.7
Bicycle	1	4	0	5	0	0	0	0	1	7	0	8	3	0	1	4	17
% Bicycle	0.1	0.1	0	0.1	0	0	0	0	1.1	0.2	0	0.2	1.9	0	0.1	0.3	0.2



Traffic Solutions

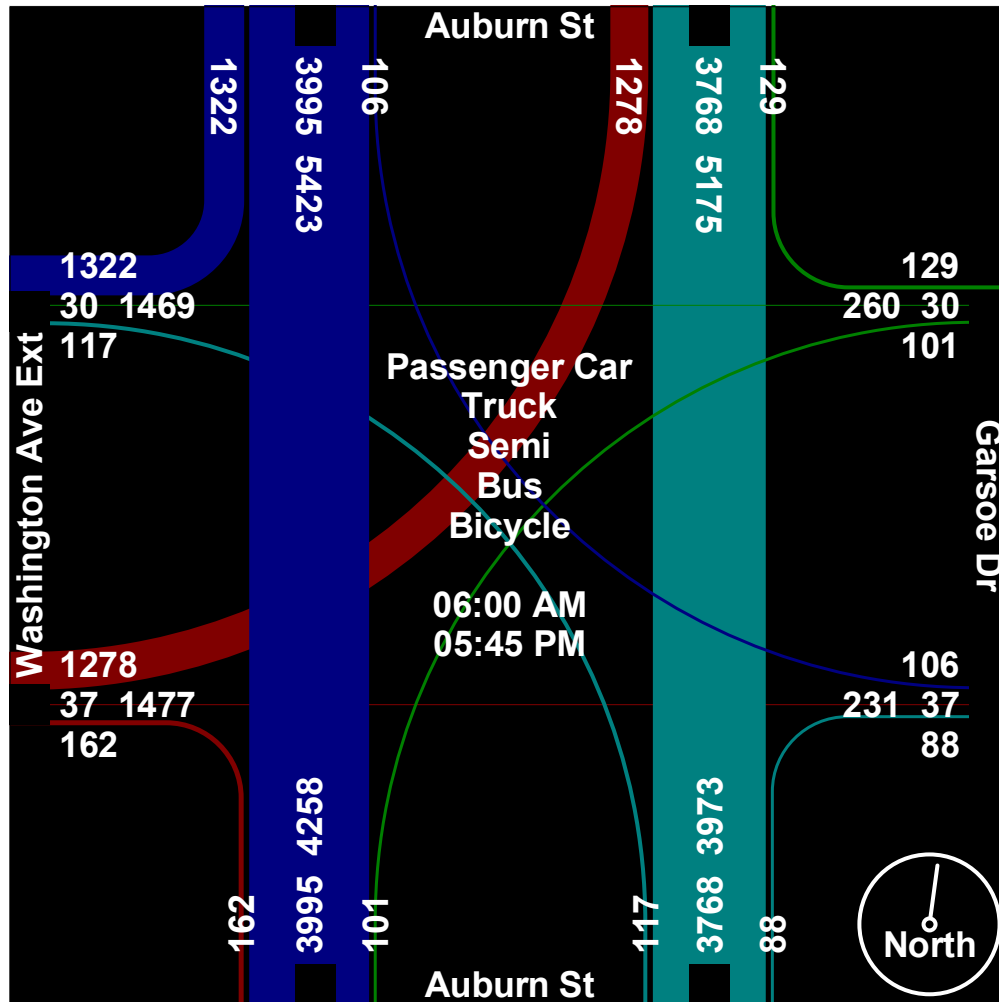
17 Mount View Dr
Gorham, ME 04038

File Name : Portland Auburn & Washington 10-7-21

Site Code : 01007211

Start Date : 10/7/2021

Page No : 4



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

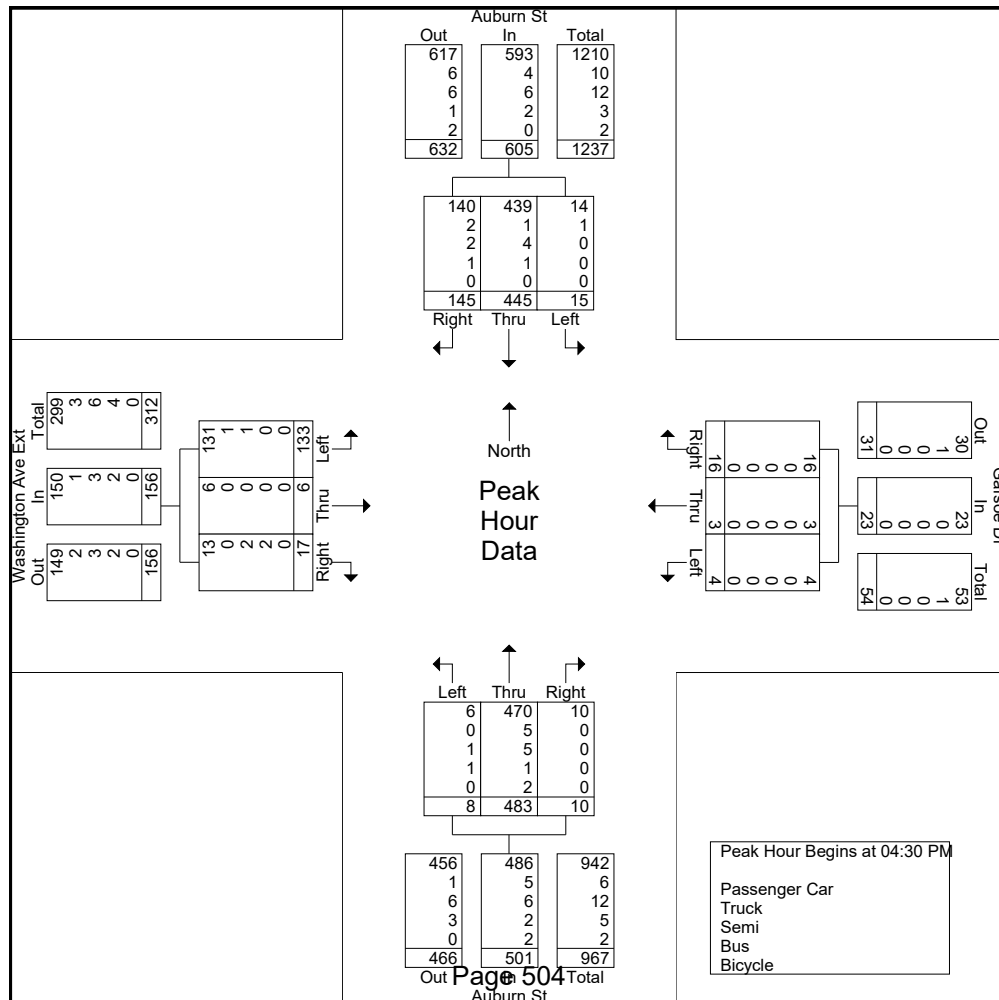
File Name : Portland Auburn & Washington 10-7-21

Site Code : 01007211

Start Date : 10/7/2021

Page No : 5

	Auburn St From North				Garsoe Dr From East				Auburn St From South				Washington Ave Ext From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	38	102	5	145	4	0	2	6	1	109	3	113	3	3	40	46	310
04:45 PM	35	115	5	155	1	1	0	2	4	127	1	132	8	1	34	43	332
05:00 PM	47	108	2	157	6	1	1	8	4	114	3	121	4	0	36	40	326
05:15 PM	25	120	3	148	5	1	1	7	1	133	1	135	2	2	23	27	317
Total Volume	145	445	15	605	16	3	4	23	10	483	8	501	17	6	133	156	1285
% App. Total	24	73.6	2.5		69.6	13	17.4		2	96.4	1.6		10.9	3.8	85.3		
PHF	.771	.927	.750	.963	.667	.750	.500	.719	.625	.908	.667	.928	.531	.500	.831	.848	.968
Passenger Car	140	439	14	593	16	3	4	23	10	470	6	486	13	6	131	150	1252
% Passenger Car	96.6	98.7	93.3	98.0	100	100	100	100	100	97.3	75.0	97.0	76.5	100	98.5	96.2	97.4
Truck	2	1	1	4	0	0	0	0	0	5	0	5	0	0	1	1	10
% Truck	1.4	0.2	6.7	0.7	0	0	0	0	0	1.0	0	1.0	0	0	0.8	0.6	0.8
Semi	2	4	0	6	0	0	0	0	0	5	1	6	2	0	1	3	15
% Semi	1.4	0.9	0	1.0	0	0	0	0	0	1.0	12.5	1.2	11.8	0	0.8	1.9	1.2
Bus	1	1	0	2	0	0	0	0	0	1	1	2	2	0	0	2	6
% Bus	0.7	0.2	0	0.3	0	0	0	0	0	0.2	12.5	0.4	11.8	0	0	1.3	0.5
Bicycle	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2
% Bicycle	0	0	0	0	0	0	0	0	0	0.4	0	0.4	0	0	0	0	0.2



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Auburn & Washington 10-7-21

Site Code : 01007211

Start Date : 10/7/2021

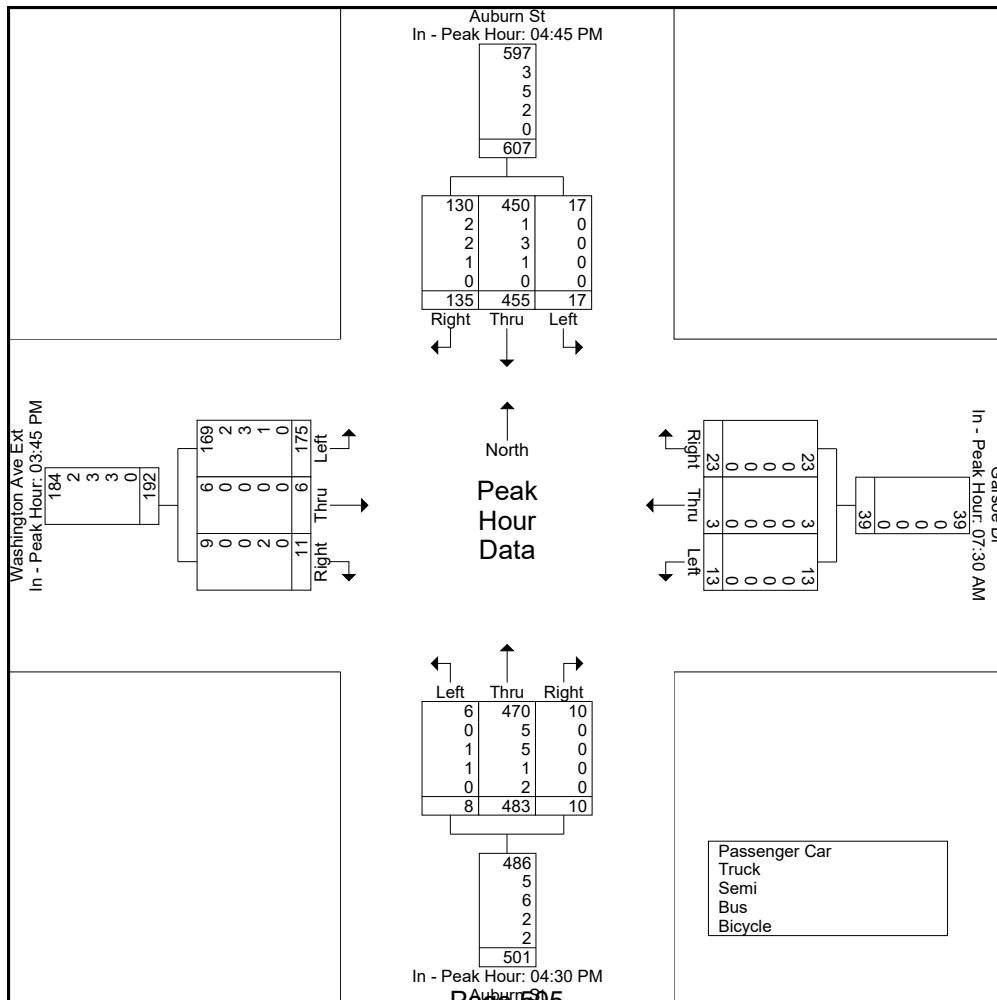
Page No : 6

	Auburn St From North				Garsoe Dr From East				Auburn St From South				Washington Ave Ext From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total

Peak Hour Analysis From 06:00 AM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:45 PM				07:30 AM				04:30 PM				03:45 PM				
+0 mins.	35	115	5	155	7	1	2	10	1	109	3	113	4	0	41	45	
+15 mins.	47	108	2	157	6	2	7	15	4	127	1	132	3	2	50	55	
+30 mins.	25	120	3	148	6	0	0	6	4	114	3	121	1	1	44	46	
+45 mins.	28	112	7	147	4	0	4	8	1	133	1	135	3	3	40	46	
Total Volume	135	455	17	607	23	3	13	39	10	483	8	501	11	6	175	192	
% App. Total	22.2	75	2.8		59	7.7	33.3		2	96.4	1.6		5.7	3.1	91.1		
PHF	.718	.948	.607	.967	.821	.375	.464	.650	.625	.908	.667	.928	.688	.500	.875	.873	
Passenger Car	130	450	17	597	23	3	13	39	10	470	6	486	9	6	169	184	
% Passenger Car	96.3	98.9	100	98.4	100	100	100	100	100	97.3	75	97	81.8	100	96.6	95.8	
Truck	2	1	0	3	0	0	0	0	0	5	0	5	0	0	2	2	
% Truck	1.5	0.2	0	0.5	0	0	0	0	0	1	0	1	0	0	1.1	1	
Semi	2	3	0	5	0	0	0	0	0	5	1	6	0	0	3	3	
% Semi	1.5	0.7	0	0.8	0	0	0	0	0	1	12.5	1.2	0	0	1.7	1.6	
Bus	1	1	0	2	0	0	0	0	0	1	1	2	2	0	1	3	
% Bus	0.7	0.2	0	0.3	0	0	0	0	0	0.2	12.5	0.4	18.2	0	0.6	1.6	
Bicycle	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	
% Bicycle	0	0	0	0	0	0	0	0	0	0.4	0	0.4	0	0	0	0	



Traffic Solutions

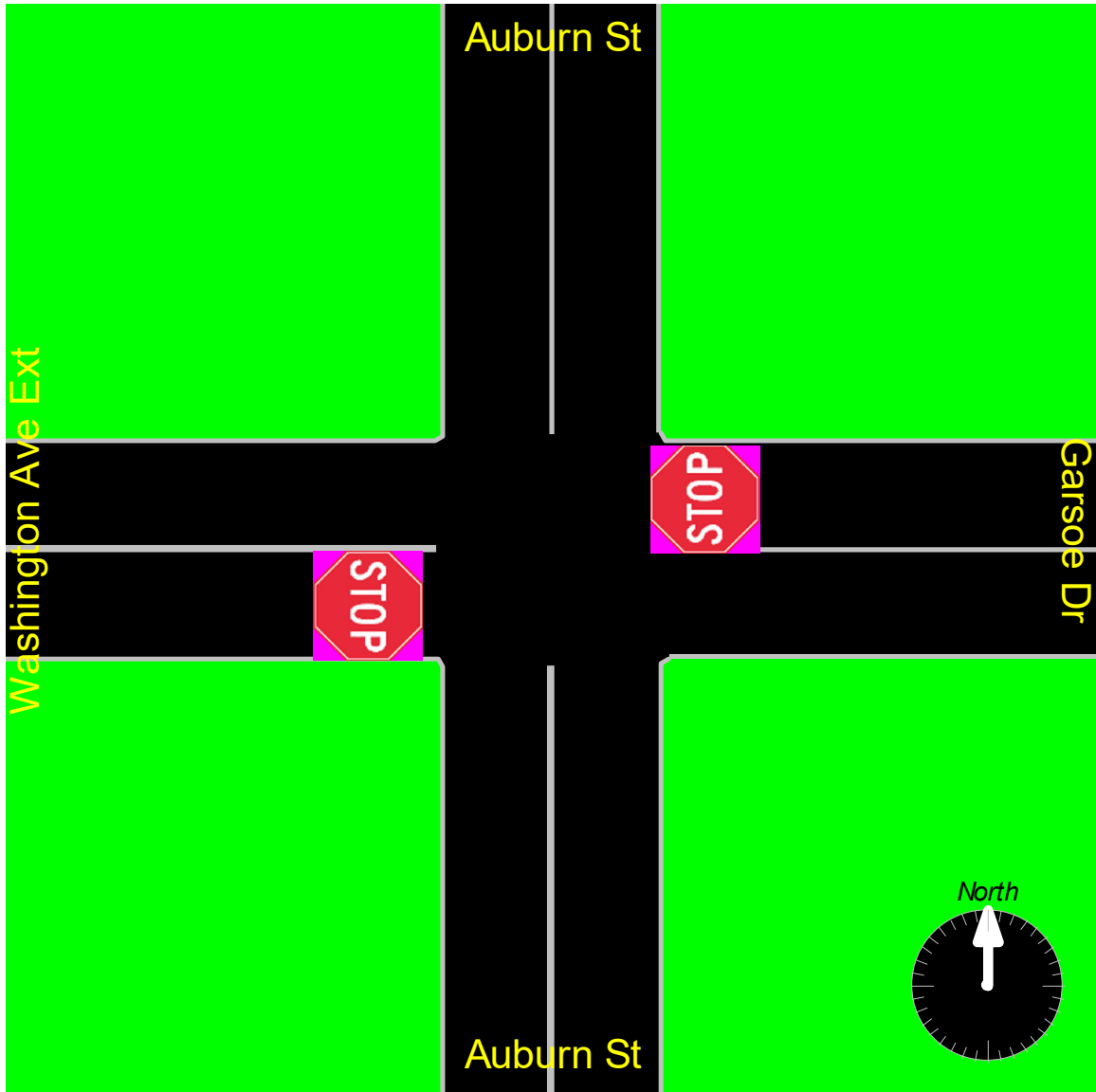
17 Mount View Dr
Gorham, ME 04038

File Name : Portland Auburn & Washington 10-7-21

Site Code : 01007211

Start Date : 10/7/2021

Page No : 7



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

Portland Lambert St & Washington Ave Ext Portland Lambert Street & Washington Ave Ext 10-5-21 AM
October 5, 2021 AM Site Code : 01005211
Sunny Start Date : 10/5/2021
Count by Jen Gilbert Page No : 1

Groups Printed- Passenger Car - Truck - Semi - Bus

Start Time	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
07:00 AM	1	44	1	46	7	36	0	43	0	10	4	14	1	27	1	29	132
07:15 AM	0	68	3	71	8	37	0	45	1	9	2	12	1	22	1	24	152
07:30 AM	2	79	8	89	3	29	0	32	1	13	1	15	5	39	3	47	183
07:45 AM	2	70	3	75	11	43	1	55	0	24	2	26	4	24	5	33	189
Total	5	261	15	281	29	145	1	175	2	56	9	67	11	112	10	133	656
08:00 AM	2	34	8	44	7	35	0	42	0	11	2	13	3	34	5	42	141
08:15 AM	2	37	2	41	9	24	1	34	0	19	0	19	2	24	6	32	126
08:30 AM	0	39	12	51	4	23	0	27	1	12	1	14	3	27	4	34	126
08:45 AM	0	35	3	38	6	26	0	32	0	14	3	17	1	19	3	23	110
Total	4	145	25	174	26	108	1	135	1	56	6	63	9	104	18	131	503

Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 AM

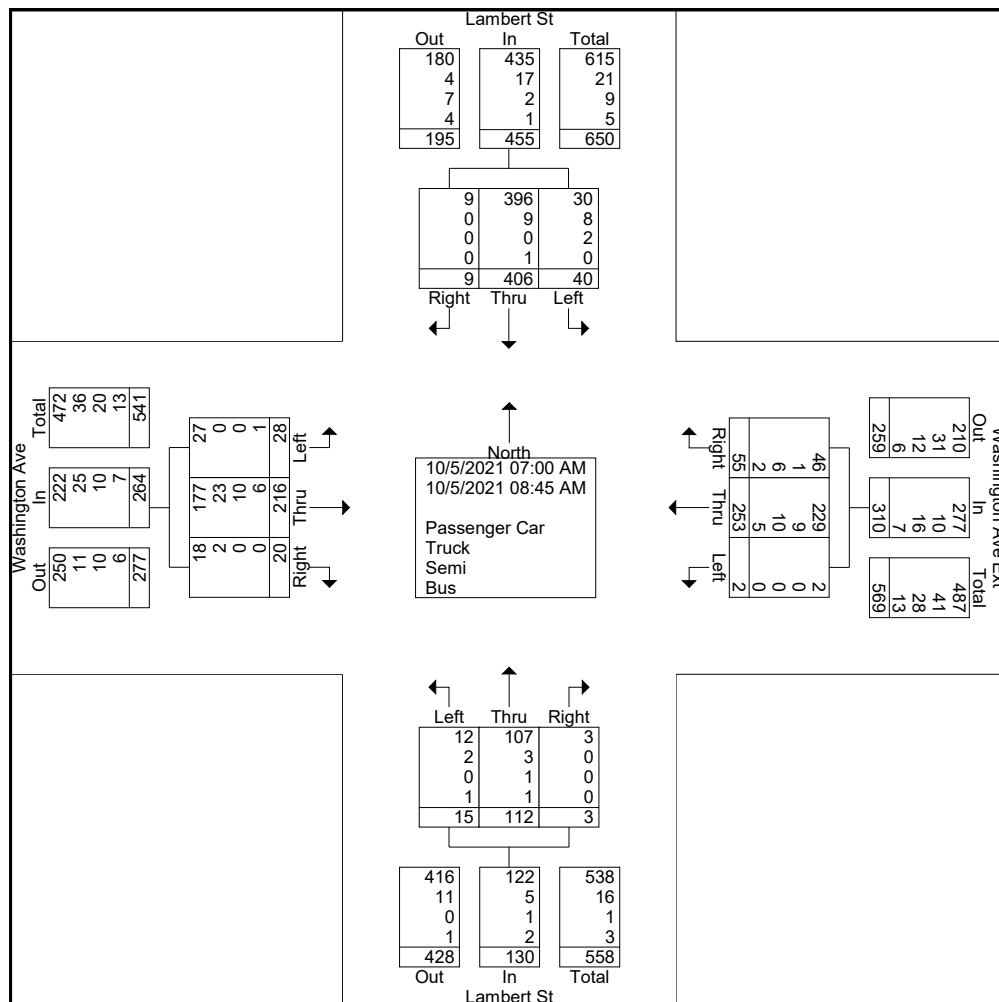
Site Code : 01005211

Start Date : 10/5/2021

Page No : 2

Groups Printed- Passenger Car - Truck - Semi - Bus

	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Grand Total	9	406	40	455	55	253	2	310	3	112	15	130	20	216	28	264	1159
Apprch %	2	89.2	8.8		17.7	81.6	0.6		2.3	86.2	11.5		7.6	81.8	10.6		
Total %	0.8	35	3.5	39.3	4.7	21.8	0.2	26.7	0.3	9.7	1.3	11.2	1.7	18.6	2.4	22.8	
Passenger Car	9	396	30	435	46	229	2	277	3	107	12	122	18	177	27	222	1056
% Passenger Car	100	97.5	75	95.6	83.6	90.5	100	89.4	100	95.5	80	93.8	90	81.9	96.4	84.1	91.1
Truck	0	9	8	17	1	9	0	10	0	3	2	5	2	23	0	25	57
% Truck	0	2.2	20	3.7	1.8	3.6	0	3.2	0	2.7	13.3	3.8	10	10.6	0	9.5	4.9
Semi	0	0	2	2	6	10	0	16	0	1	0	1	0	10	0	10	29
% Semi	0	0	5	0.4	10.9	4	0	5.2	0	0.9	0	0.8	0	4.6	0	3.8	2.5
Bus	0	1	0	1	2	5	0	7	0	1	1	2	0	6	1	7	17
% Bus	0	0.2	0	0.2	3.6	2	0	2.3	0	0.9	6.7	1.5	0	2.8	3.6	2.7	1.5



Traffic Solutions

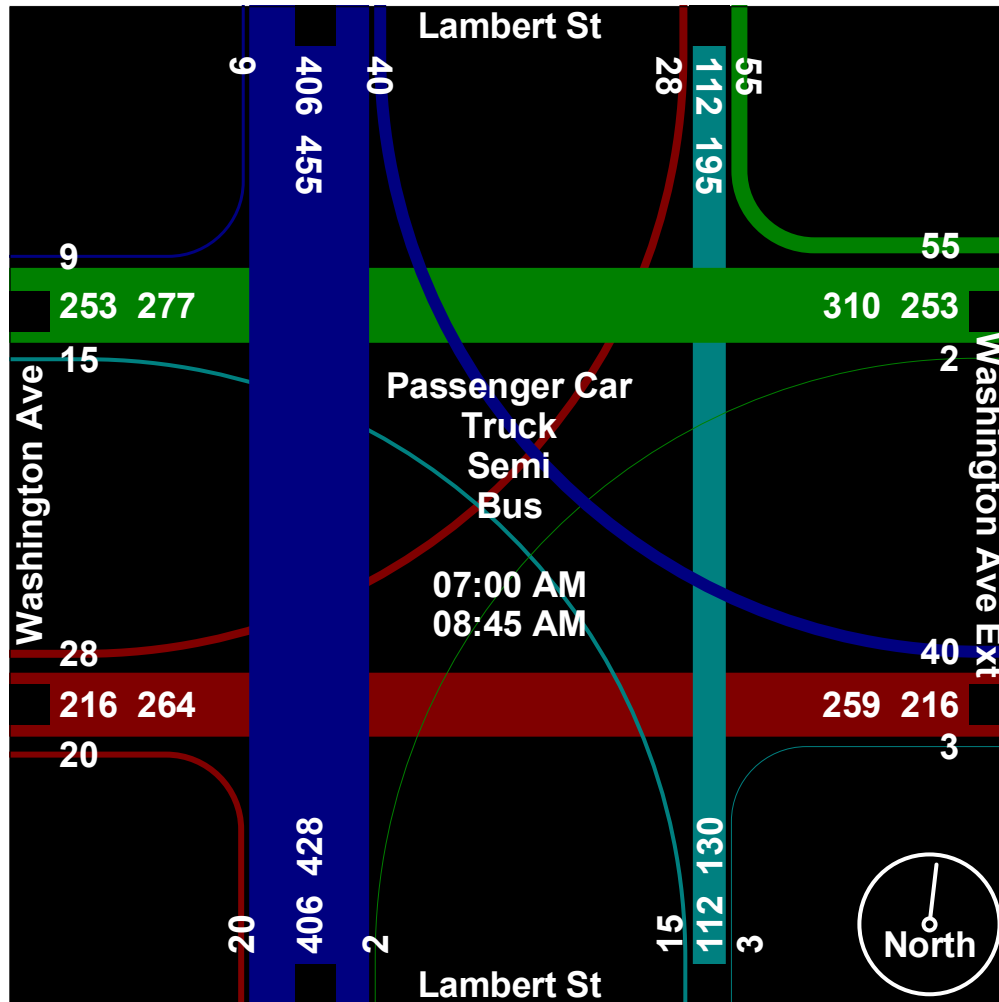
17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 AM

Site Code : 01005211

Start Date : 10/5/2021

Page No : 3



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

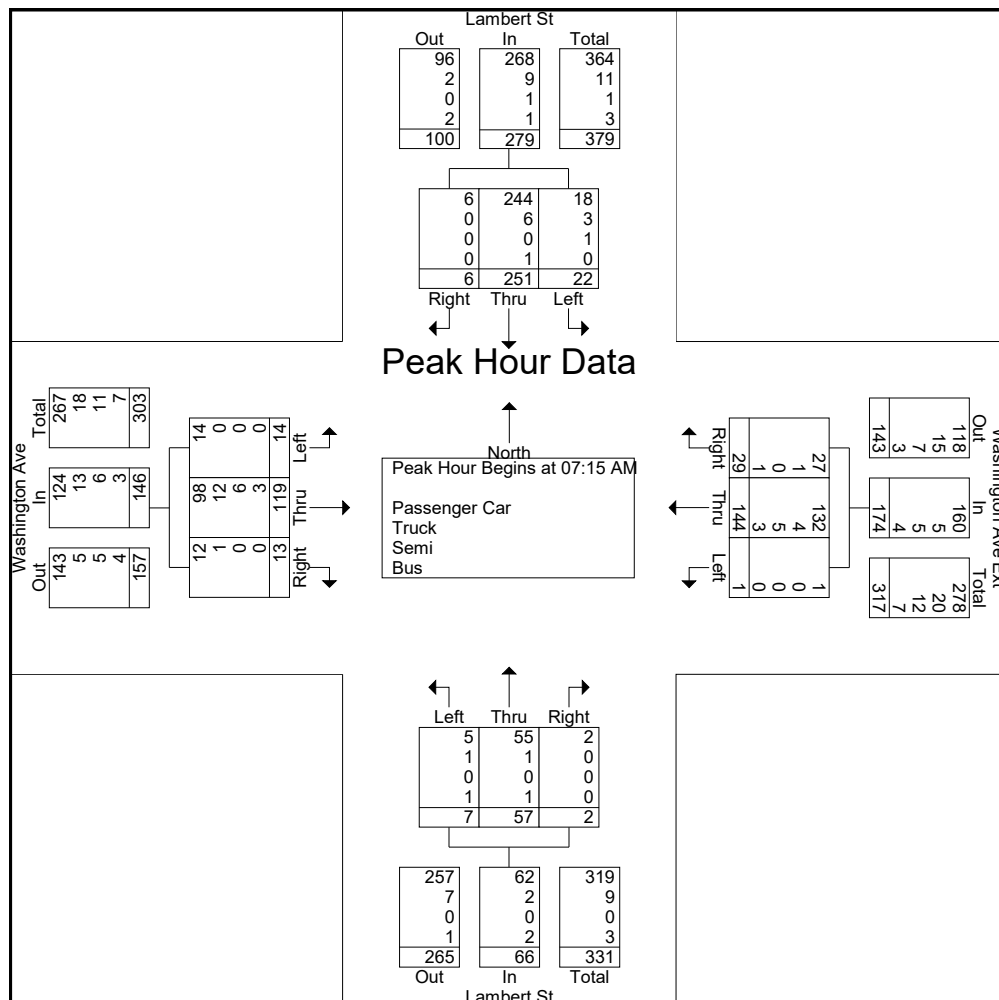
File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 AM

Site Code : 01005211

Start Date : 10/5/2021

Page No : 4

	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	68	3	71	8	37	0	45	1	9	2	12	1	22	1	24	152
07:30 AM	2	79	8	89	3	29	0	32	1	13	1	15	5	39	3	47	183
07:45 AM	2	70	3	75	11	43	1	55	0	24	2	26	4	24	5	33	189
08:00 AM	2	34	8	44	7	35	0	42	0	11	2	13	3	34	5	42	141
Total Volume	6	251	22	279	29	144	1	174	2	57	7	66	13	119	14	146	665
% App. Total	2.2	90	7.9		16.7	82.8	0.6		3	86.4	10.6		8.9	81.5	9.6		
PHF	.750	.794	.688	.784	.659	.837	.250	.791	.500	.594	.875	.635	.650	.763	.700	.777	.880
Passenger Car	6	244	18	268	27	132	1	160	2	55	5	62	12	98	14	124	614
% Passenger Car	100	97.2	81.8	96.1	93.1	91.7	100	92.0	100	96.5	71.4	93.9	92.3	82.4	100	84.9	92.3
Truck	0	6	3	9	1	4	0	5	0	1	1	2	1	12	0	13	29
% Truck	0	2.4	13.6	3.2	3.4	2.8	0	2.9	0	1.8	14.3	3.0	7.7	10.1	0	8.9	4.4
Semi	0	0	1	1	0	5	0	5	0	0	0	0	0	6	0	6	12
% Semi	0	0	4.5	0.4	0	3.5	0	2.9	0	0	0	0	0	5.0	0	4.1	1.8
Bus	0	1	0	1	1	3	0	4	0	1	1	2	0	3	0	3	10
% Bus	0	0.4	0	0.4	3.4	2.1	0	2.3	0	1.8	14.3	3.0	0	2.5	0	2.1	1.5



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 AM

Site Code : 01005211

Start Date : 10/5/2021

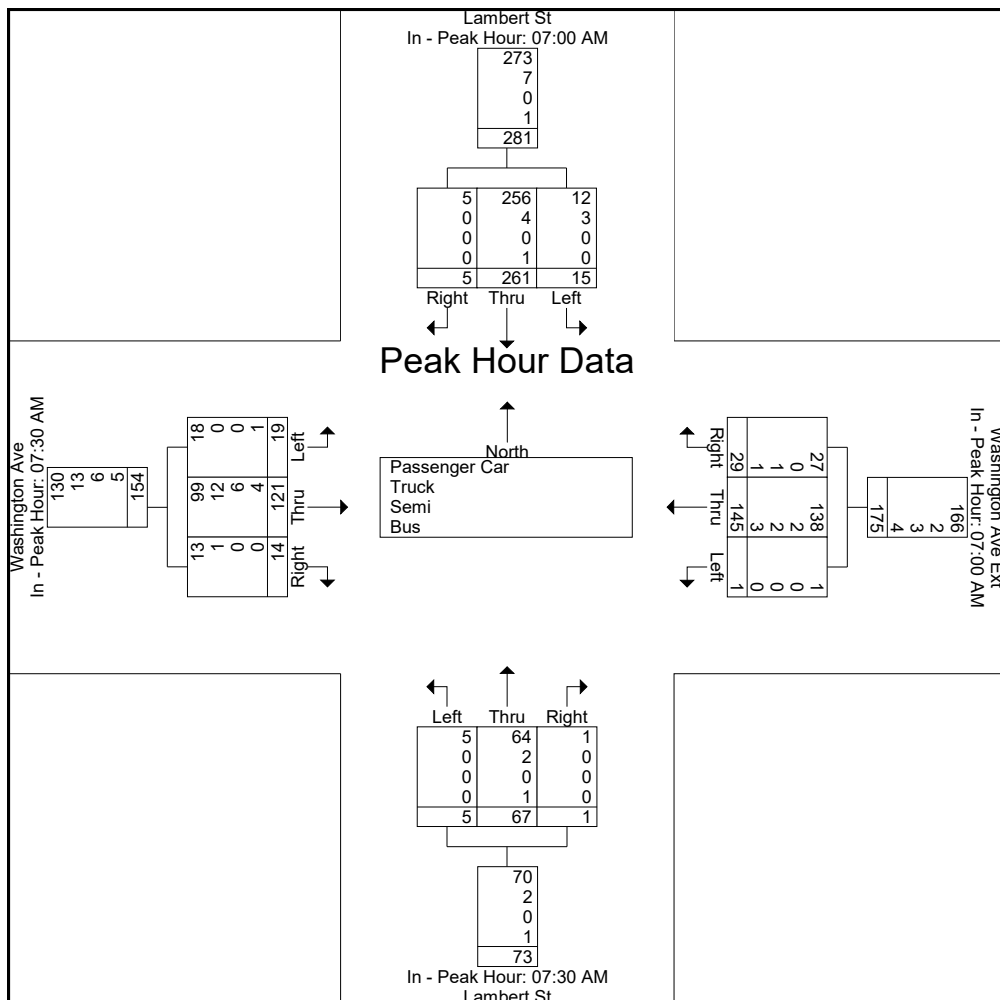
Page No : 5

	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:30 AM				07:30 AM				
+0 mins.	1	44	1	46	7	36	0	43	1	13	1	15	5	39	3	47	
+15 mins.	0	68	3	71	8	37	0	45	0	24	2	26	4	24	5	33	
+30 mins.	2	79	8	89	3	29	0	32	0	11	2	13	3	34	5	42	
+45 mins.	2	70	3	75	11	43	1	55	0	19	0	19	2	24	6	32	
Total Volume	5	261	15	281	29	145	1	175	1	67	5	73	14	121	19	154	
% App. Total	1.8	92.9	5.3		16.6	82.9	0.6		1.4	91.8	6.8		9.1	78.6	12.3		
PHF	.625	.826	.469	.789	.659	.843	.250	.795	.250	.698	.625	.702	.700	.776	.792	.819	
Passenger Car	5	256	12	273	27	138	1	166	1	64	5	70	13	99	18	130	
% Passenger Car	100	98.1	80	97.2	93.1	95.2	100	94.9	100	95.5	100	95.9	92.9	81.8	94.7	84.4	
Truck	0	4	3	7	0	2	0	2	0	2	0	2	1	12	0	13	
% Truck	0	1.5	20	2.5	0	1.4	0	1.1	0	3	0	2.7	7.1	9.9	0	8.4	
Semi	0	0	0	0	1	2	0	3	0	0	0	0	0	6	0	6	
% Semi	0	0	0	0	3.4	1.4	0	1.7	0	0	0	0	0	5	0	3.9	
Bus	0	1	0	1	1	3	0	4	0	1	0	1	0	4	1	5	
% Bus	0	0.4	0	0.4	3.4	2.1	0	2.3	0	1.5	0	1.4	0	3.3	5.3	3.2	



Traffic Solutions

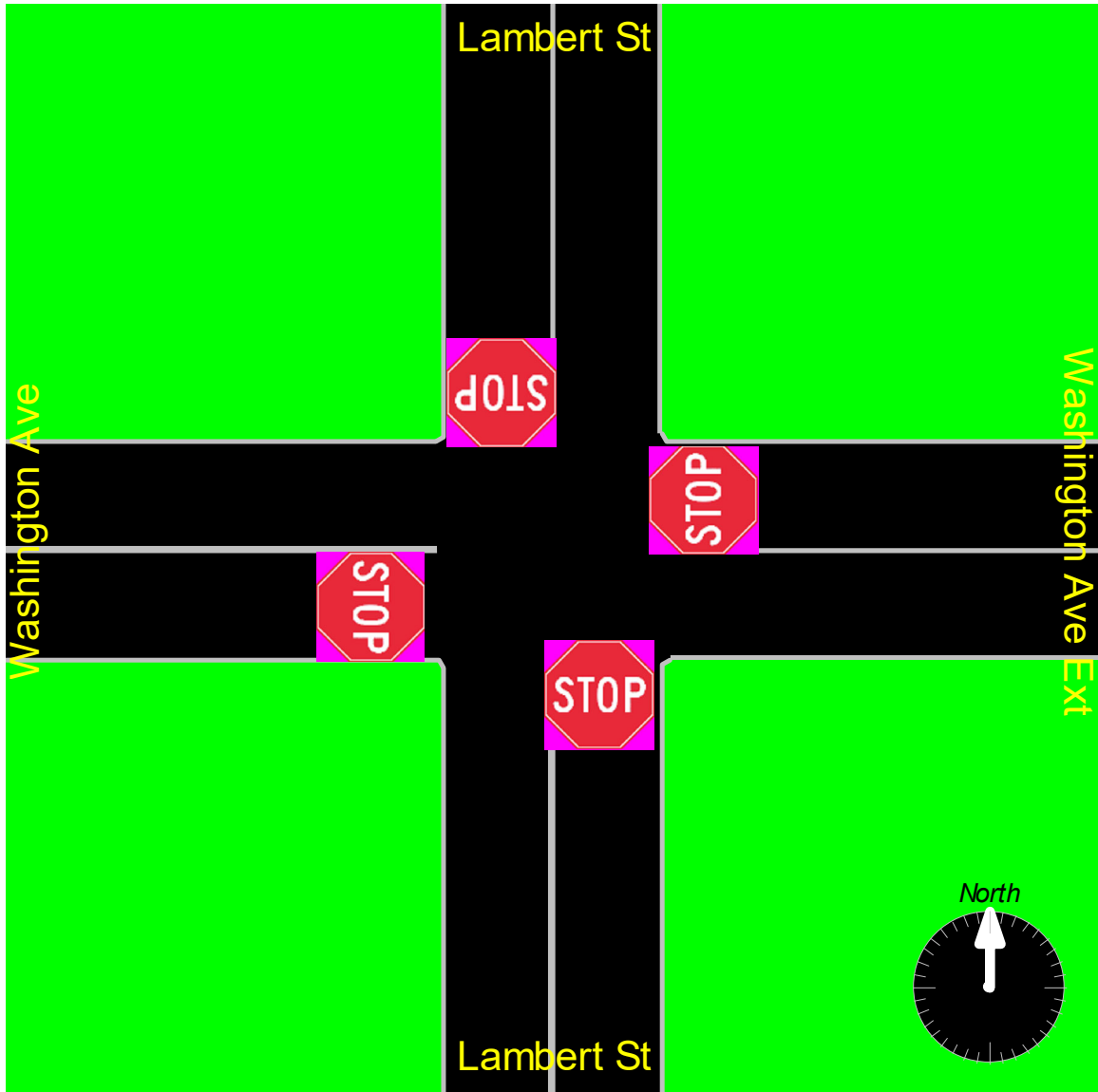
17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 AM

Site Code : 01005211

Start Date : 10/5/2021

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Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

Portland Lambert & Washington Ave Ext : Portland Lambert Street & Washington Ave Ext 10-5-21 PM
October 5, 2021 PM Site Code : 01005212
Sunny Start Date : 10/5/2021
Count by Jen Gilbert Page No : 1

Groups Printed- Passenger Car - Truck - Semi - Bus - Bicycle

Start Time	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
03:00 PM	1	21	0	22	4	24	0	28	1	28	6	35	1	23	5	29	114
03:15 PM	0	21	2	23	4	26	1	31	5	23	1	29	3	31	10	44	127
03:30 PM	1	25	8	34	8	27	2	37	0	31	1	32	2	36	1	39	142
03:45 PM	1	17	5	23	8	24	0	32	0	38	1	39	2	25	6	33	127
Total	3	84	15	102	24	101	3	128	6	120	9	135	8	115	22	145	510
04:00 PM	1	22	8	31	9	30	0	39	1	39	3	43	2	45	2	49	162
04:15 PM	0	17	8	25	14	34	2	50	1	54	3	58	3	38	5	46	179
04:30 PM	1	23	6	30	3	30	0	33	1	47	0	48	6	40	7	53	164
04:45 PM	3	14	6	23	7	33	0	40	2	45	3	50	3	32	7	42	155
Total	5	76	28	109	33	127	2	162	5	185	9	199	14	155	21	190	660
05:00 PM	3	23	6	32	7	23	0	30	0	52	4	56	4	33	7	44	162
05:15 PM	0	13	4	17	2	29	1	32	1	49	2	52	2	35	8	45	146
05:30 PM	2	26	6	34	3	25	0	28	0	39	1	40	3	19	10	32	134
05:45 PM	2	26	4	32	2	27	0	29	0	28	0	28	2	23	3	28	117
Total	7	88	20	115	14	104	1	119	1	168	7	176	11	110	28	149	559

Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 PM

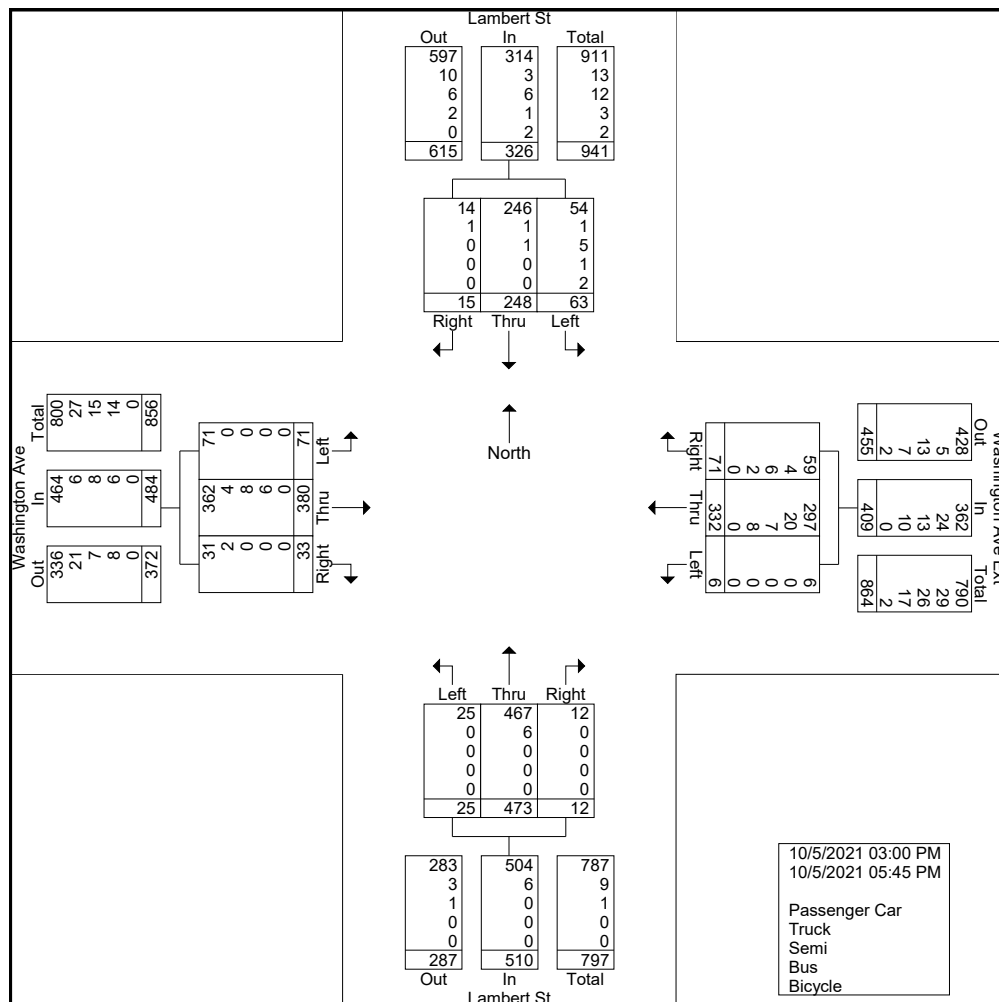
Site Code : 01005212

Start Date : 10/5/2021

Page No : 2

Groups Printed- Passenger Car - Truck - Semi - Bus - Bicycle

	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Grand Total	15	248	63	326	71	332	6	409	12	473	25	510	33	380	71	484	1729
Apprch %	4.6	76.1	19.3		17.4	81.2	1.5		2.4	92.7	4.9		6.8	78.5	14.7		
Total %	0.9	14.3	3.6	18.9	4.1	19.2	0.3	23.7	0.7	27.4	1.4	29.5	1.9	22	4.1	28	
Passenger Car	14	246	54	314	59	297	6	362	12	467	25	504	31	362	71	464	1644
% Passenger Car	93.3	99.2	85.7	96.3	83.1	89.5	100	88.5	100	98.7	100	98.8	93.9	95.3	100	95.9	95.1
Truck	1	1	1	3	4	20	0	24	0	6	0	6	2	4	0	6	39
% Truck	6.7	0.4	1.6	0.9	5.6	6	0	5.9	0	1.3	0	1.2	6.1	1.1	0	1.2	2.3
Semi	0	1	5	6	6	7	0	13	0	0	0	0	0	8	0	8	27
% Semi	0	0.4	7.9	1.8	8.5	2.1	0	3.2	0	0	0	0	0	2.1	0	1.7	1.6
Bus	0	0	1	1	2	8	0	10	0	0	0	0	0	6	0	6	17
% Bus	0	0	1.6	0.3	2.8	2.4	0	2.4	0	0	0	0	0	1.6	0	1.2	1
Bicycle	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2
% Bicycle	0	0	3.2	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0.1



Traffic Solutions

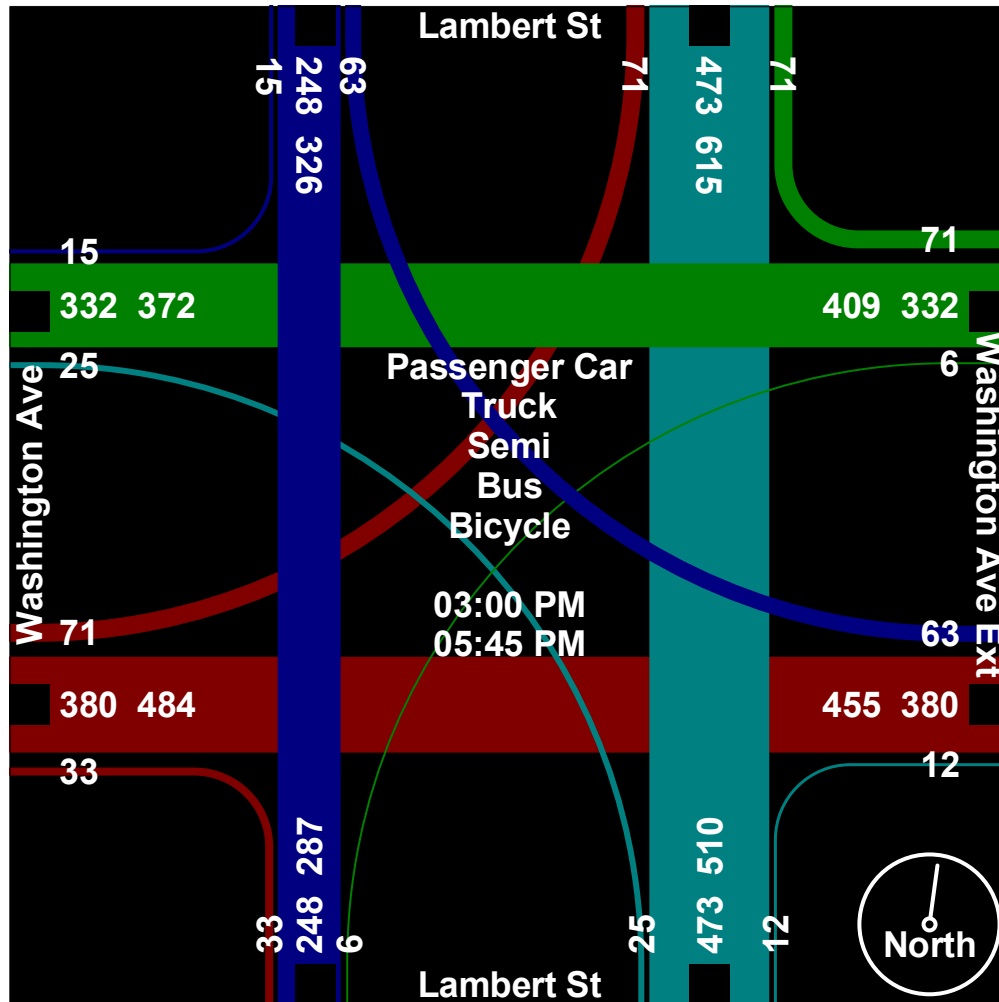
17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 PM

Site Code : 01005212

Start Date : 10/5/2021

Page No : 3



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

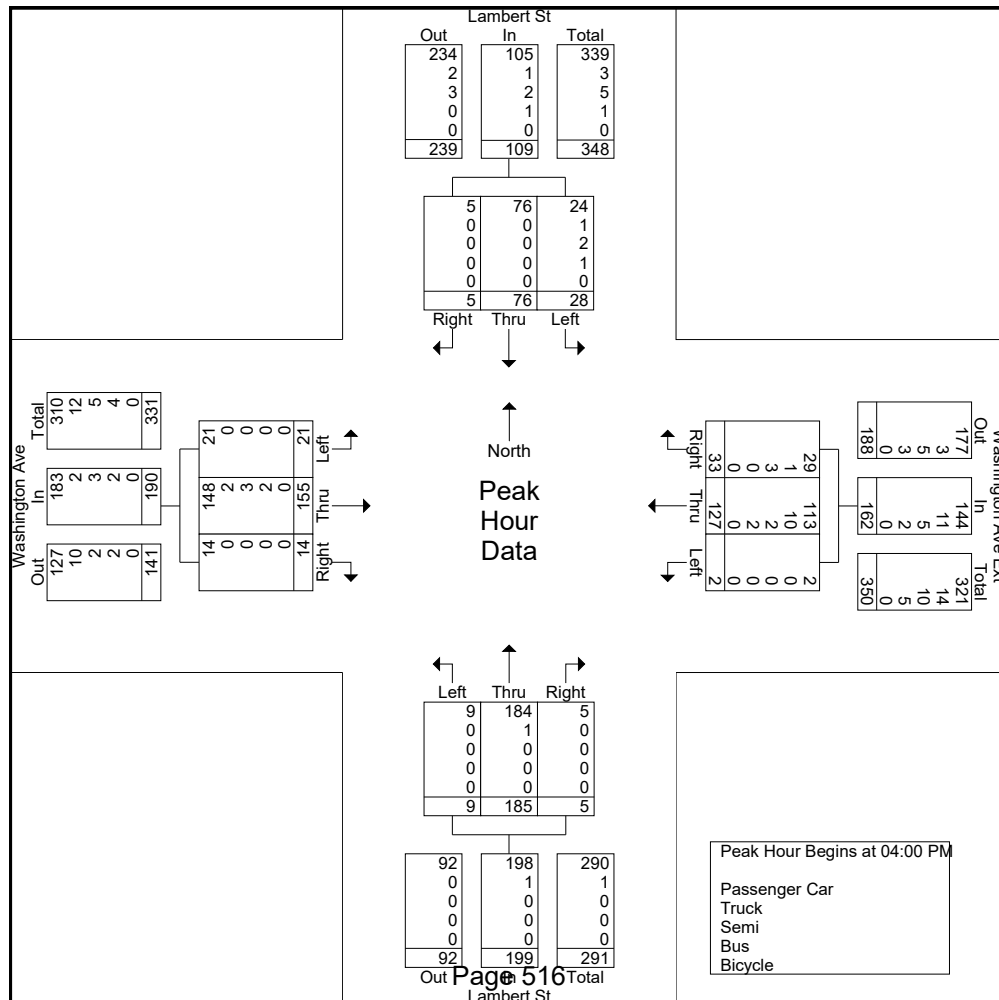
File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 PM

Site Code : 01005212

Start Date : 10/5/2021

Page No : 4

	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	1	22	8	31	9	30	0	39	1	39	3	43	2	45	2	49	162
04:15 PM	0	17	8	25	14	34	2	50	1	54	3	58	3	38	5	46	179
04:30 PM	1	23	6	30	3	30	0	33	1	47	0	48	6	40	7	53	164
04:45 PM	3	14	6	23	7	33	0	40	2	45	3	50	3	32	7	42	155
Total Volume	5	76	28	109	33	127	2	162	5	185	9	199	14	155	21	190	660
% App. Total	4.6	69.7	25.7		20.4	78.4	1.2		2.5	93	4.5		7.4	81.6	11.1		
PHF	.417	.826	.875	.879	.589	.934	.250	.810	.625	.856	.750	.858	.583	.861	.750	.896	.922
Passenger Car	5	76	24	105	29	113	2	144	5	184	9	198	14	148	21	183	630
% Passenger Car	100	100	85.7	96.3	87.9	89.0	100	88.9	100	99.5	100	99.5	100	95.5	100	96.3	95.5
Truck	0	0	1	1	1	10	0	11	0	1	0	1	0	2	0	2	15
% Truck	0	0	3.6	0.9	3.0	7.9	0	6.8	0	0.5	0	0.5	0	1.3	0	1.1	2.3
Semi	0	0	2	2	3	2	0	5	0	0	0	0	0	3	0	3	10
% Semi	0	0	7.1	1.8	9.1	1.6	0	3.1	0	0	0	0	0	1.9	0	1.6	1.5
Bus	0	0	1	1	0	2	0	2	0	0	0	0	0	2	0	2	5
% Bus	0	0	3.6	0.9	0	1.6	0	1.2	0	0	0	0	0	1.3	0	1.1	0.8
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Traffic Solutions

17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 PM

Site Code : 01005212

Start Date : 10/5/2021

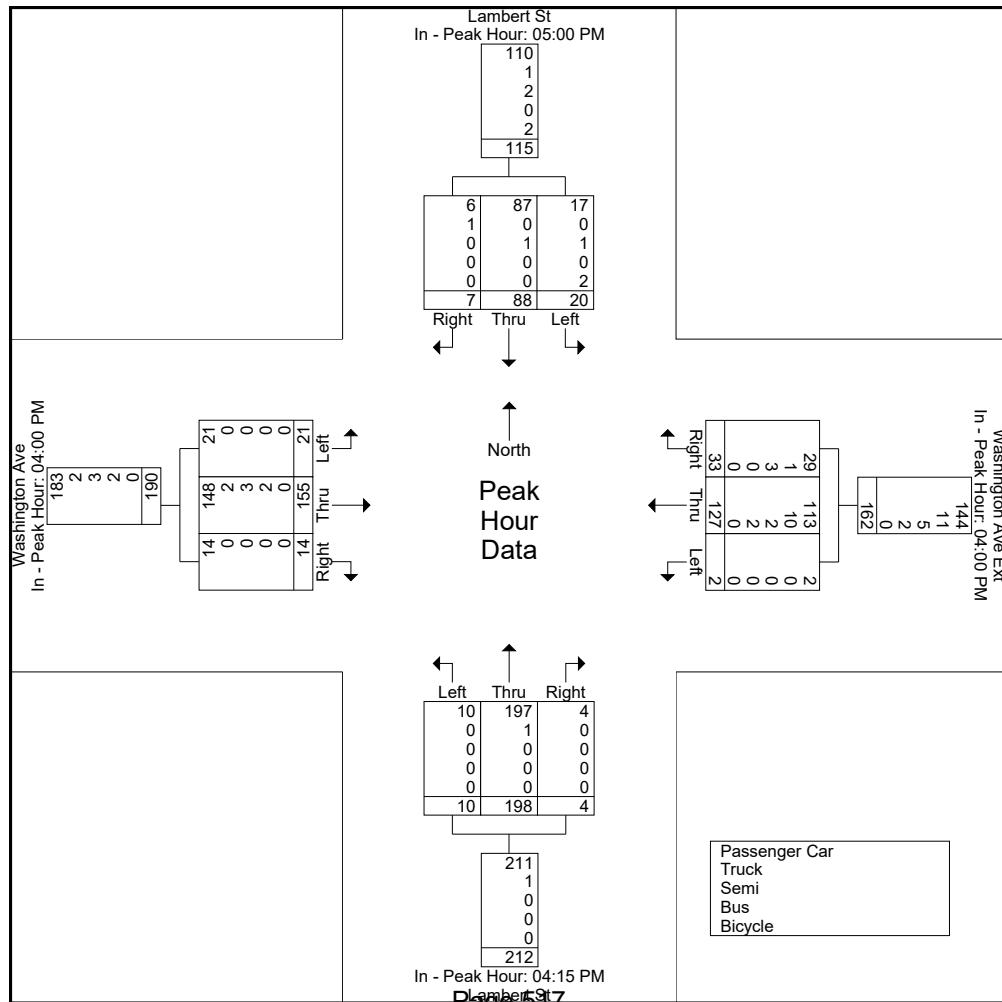
Page No : 5

	Lambert St From North				Washington Ave Ext From East				Lambert St From South				Washington Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total

Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				04:15 PM				04:00 PM				
+0 mins.	3	23	6	32	9	30	0	39	1	54	3	58	2	45	2	49	
+15 mins.	0	13	4	17	14	34	2	50	1	47	0	48	3	38	5	46	
+30 mins.	2	26	6	34	3	30	0	33	2	45	3	50	6	40	7	53	
+45 mins.	2	26	4	32	7	33	0	40	0	52	4	56	3	32	7	42	
Total Volume	7	88	20	115	33	127	2	162	4	198	10	212	14	155	21	190	
% App. Total	6.1	76.5	17.4		20.4	78.4	1.2		1.9	93.4	4.7		7.4	81.6	11.1		
PHF	.583	.846	.833	.846	.589	.934	.250	.810	.500	.917	.625	.914	.583	.861	.750	.896	
Passenger Car	6	87	17	110	29	113	2	144	4	197	10	211	14	148	21	183	
% Passenger Car	85.7	98.9	85	95.7	87.9	89	100	88.9	100	99.5	100	99.5	100	95.5	100	96.3	
Truck	1	0	0	1	1	10	0	11	0	1	0	1	0	2	0	2	
% Truck	14.3	0	0	0.9	3	7.9	0	6.8	0	0.5	0	0.5	0	1.3	0	1.1	
Semi	0	1	1	2	3	2	0	5	0	0	0	0	0	3	0	3	
% Semi	0	1.1	5	1.7	9.1	1.6	0	3.1	0	0	0	0	0	1.9	0	1.6	
Bus	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	2	
% Bus	0	0	0	0	0	1.6	0	1.2	0	0	0	0	0	1.3	0	1.1	
Bicycle	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycle	0	0	10	1.7	0	0	0	0	0	0	0	0	0	0	0	0	



Traffic Solutions

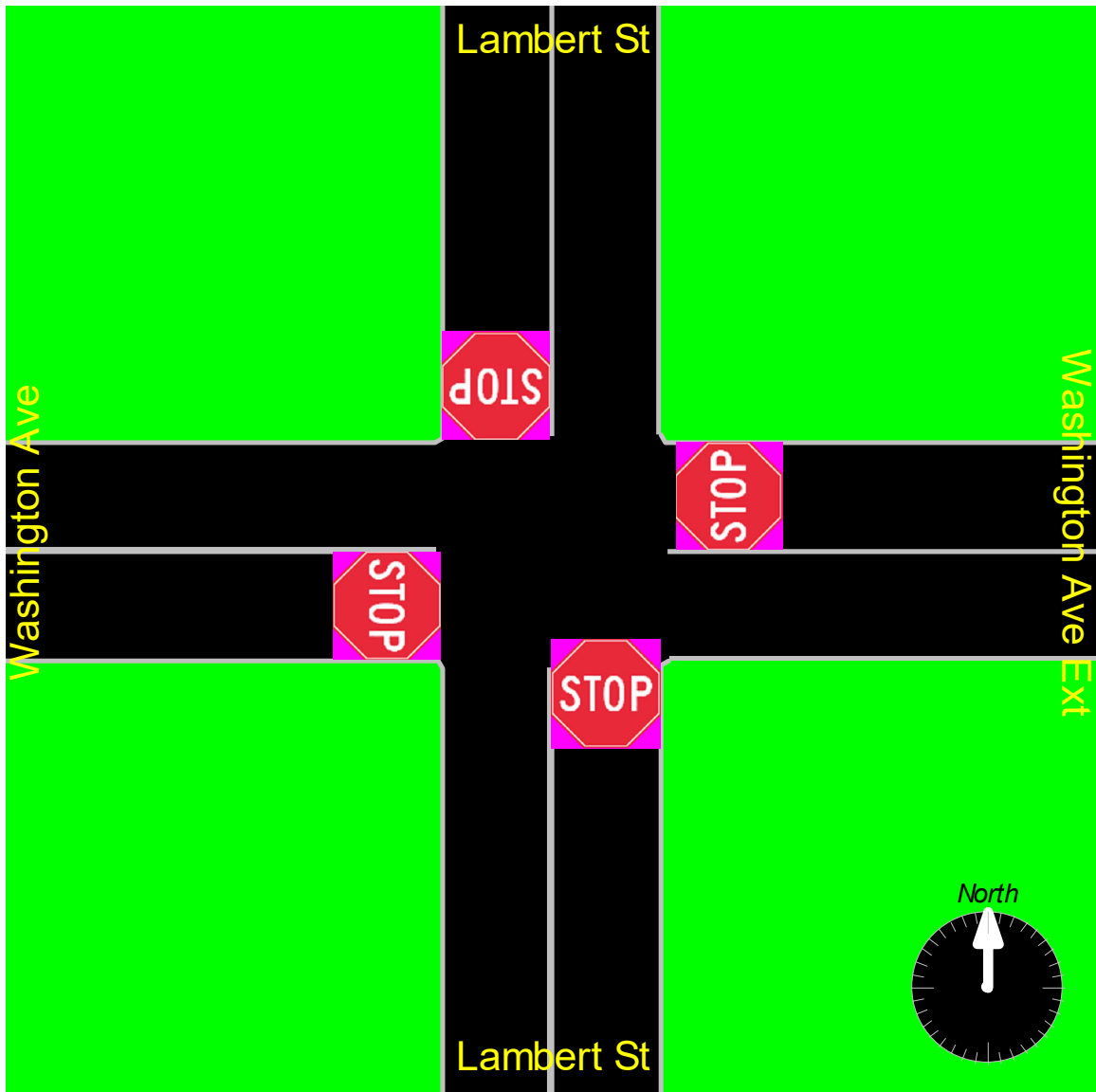
17 Mount View Dr
Gorham, ME 04038

File Name : Portland Lambert Street & Washington Ave Ext 10-5-21 PM

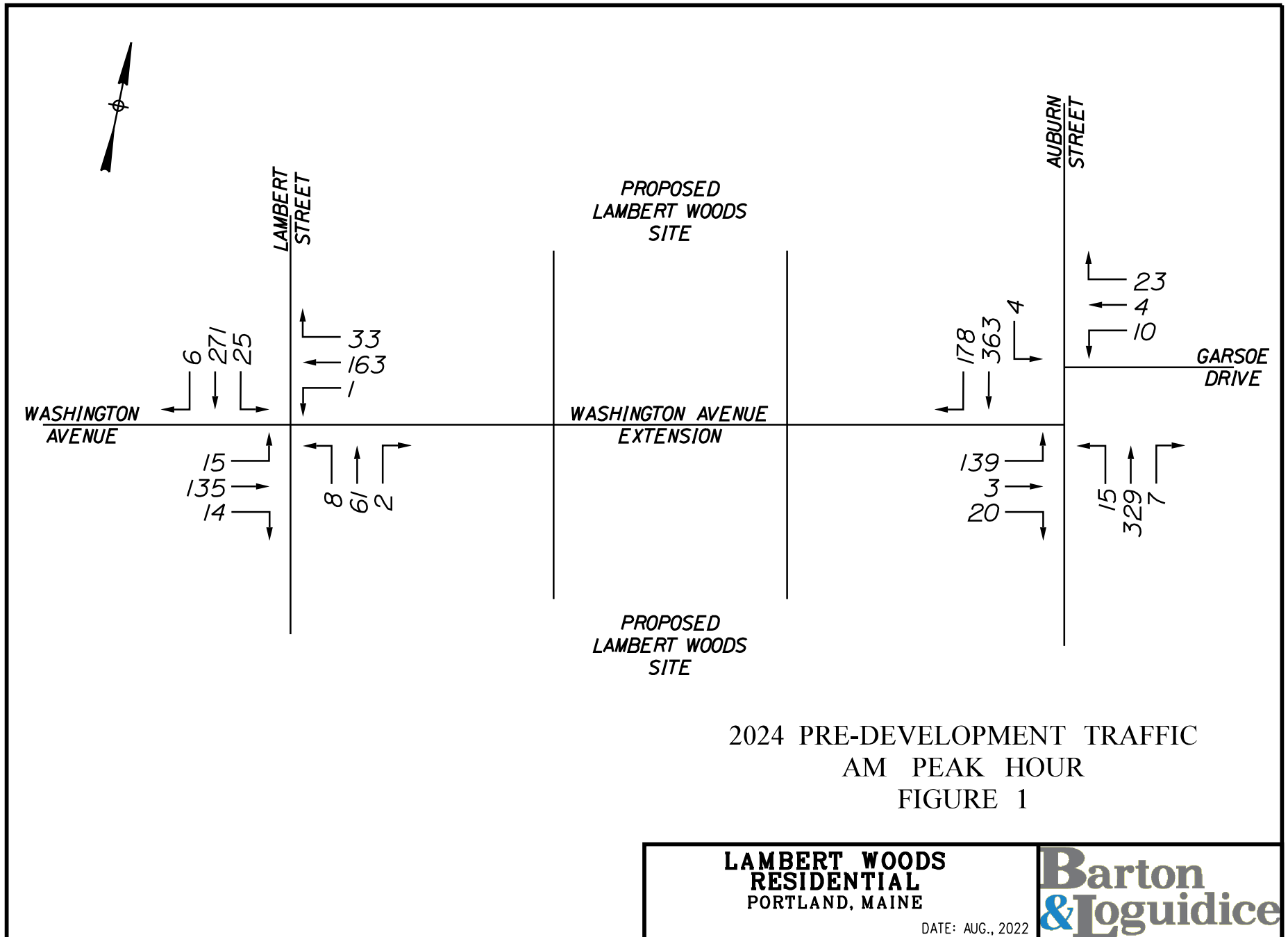
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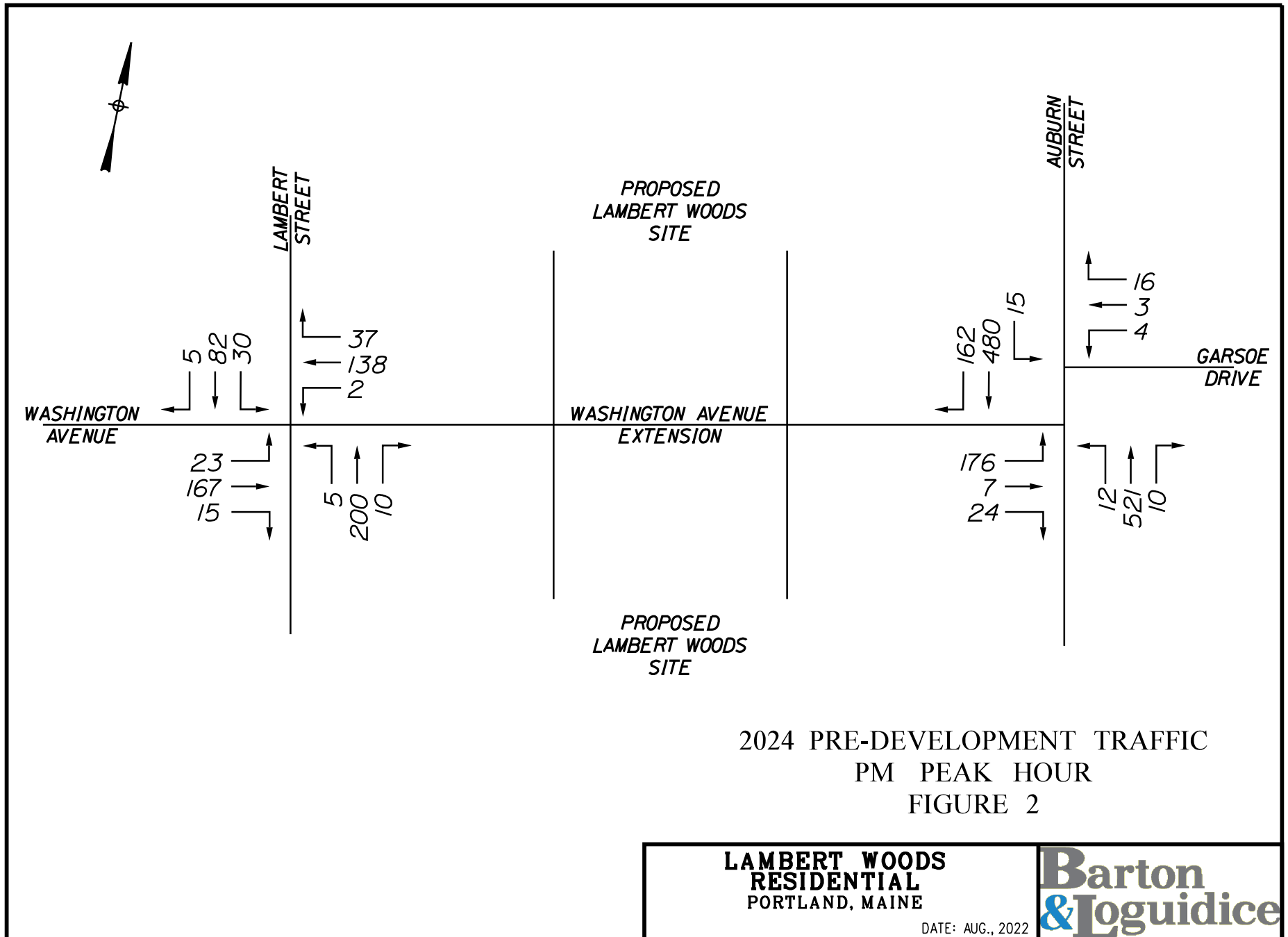
Start Date : 10/5/2021

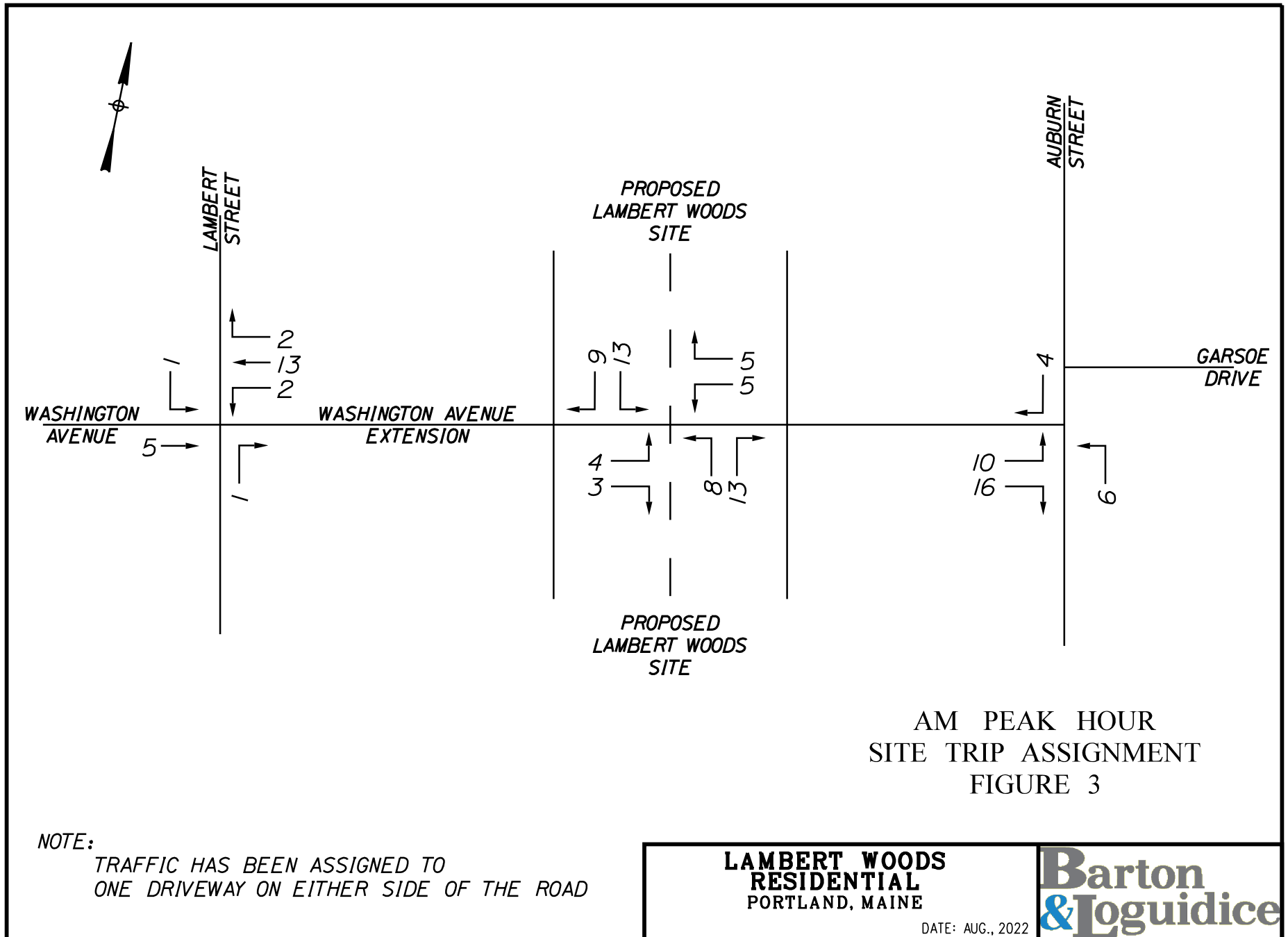
Page No : 6

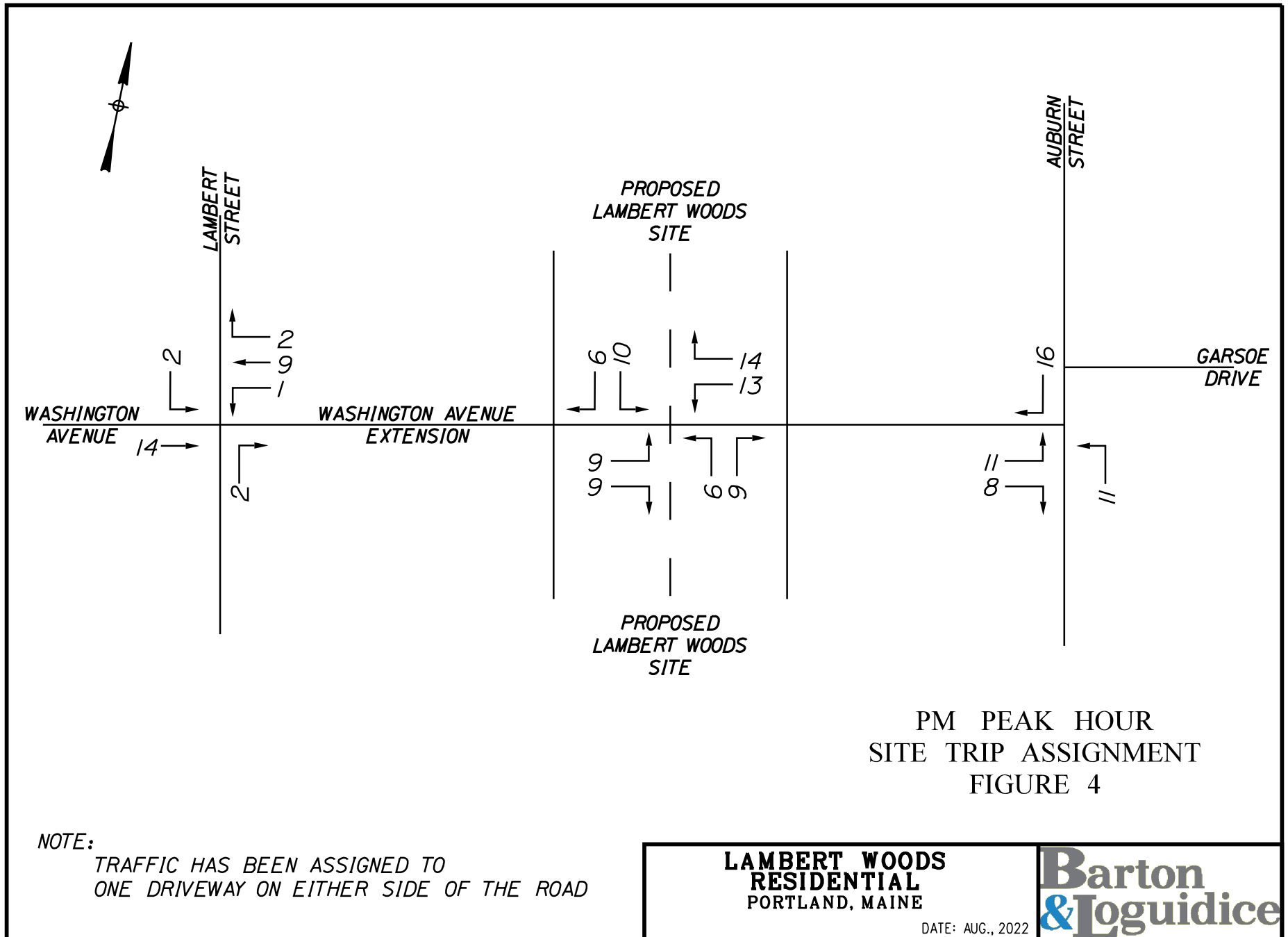


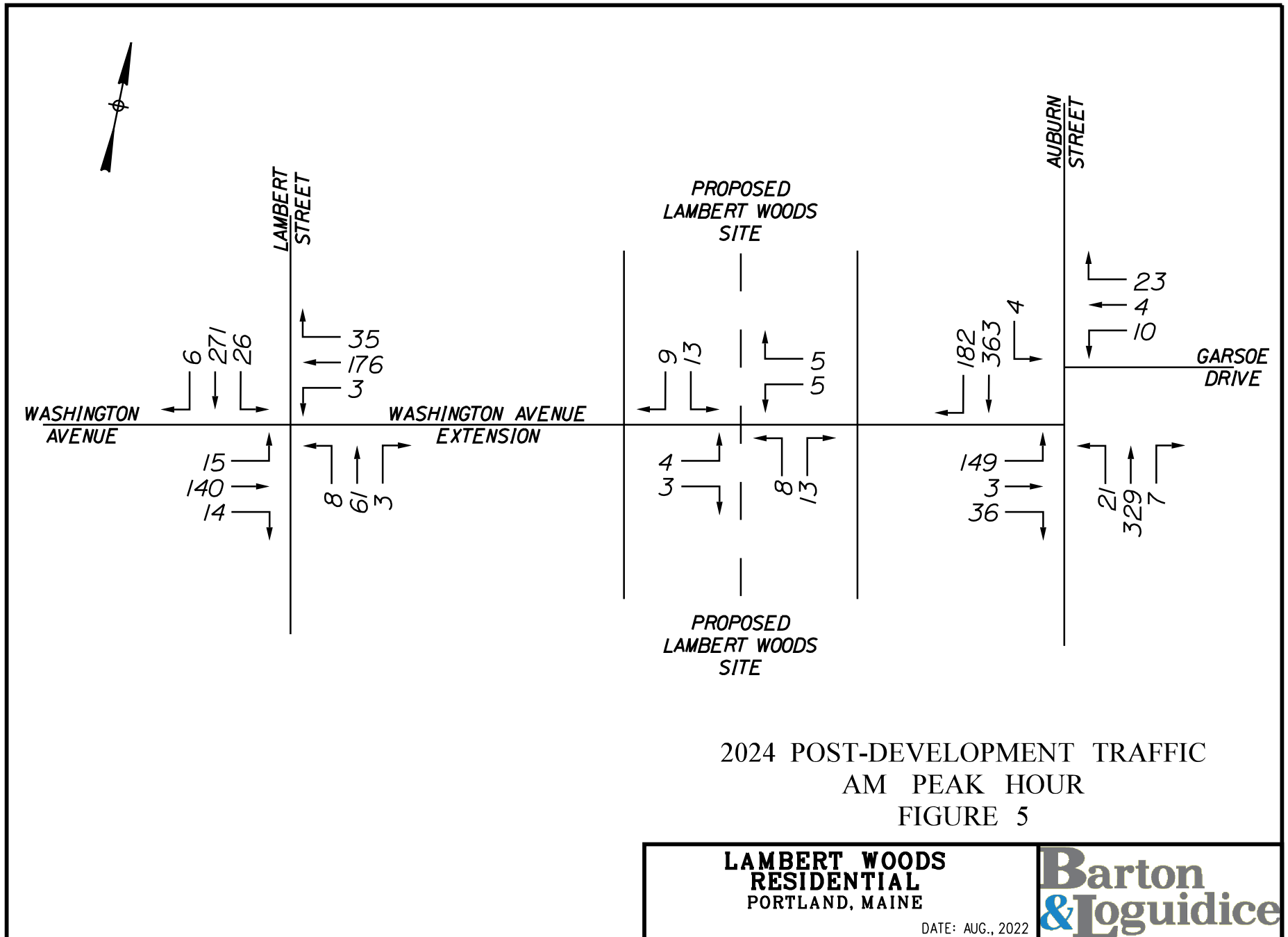
APPENDIX C – TRAFFIC FIGURES

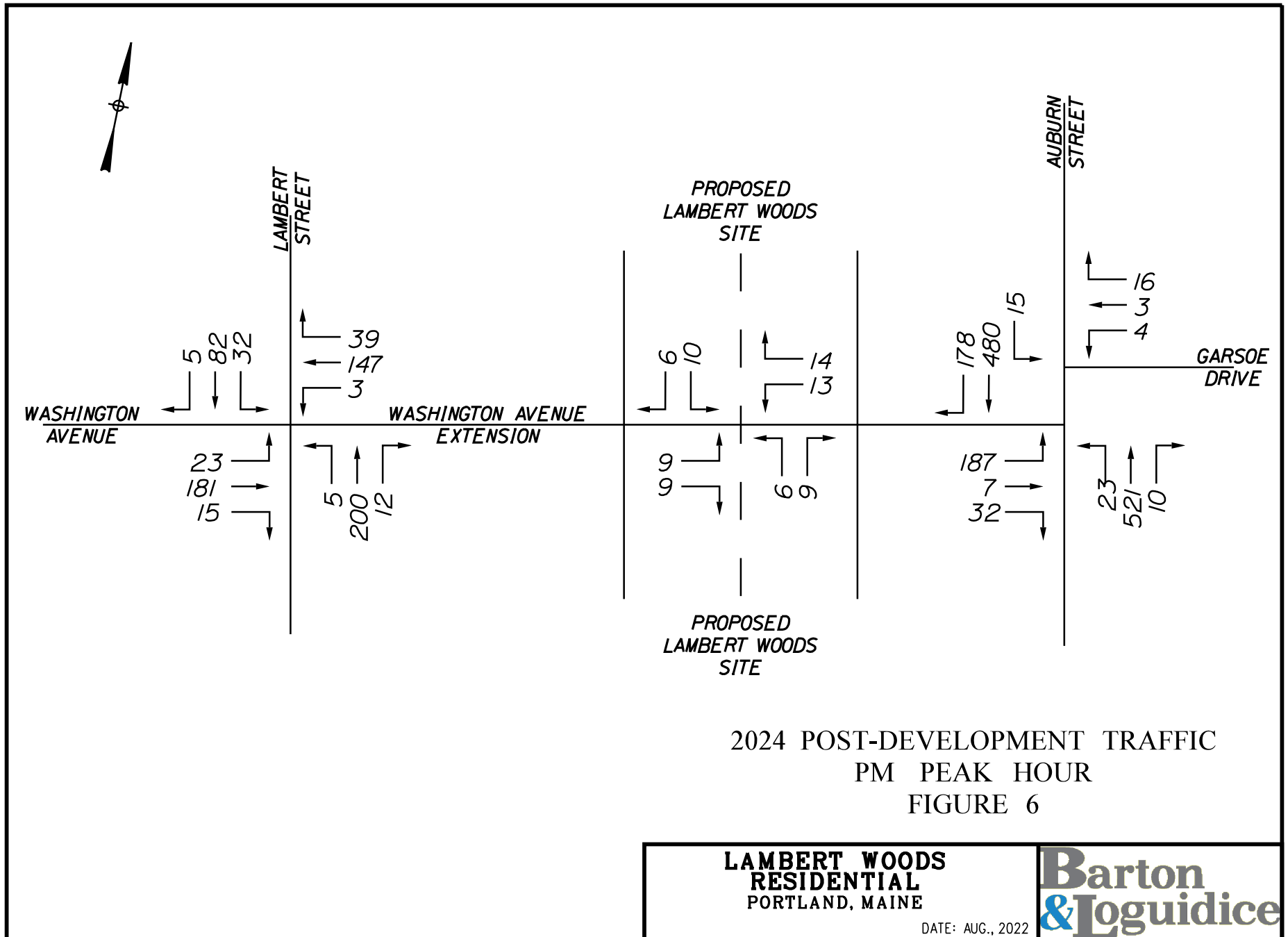












APPENDIX D – SIMTRAFFIC REPORT DATA

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1469	1512	1461	1487	1424	1470
Vehs Exited	1474	1518	1467	1491	1415	1472
Starting Vehs	25	15	25	22	13	19
Ending Vehs	20	9	19	18	22	17
Travel Distance (mi)	387	399	382	385	369	384
Travel Time (hr)	17.8	18.6	17.1	17.3	16.5	17.5
Total Delay (hr)	3.9	4.3	3.4	3.6	3.3	3.7
Total Stops	956	960	931	932	883	932
Fuel Used (gal)	14.7	15.4	14.3	14.4	13.6	14.5

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1469	1512	1461	1487	1424	1470
Vehs Exited	1474	1518	1467	1491	1415	1472
Starting Vehs	25	15	25	22	13	19
Ending Vehs	20	9	19	18	22	17
Travel Distance (mi)	387	399	382	385	369	384
Travel Time (hr)	17.8	18.6	17.1	17.3	16.5	17.5
Total Delay (hr)	3.9	4.3	3.4	3.6	3.3	3.7
Total Stops	956	960	931	932	883	932
Fuel Used (gal)	14.7	15.4	14.3	14.4	13.6	14.5

3: Lambert Street & Washington Avenue/Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.1	0.3	0.2
Total Del/Veh (s)	7.2	5.9	6.9	8.6	7.4

4: Auburn Street & Washington Avenue Ext./Garsoe Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.3	0.4	0.3
Total Del/Veh (s)	21.5	10.1	1.3	2.2	5.0

Total Network Performance

Denied Del/Veh (s)			0.3		
Total Del/Veh (s)			8.6		

Intersection: 3: Lambert Street & Washington Avenue/Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	102	100	75	125
Average Queue (ft)	53	54	33	63
95th Queue (ft)	84	85	61	98
Link Distance (ft)	475	1179	542	518
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LTR
Maximum Queue (ft)	154	58	69	82	24
Average Queue (ft)	74	16	27	7	1
95th Queue (ft)	133	45	54	37	10
Link Distance (ft)	1179		428	508	501
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		145			
Storage Blk Time (%)	1				
Queuing Penalty (veh)	0				

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:57	4:57	4:57	4:57	4:57	4:57
End Time	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1735	1808	1742	1724	1654	1734
Vehs Exited	1735	1799	1738	1730	1652	1730
Starting Vehs	24	21	25	25	19	22
Ending Vehs	24	30	29	19	21	23
Travel Distance (mi)	449	457	443	441	417	442
Travel Time (hr)	32.7	41.5	22.6	23.9	19.6	28.1
Total Delay (hr)	16.7	25.4	6.9	8.3	4.8	12.4
Total Stops	1057	1010	965	980	908	986
Fuel Used (gal)	19.5	21.4	17.0	17.4	15.7	18.2

Interval #0 Information Seeding

Start Time	4:57
End Time	5:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1735	1808	1742	1724	1654	1734
Vehs Exited	1735	1799	1738	1730	1652	1730
Starting Vehs	24	21	25	25	19	22
Ending Vehs	24	30	29	19	21	23
Travel Distance (mi)	449	457	443	441	417	442
Travel Time (hr)	32.7	41.5	22.6	23.9	19.6	28.1
Total Delay (hr)	16.7	25.4	6.9	8.3	4.8	12.4
Total Stops	1057	1010	965	980	908	986
Fuel Used (gal)	19.5	21.4	17.0	17.4	15.7	18.2

3: Lambert Street & Washington Avenue/Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.2	0.2	0.2
Total Del/Veh (s)	7.3	5.5	7.7	6.4	6.8

4: Auburn Street & Washington Avenue Ext./Garsoe Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	4.1	0.1	0.4	0.6	1.0
Total Del/Veh (s)	150.8	16.6	1.9	2.8	25.9

Total Network Performance

Denied Del/Veh (s)			0.9		
Total Del/Veh (s)			24.6		

Intersection: 3: Lambert Street & Washington Avenue/Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	94	92	85	74
Average Queue (ft)	50	49	47	38
95th Queue (ft)	80	79	72	61
Link Distance (ft)	475	1179	542	518
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LTR
Maximum Queue (ft)	559	168	61	146	84
Average Queue (ft)	301	51	20	13	9
95th Queue (ft)	729	162	51	72	44
Link Distance (ft)	1179		428	508	501
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		145			
Storage Blk Time (%)	50	0			
Queuing Penalty (veh)	12	0			

Network Summary

Network wide Queuing Penalty: 12

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1599	1596	1599	1568	1588	1590
Vehs Exited	1604	1596	1591	1560	1590	1588
Starting Vehs	22	15	13	10	17	16
Ending Vehs	17	15	21	18	15	15
Travel Distance (mi)	410	398	407	395	402	402
Travel Time (hr)	19.6	18.4	18.7	18.4	18.6	18.7
Total Delay (hr)	4.8	4.1	4.0	4.1	4.0	4.2
Total Stops	1076	1061	1059	1003	1037	1045
Fuel Used (gal)	15.8	15.3	15.5	15.0	15.5	15.4

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1599	1596	1599	1568	1588	1590
Vehs Exited	1604	1596	1591	1560	1590	1588
Starting Vehs	22	15	13	10	17	16
Ending Vehs	17	15	21	18	15	15
Travel Distance (mi)	410	398	407	395	402	402
Travel Time (hr)	19.6	18.4	18.7	18.4	18.6	18.7
Total Delay (hr)	4.8	4.1	4.0	4.1	4.0	4.2
Total Stops	1076	1061	1059	1003	1037	1045
Fuel Used (gal)	15.8	15.3	15.5	15.0	15.5	15.4

3: Lambert Street & Washington Avenue/Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.1	0.3	0.2
Total Del/Veh (s)	7.2	5.7	6.5	8.6	7.3

4: Auburn Street & Washington Avenue Ext./Garsoe Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.1	0.3	0.4	0.3
Total Del/Veh (s)	20.8	11.0	1.5	2.3	5.6

9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.7	0.4	3.8	4.6	1.3

Total Network Performance

Denied Del/Veh (s)			0.3		
Total Del/Veh (s)			9.1		

Intersection: 3: Lambert Street & Washington Avenue/Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	99	116	70	118
Average Queue (ft)	53	53	34	63
95th Queue (ft)	85	88	58	98
Link Distance (ft)	475	564	542	518
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	223	65	79	33
Average Queue (ft)	88	27	12	2
95th Queue (ft)	168	56	49	15
Link Distance (ft)	559	428	525	501
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	18	25	45	40
Average Queue (ft)	1	1	16	16
95th Queue (ft)	9	12	42	41
Link Distance (ft)	564	559	162	152
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:57	4:57	4:57	4:57	4:57	4:57
End Time	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1813	1909	1837	1791	1869	1844
Vehs Exited	1793	1893	1825	1787	1863	1831
Starting Vehs	21	20	20	20	20	21
Ending Vehs	41	36	32	24	26	29
Travel Distance (mi)	453	470	451	451	468	459
Travel Time (hr)	31.3	40.3	25.0	31.1	38.0	33.1
Total Delay (hr)	15.2	23.6	9.0	14.9	21.4	16.8
Total Stops	1028	1036	984	1020	1085	1031
Fuel Used (gal)	19.3	21.4	17.9	19.2	21.0	19.7

Interval #0 Information Seeding

Start Time	4:57
End Time	5:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1813	1909	1837	1791	1869	1844
Vehs Exited	1793	1893	1825	1787	1863	1831
Starting Vehs	21	20	20	20	20	21
Ending Vehs	41	36	32	24	26	29
Travel Distance (mi)	453	470	451	451	468	459
Travel Time (hr)	31.3	40.3	25.0	31.1	38.0	33.1
Total Delay (hr)	15.2	23.6	9.0	14.9	21.4	16.8
Total Stops	1028	1036	984	1020	1085	1031
Fuel Used (gal)	19.3	21.4	17.9	19.2	21.0	19.7

3: Lambert Street & Washington Avenue/Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.2	0.2	0.2
Total Del/Veh (s)	7.5	5.1	7.7	6.6	6.8

4: Auburn Street & Washington Avenue Ext./Garsoe Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	44.6	0.1	0.5	0.6	7.5
Total Del/Veh (s)	164.2	14.5	2.4	2.9	28.2

9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.0	0.6	4.5	4.9	1.5

Total Network Performance

Denied Del/Veh (s)			6.1		
Total Del/Veh (s)			26.5		

Intersection: 3: Lambert Street & Washington Avenue/Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	93	101	82	78
Average Queue (ft)	54	51	47	38
95th Queue (ft)	84	83	72	63
Link Distance (ft)	475	568	542	518
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	524	55	169	103
Average Queue (ft)	327	20	25	10
95th Queue (ft)	573	48	94	55
Link Distance (ft)	555	428	525	501
Upstream Blk Time (%)	2			
Queuing Penalty (veh)	4			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	37	35	40	35
Average Queue (ft)	2	4	11	11
95th Queue (ft)	19	22	36	36
Link Distance (ft)	568	555	176	179
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 4

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1599	1596	1599	1568	1588	1590
Vehs Exited	1604	1596	1591	1560	1590	1588
Starting Vehs	22	15	13	10	17	16
Ending Vehs	17	15	21	18	15	15
Travel Distance (mi)	410	398	407	395	402	402
Travel Time (hr)	19.4	18.4	18.7	18.4	18.6	18.7
Total Delay (hr)	4.5	4.1	3.9	4.2	3.9	4.1
Total Stops	1079	1065	1063	1007	1037	1049
Fuel Used (gal)	15.8	15.3	15.4	15.1	15.5	15.4

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1599	1596	1599	1568	1588	1590
Vehs Exited	1604	1596	1591	1560	1590	1588
Starting Vehs	22	15	13	10	17	16
Ending Vehs	17	15	21	18	15	15
Travel Distance (mi)	410	398	407	395	402	402
Travel Time (hr)	19.4	18.4	18.7	18.4	18.6	18.7
Total Delay (hr)	4.5	4.1	3.9	4.2	3.9	4.1
Total Stops	1079	1065	1063	1007	1037	1049
Fuel Used (gal)	15.8	15.3	15.4	15.1	15.5	15.4

3: Lambert Street & Washington Avenue/Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.1	0.3	0.2
Total Del/Veh (s)	7.2	5.8	6.5	8.6	7.3

4: Auburn Street & Washington Avenue Ext./Garsoe Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.4	0.3
Total Del/Veh (s)	19.4	11.5	1.5	2.3	5.4

9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.7	0.4	3.8	4.7	1.3

Total Network Performance

	EB	WB	NB	SB	All
Denied Del/Veh (s)			0.3		
Total Del/Veh (s)			9.0		

Intersection: 3: Lambert Street & Washington Avenue/Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	99	116	70	118
Average Queue (ft)	53	53	34	63
95th Queue (ft)	85	88	58	98
Link Distance (ft)	475	564	542	518
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LTR
Maximum Queue (ft)	202	129	65	77	27
Average Queue (ft)	79	30	27	10	2
95th Queue (ft)	150	78	56	46	14
Link Distance (ft)	559		428	508	501
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		145			
Storage Blk Time (%)	3	0			
Queuing Penalty (veh)	1	0			

Intersection: 9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	18	25	45	40
Average Queue (ft)	1	1	16	16
95th Queue (ft)	9	12	42	41
Link Distance (ft)	564	559	162	152
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 1

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:57	4:57	4:57	4:57	4:57	4:57
End Time	6:00	6:00	6:00	6:00	6:00	6:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1808	1910	1837	1795	1871	1844
Vehs Exited	1786	1896	1828	1792	1865	1832
Starting Vehs	21	21	20	20	22	22
Ending Vehs	43	35	29	23	28	29
Travel Distance (mi)	451	471	451	452	468	459
Travel Time (hr)	35.9	40.9	24.0	29.4	39.2	33.9
Total Delay (hr)	19.8	24.1	8.0	13.2	22.5	17.5
Total Stops	1058	1067	1001	1030	1154	1060
Fuel Used (gal)	20.1	21.5	17.7	18.9	21.3	19.9

Interval #0 Information Seeding

Start Time	4:57
End Time	5:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:00
End Time	6:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1808	1910	1837	1795	1871	1844
Vehs Exited	1786	1896	1828	1792	1865	1832
Starting Vehs	21	21	20	20	22	22
Ending Vehs	43	35	29	23	28	29
Travel Distance (mi)	451	471	451	452	468	459
Travel Time (hr)	35.9	40.9	24.0	29.4	39.2	33.9
Total Delay (hr)	19.8	24.1	8.0	13.2	22.5	17.5
Total Stops	1058	1067	1001	1030	1154	1060
Fuel Used (gal)	20.1	21.5	17.7	18.9	21.3	19.9

3: Lambert Street & Washington Avenue/Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.2	0.0	0.2	0.2	0.2
Total Del/Veh (s)	7.5	5.1	7.7	6.6	6.8

4: Auburn Street & Washington Avenue Ext./Garsoe Drive Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	44.7	0.1	0.5	0.6	7.5
Total Del/Veh (s)	171.6	15.2	2.4	3.0	29.4

9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext. Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	4.4	0.6	21.9	5.1	3.2

Total Network Performance

Denied Del/Veh (s)			6.1		
Total Del/Veh (s)			27.9		

Intersection: 3: Lambert Street & Washington Avenue/Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	93	100	82	78
Average Queue (ft)	54	51	47	38
95th Queue (ft)	84	83	72	64
Link Distance (ft)	475	568	542	518
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LTR	LTR	LTR
Maximum Queue (ft)	514	170	55	160	98
Average Queue (ft)	336	88	20	22	10
95th Queue (ft)	603	218	48	87	54
Link Distance (ft)	555		428	508	501
Upstream Blk Time (%)	5				
Queuing Penalty (veh)	10				
Storage Bay Dist (ft)		145			
Storage Blk Time (%)	71	0			
Queuing Penalty (veh)	23	0			

Intersection: 9: Lambert Woods South/Lambert Woods North & Washington Avenue Ext.

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	75	35	57	35
Average Queue (ft)	10	4	13	11
95th Queue (ft)	59	22	46	36
Link Distance (ft)	568	555	176	179
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 33

APPENDIX E – CALIBRATED SYNCHRO REPORT **DATA**

HCM Unsignalized Intersection Capacity Analysis 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

AM Peak Hour Pre-Development
09/15/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	139	3	20	10	4	23	15	329	7	4	363	178
Future Volume (Veh/h)	139	3	20	10	4	23	15	329	7	4	363	178
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	139	3	20	10	4	23	15	329	7	4	363	178
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)	6											
Median type	None											
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	848	826	452	834	912	332	541			336		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	848	826	452	834	912	332	541			336		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	48	99	97	96	99	97	99			100		
cM capacity (veh/h)	266	302	608	272	269	709	1028			1223		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	162	37	351	545								
Volume Left	139	10	15	4								
Volume Right	20	23	7	178								
cSH	304	440	1028	1223								
Volume to Capacity	0.53	0.08	0.01	0.00								
Queue Length 95th (ft)	73	7	1	0								
Control Delay (s)	30.2	13.9	0.5	0.1								
Lane LOS	D	B	A	A								
Approach Delay (s)	30.2	13.9	0.5	0.1								
Approach LOS	D	B										
Intersection Summary												
Average Delay	5.2											
Intersection Capacity Utilization	52.6%											
ICU Level of Service	A											
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

4: Auburn Street & Washington Avenue Ext./Garsoe Drive

PM Peak Hour Pre-Dev - Calibrated
09/15/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	176	7	24	4	3	16	12	521	10	15	480	162
Future Volume (Veh/h)	176	7	24	4	3	16	12	521	10	15	480	162
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	176	7	24	4	3	16	12	521	10	15	480	162
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1158	1146	561	1156	1222	526	642			531		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1158	1146	561	1156	1222	526	642			531		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	96	95	97	98	97	99			99		
cM capacity (veh/h)	162	194	527	158	175	552	943			1036		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	207	23	543	657								
Volume Left	176	4	12	15								
Volume Right	24	16	10	162								
cSH	182	322	943	1036								
Volume to Capacity	1.13	0.07	0.01	0.01								
Queue Length 95th (ft)	262	6	1	1								
Control Delay (s)	159.8	17.1	0.4	0.4								
Lane LOS	F	C	A	A								
Approach Delay (s)	159.8	17.1	0.4	0.4								
Approach LOS	F	C										
Intersection Summary												
Average Delay			23.7									
Intersection Capacity Utilization			66.1%		ICU Level of Service					C		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

AM Peak Hour Post-Development_LTR

09/15/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	3	36	10	4	23	21	329	7	4	363	182
Future Volume (Veh/h)	149	3	36	10	4	23	21	329	7	4	363	182
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	149	3	36	10	4	23	21	329	7	4	363	182
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	862	840	454	874	928	332	545			336		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	862	840	454	874	928	332	545			336		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	42	99	94	96	98	97	98			100		
cM capacity (veh/h)	259	294	606	248	262	709	1024			1223		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	188	37	357	549								
Volume Left	149	10	21	4								
Volume Right	36	23	7	182								
cSH	291	420	1024	1223								
Volume to Capacity	0.65	0.09	0.02	0.00								
Queue Length 95th (ft)	103	7	2	0								
Control Delay (s)	37.4	14.4	0.7	0.1								
Lane LOS	E	B	A	A								
Approach Delay (s)	37.4	14.4	0.7	0.1								
Approach LOS	E	B										
Intersection Summary												
Average Delay												
Intersection Capacity Utilization												
Analysis Period (min)												

HCM Unsignalized Intersection Capacity Analysis 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

PM Peak Hour Post-Development_LTR

09/15/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	187	7	32	4	3	16	23	521	10	15	480	178
Future Volume (Veh/h)	187	7	32	4	3	16	23	521	10	15	480	178
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	187	7	32	4	3	16	23	521	10	15	480	178
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1188	1176	569	1206	1260	526	658				531	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1188	1176	569	1206	1260	526	658				531	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	0	96	94	97	98	97	98				99	
cM capacity (veh/h)	153	184	522	142	164	552	930				1036	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	226	23	554	673								
Volume Left	187	4	23	15								
Volume Right	32	16	10	178								
cSH	171	304	930	1036								
Volume to Capacity	1.32	0.08	0.02	0.01								
Queue Length 95th (ft)	331	6	2	1								
Control Delay (s)	231.0	17.8	0.7	0.4								
Lane LOS	F	C	A	A								
Approach Delay (s)	231.0	17.8	0.7	0.4								
Approach LOS	F	C										
Intersection Summary												
Average Delay												
Intersection Capacity Utilization												
Analysis Period (min)												
ICU Level of Service												
C												

HCM Unsignalized Intersection Capacity Analysis AM Peak Hour Post-Development_RT-LT 4: Auburn Street & Washington Avenue Ext./Garsoe Drive

09/15/2022

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	149	3	36	10	4	23	21	329	7	4	363	182								
Future Volume (Veh/h)	149	3	36	10	4	23	21	329	7	4	363	182								
Sign Control	Stop			Stop			Free			Free										
Grade	0%			0%			0%			0%										
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
Hourly flow rate (vph)	149	3	36	10	4	23	21	329	7	4	363	182								
Pedestrians																				
Lane Width (ft)																				
Walking Speed (ft/s)																				
Percent Blockage																				
Right turn flare (veh)	6																			
Median type	None								None											
Median storage veh)																				
Upstream signal (ft)																				
pX, platoon unblocked																				
vC, conflicting volume	862	840	454	856	928	332	545			336										
vC1, stage 1 conf vol																				
vC2, stage 2 conf vol																				
vCu, unblocked vol	862	840	454	856	928	332	545			336										
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1										
tC, 2 stage (s)																				
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2										
p0 queue free %	42	99	94	96	98	97	98			100										
cM capacity (veh/h)	259	294	606	255	262	709	1024			1223										
Direction, Lane #	EB 1	WB 1	NB 1	SB 1																
Volume Total	188	37	357	549																
Volume Left	149	10	21	4																
Volume Right	36	23	7	182																
cSH	321	425	1024	1223																
Volume to Capacity	0.59	0.09	0.02	0.00																
Queue Length 95th (ft)	88	7	2	0																
Control Delay (s)	31.9	14.3	0.7	0.1																
Lane LOS	D	B	A	A																
Approach Delay (s)	31.9	14.3	0.7	0.1																
Approach LOS	D	B																		
Intersection Summary																				
Average Delay	6.0																			
Intersection Capacity Utilization	53.8%			ICU Level of Service					A											
Analysis Period (min)	15																			

HCM Unsignalized Intersection Capacity Analysis PM Peak Hour Post-Development_RT-LT
4: Auburn Street & Washington Avenue Ext./Garsoe Drive 09/15/2022

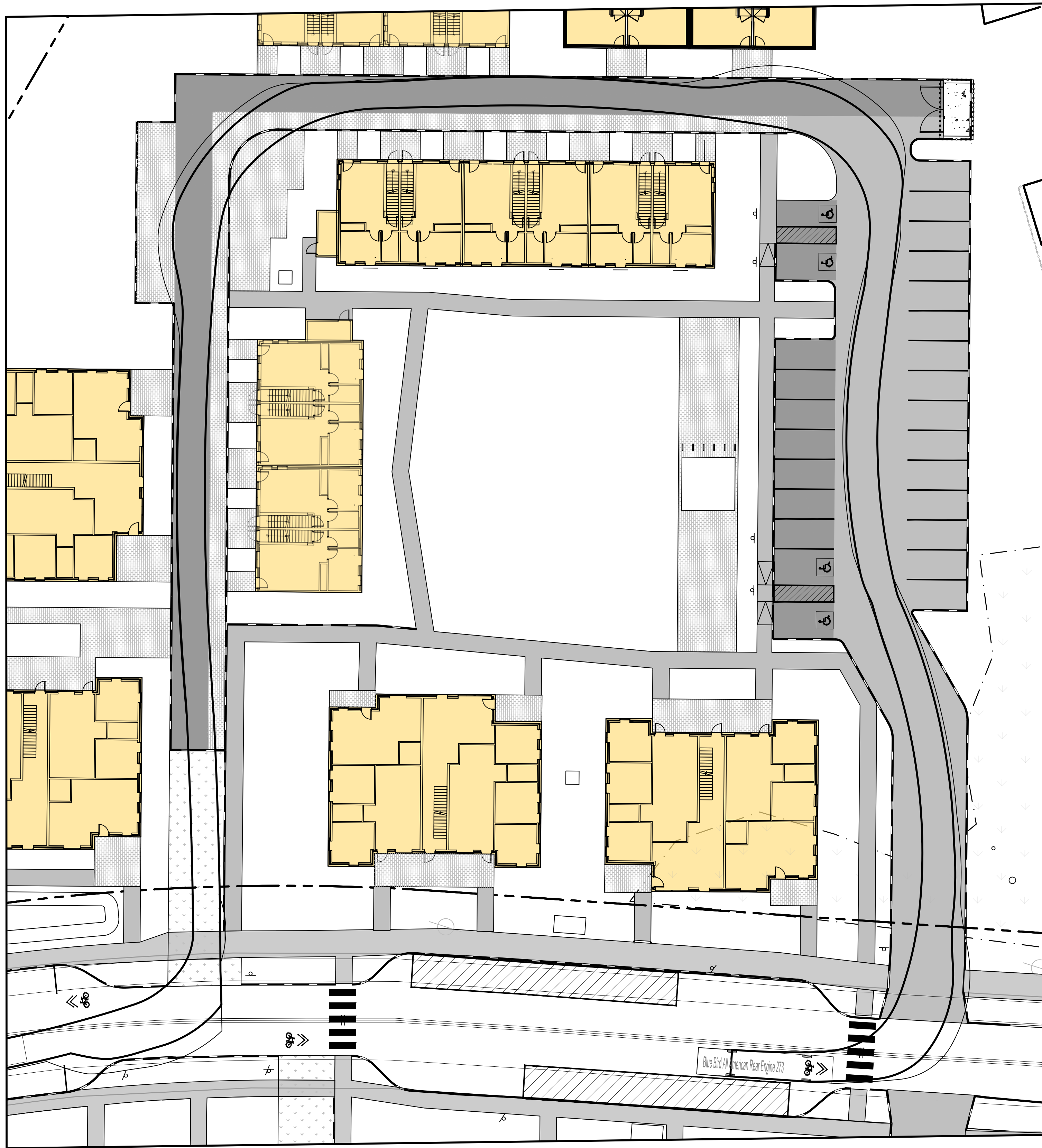
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	187	7	32	4	3	16	23	521	10	15	480	178
Future Volume (Veh/h)	187	7	32	4	3	16	23	521	10	15	480	178
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	187	7	32	4	3	16	23	521	10	15	480	178
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			6									
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1188	1176	569	1190	1260	526	658			531		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1188	1176	569	1190	1260	526	658			531		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	96	94	97	98	97	98			99		
cM capacity (veh/h)	153	184	522	145	164	552	930			1036		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	226	23	554	673								
Volume Left	187	4	23	15								
Volume Right	32	16	10	178								
cSH	175	307	930	1036								
Volume to Capacity	1.29	0.07	0.02	0.01								
Queue Length 95th (ft)	323	6	2	1								
Control Delay (s)	218.1	17.7	0.7	0.4								
Lane LOS	F	C	A	A								
Approach Delay (s)	218.1	17.7	0.7	0.4								
Approach LOS	F	C										
Intersection Summary												
Average Delay			34.1									
Intersection Capacity Utilization			65.8%		ICU Level of Service				C			
Analysis Period (min)			15									

APPENDIX F – TRAFFIC SIGNAL WARRANT

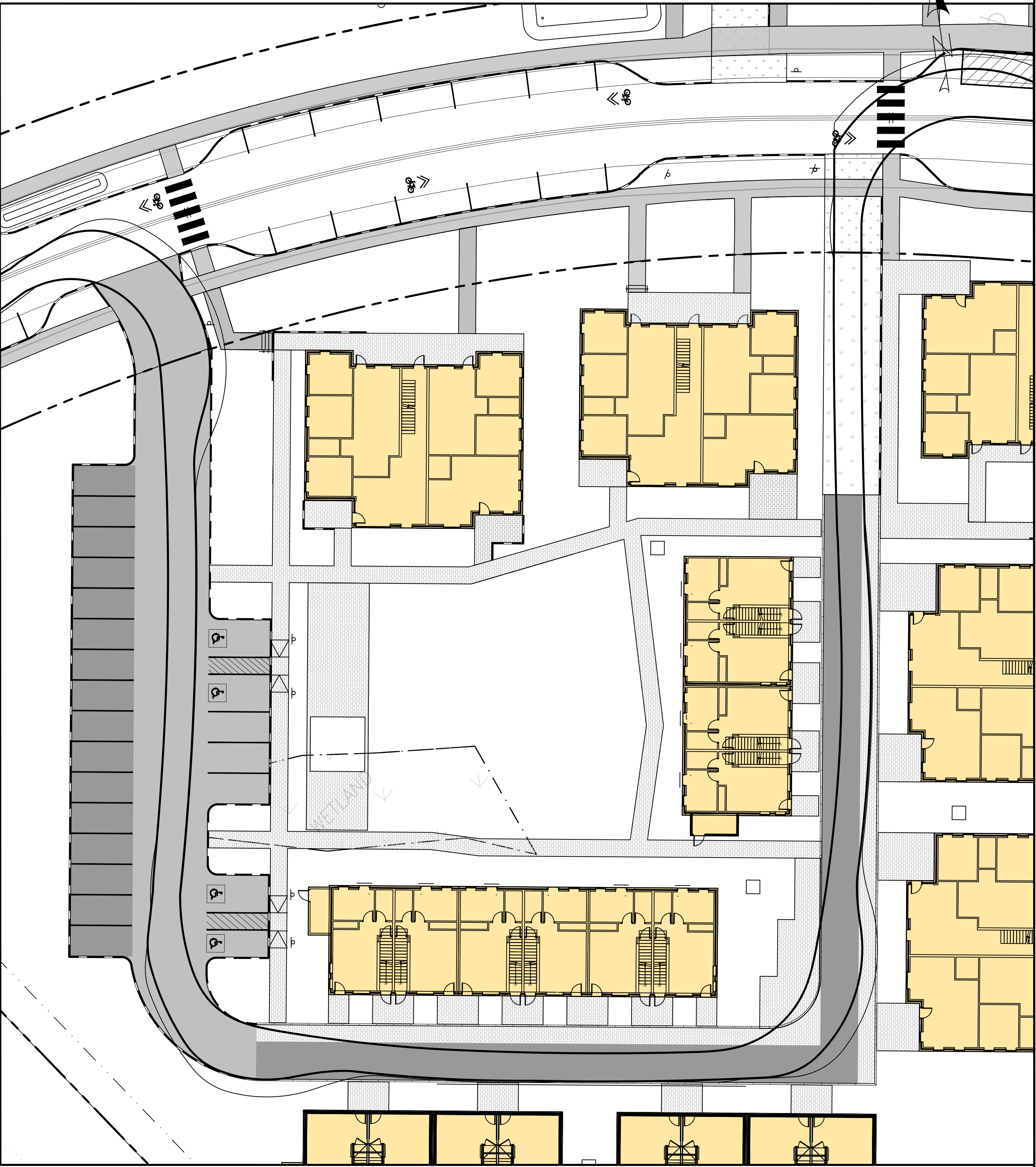
TOWN: Portland ROUTE: 100								ENG: JWS DATE: 8/16/2022							
LOCATION: Auburn Street and Washington Street Extension_Post Development Analysis															
AREA TYPE (URBAN=U, RURAL OR 85TH PERCENTILE SPEED>40=R): R															
TIME BEG HR	MAJOR STREET #OF LANES: 1			MINOR STREET #OF LANES: 1			MINIMUM VEH. VOLUME WARRANT			80% Combo Warrant Met?	INTERRUPTION OF TRAFFIC WARRANT			80% Combo Warrant Met?	
	SB APP.	NB APP.	TOTAL	EB APP.	WB APP.	HIGHER	Major Rd 350	Minor Rd 105	Met?		Major Rd 525	Minor Rd 53	Met?		
12 AM	0	0	0	0	0	0	0%	0%			0%	0%			
1 AM	0	0	0	0	0	0	0%	0%			0%	0%			
2 AM	0	0	0	0	0	0	0%	0%			0%	0%			
3 AM	0	0	0	0	0	0	0%	0%			0%	0%			
4 AM	0	0	0	0	0	0	0%	0%			0%	0%			
5 AM	0	0	0	0	0	0	0%	0%			0%	0%			
6 AM	336	152	488	69	9	69	139%	65%			93%	129%		YES	
7 AM	558	300	858	174	37	174	245%	166%	YES	YES	164%	329%	YES	YES	
8 AM	533	314	847	179	25	179	242%	171%	YES	YES	161%	338%	YES	YES	
9 AM	383	252	635	117	19	117	182%	112%	YES	YES	121%	222%	YES	YES	
10 AM	367	271	638	123	13	123	182%	117%	YES	YES	122%	233%	YES	YES	
11 AM	390	281	670	133	28	133	192%	127%	YES	YES	128%	251%	YES	YES	
12 PM	419	350	769	130	13	130	220%	124%	YES	YES	147%	245%	YES	YES	
1 PM	385	307	692	116	19	116	198%	111%	YES	YES	132%	219%	YES	YES	
2 PM	409	356	764	140	21	140	218%	133%	YES	YES	146%	264%	YES	YES	
3 PM	483	444	927	173	23	173	265%	165%	YES	YES	177%	326%	YES	YES	
4 PM	567	492	1060	215	24	215	303%	205%	YES	YES	202%	406%	YES	YES	
5 PM	580	457	1037	148	29	148	296%	141%	YES	YES	198%	279%	YES	YES	
6 PM	0	0	0	0	0	0	0%	0%			0%	0%			
7 PM	0	0	0	0	0	0	0%	0%			0%	0%			
8 PM	0	0	0	0	0	0	0%	0%			0%	0%			
9 PM	0	0	0	0	0	0	0%	0%			0%	0%			
10 PM	0	0	0	0	0	0	0%	0%			0%	0%			
11 PM	0	0	0	0	0	0	0%	0%			0%	0%			
TOTAL HOURS MET:									11	11				11	12

TOWN: Portland ROUTE: 100 LOCATION: Auburn Street and Washington Street Extension_Existing Conditions AREA TYPE (URBAN=U, RURAL OR 85TH PERCENTILE SPEED>40=R):										ENG: JWS DATE: 8/16/2022 R						
TIME BEG HR	MAJOR STREET #OF LANES: 1			MINOR STREET #OF LANES: 1			MINIMUM VEH. VOLUME WARRANT			80% Combo Warrant Met?	INTERRUPTION OF TRAFFIC WARRANT			80% Combo Warrant Met?		
	SB APP.	NB APP.	TOTAL	EB APP.	WB APP.	HIGHER	Major Rd 350	Minor Rd 105	Met?		Major Rd 525	Minor Rd 53	Met?			
12 AM	0	0	0	0	0	0	0%	0%			0%	0%				
1 AM	0	0	0	0	0	0	0%	0%			0%	0%				
2 AM	0	0	0	0	0	0	0%	0%			0%	0%				
3 AM	0	0	0	0	0	0	0%	0%			0%	0%				
4 AM	0	0	0	0	0	0	0%	0%			0%	0%				
5 AM	0	0	0	0	0	0	0%	0%			0%	0%				
6 AM	323	144	467	50	9	50	133%	48%			89%	95%		YES		
7 AM	536	285	821	117	37	117	235%	112%	YES	YES	156%	221%	YES	YES		
8 AM	513	297	809	129	25	129	231%	122%	YES	YES	154%	243%	YES	YES		
9 AM	368	239	607	78	19	78	173%	74%			116%	146%	YES	YES		
10 AM	353	256	609	84	13	84	174%	80%		YES	116%	159%	YES	YES		
11 AM	374	266	640	94	28	94	183%	89%		YES	122%	177%	YES	YES		
12 PM	392	330	722	97	13	97	206%	93%		YES	138%	184%	YES	YES		
1 PM	360	289	650	85	19	85	186%	81%		YES	124%	161%	YES	YES		
2 PM	382	336	718	106	21	106	205%	101%	YES	YES	137%	200%	YES	YES		
3 PM	452	420	872	129	23	129	249%	122%	YES	YES	166%	243%	YES	YES		
4 PM	531	464	996	165	24	165	285%	158%	YES	YES	190%	312%	YES	YES		
5 PM	543	431	974	110	29	110	278%	104%	YES	YES	186%	207%	YES	YES		
6 PM	0	0	0	0	0	0	0%	0%			0%	0%				
7 PM	0	0	0	0	0	0	0%	0%			0%	0%				
8 PM	0	0	0	0	0	0	0%	0%			0%	0%				
9 PM	0	0	0	0	0	0	0%	0%			0%	0%				
10 PM	0	0	0	0	0	0	0%	0%			0%	0%				
11 PM	0	0	0	0	0	0	0%	0%			0%	0%				
TOTAL HOURS MET:										6	10				11	12

APPENDIX G – OFF SITE IMPROVEMENTS

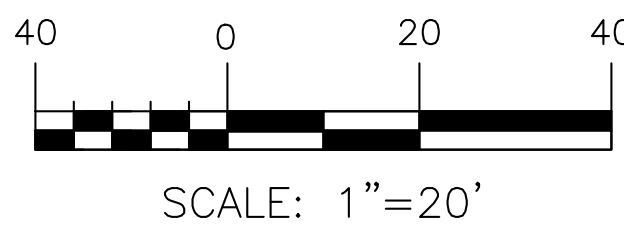


41' FIRE TEMPLATE ON NORTH SIDE OF DEVELOPMENT



41' FIRE TEMPLATE ON SOUTH SIDE OF DEVELOPMENT

Blue Bird All American Rear Engine 273	
Overall Length	40.789ft
Overall Width	8.000ft
Overall Body Height	10.500ft
Min. Body Ground Clearance	1.088ft
Track Width	8.000ft
Lock-to-lock time	8.00s
Max Wheel Angle	50.00°



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BY
DATE

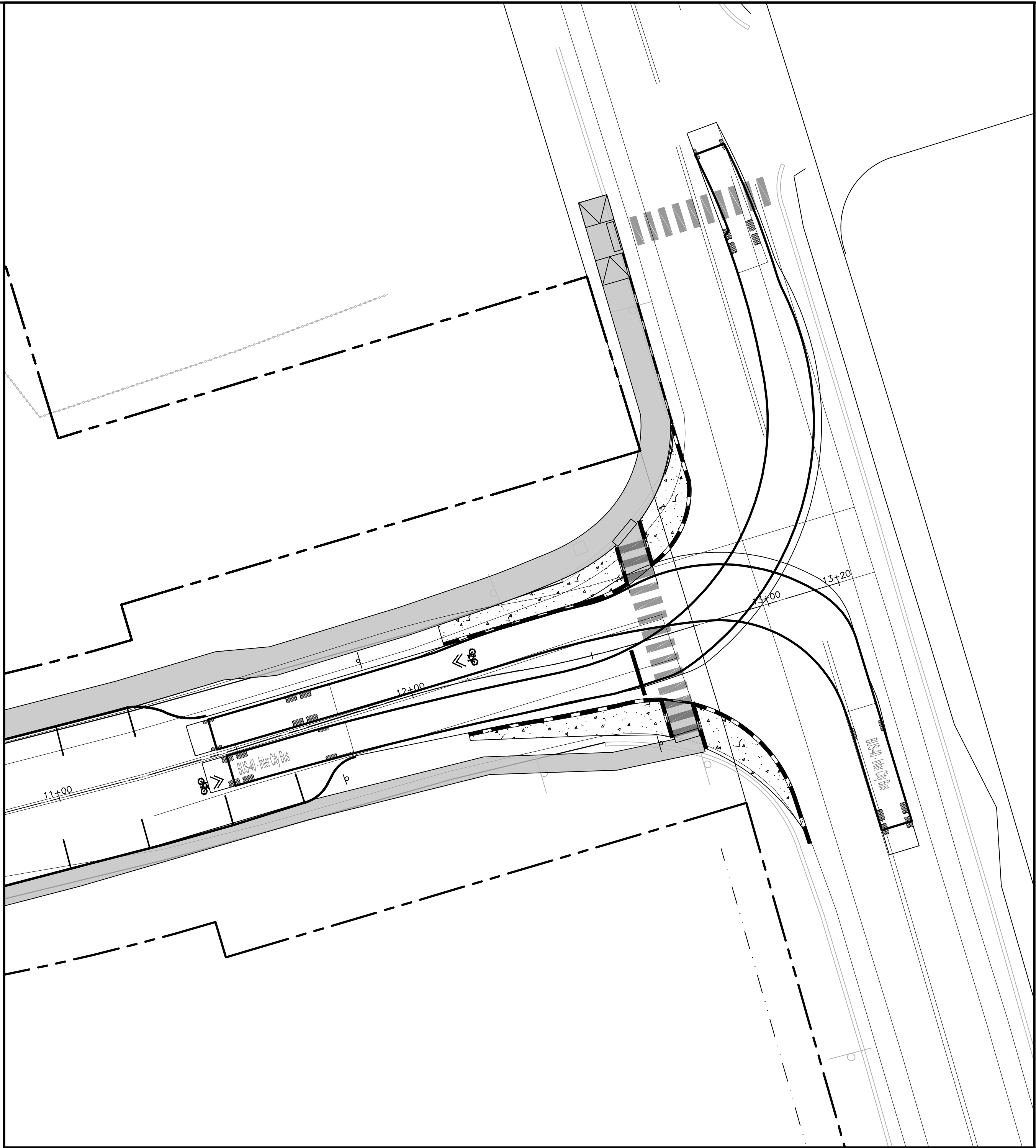
41' FIRE TURNING TEMPLATE
PROJECT NAME/ADDRESS:
165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103
CLIENT/OWNER OF RECORD:
MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

ENGINEERING, INC.
ACORN ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101
(207) 775-2655
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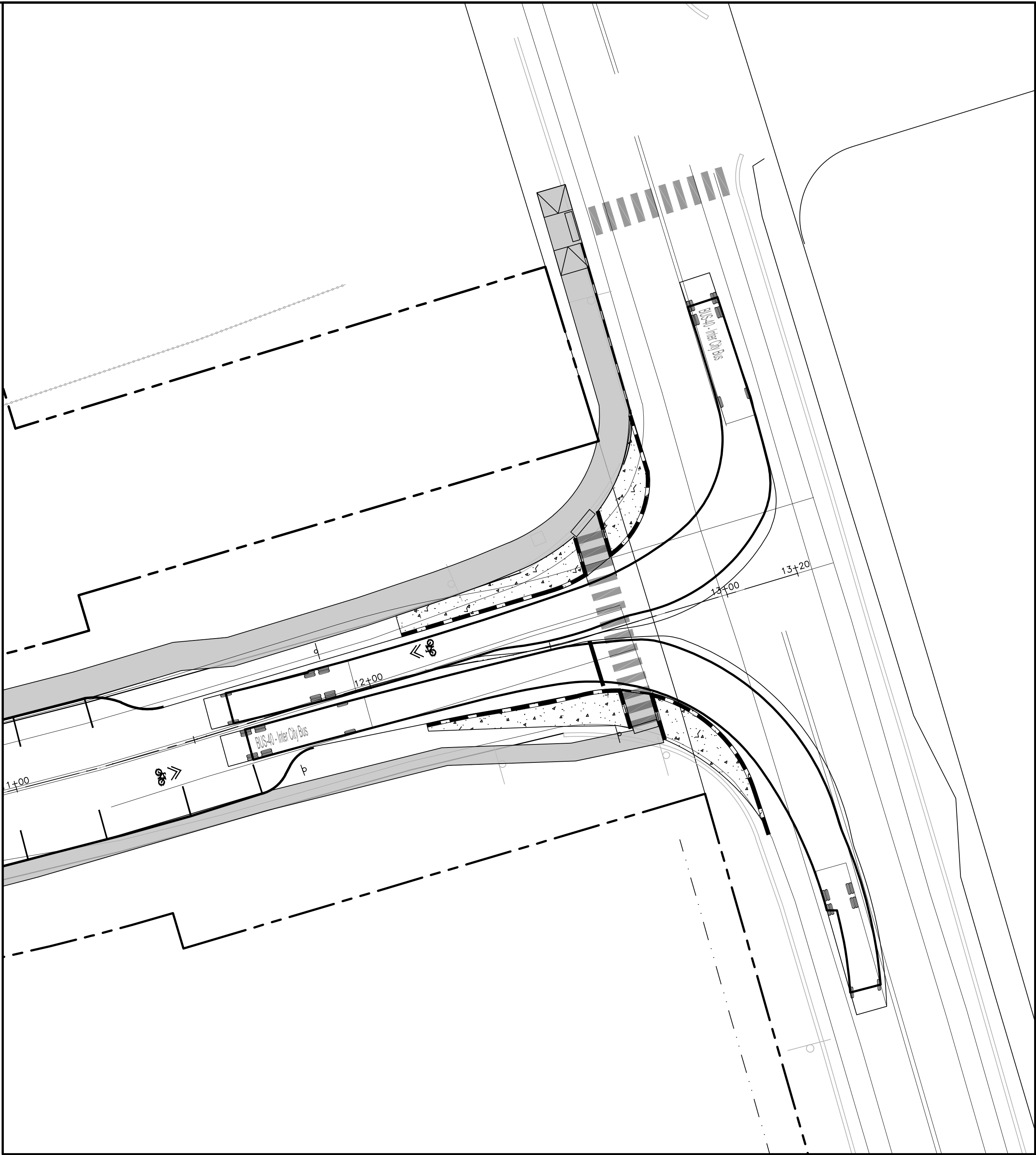
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JN: 1145
SCALE: AS NOTED
DESIGNED BY: SUL
DRAWN BY: NPH
CHECKED BY: WHS

STATE OF MAINE
SAMUEL J. LEBEL
REGISTERED PROFESSIONAL ENGINEER
6/1/2020

DRAWING NO.
TT1



40' BUS LEFT HAND TURN TEMPLATES



40' BUS RIGHT HAND TURN TEMPLATES

BUS-40 - Inter City Bus	
Overall Length	40.500ft
Overall Width	8.500ft
Overall Body Height	12.000ft
Min Body Ground Clearance	1.158ft
Track Width	8.500ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	41.90°



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BY

DATE

AUBURN STREET BUS TURN TEMPLATE

PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD: MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

ENGINEERING, INC.

ACORN ENGINEERING, INC.

PO BOX 3372, PORTLAND MAINE 04101

(207) 775-2655

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FILE: 1145_CIVIL

JN: 1145

SCALE: AS NOTED

DESIGNED BY: SJL

DRAWN BY: NPH

CHECKED BY: WHS

STATE OF MAINE

SAMUEL J. LEBEL

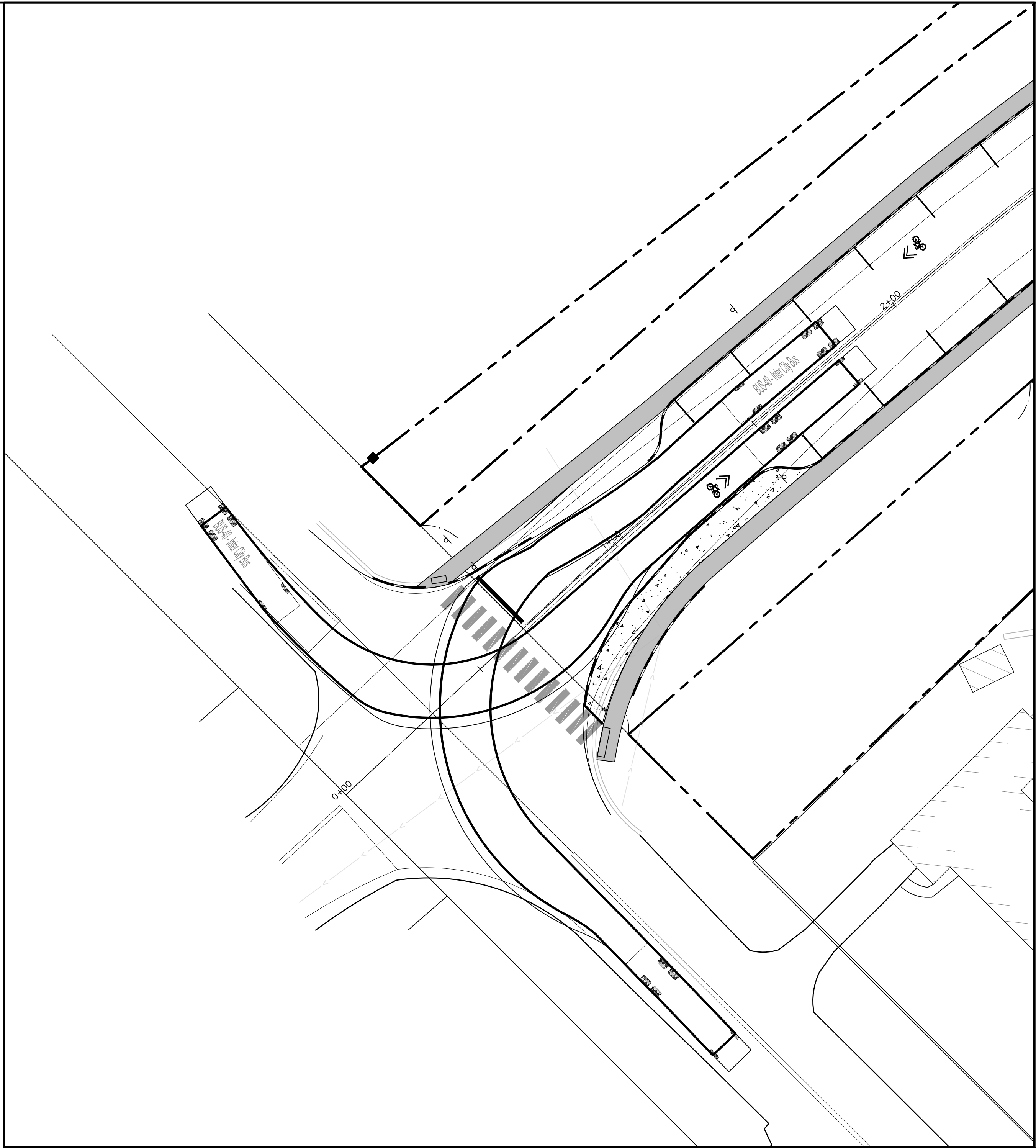
REGISTERED PROFESSIONAL ENGINEER

67542

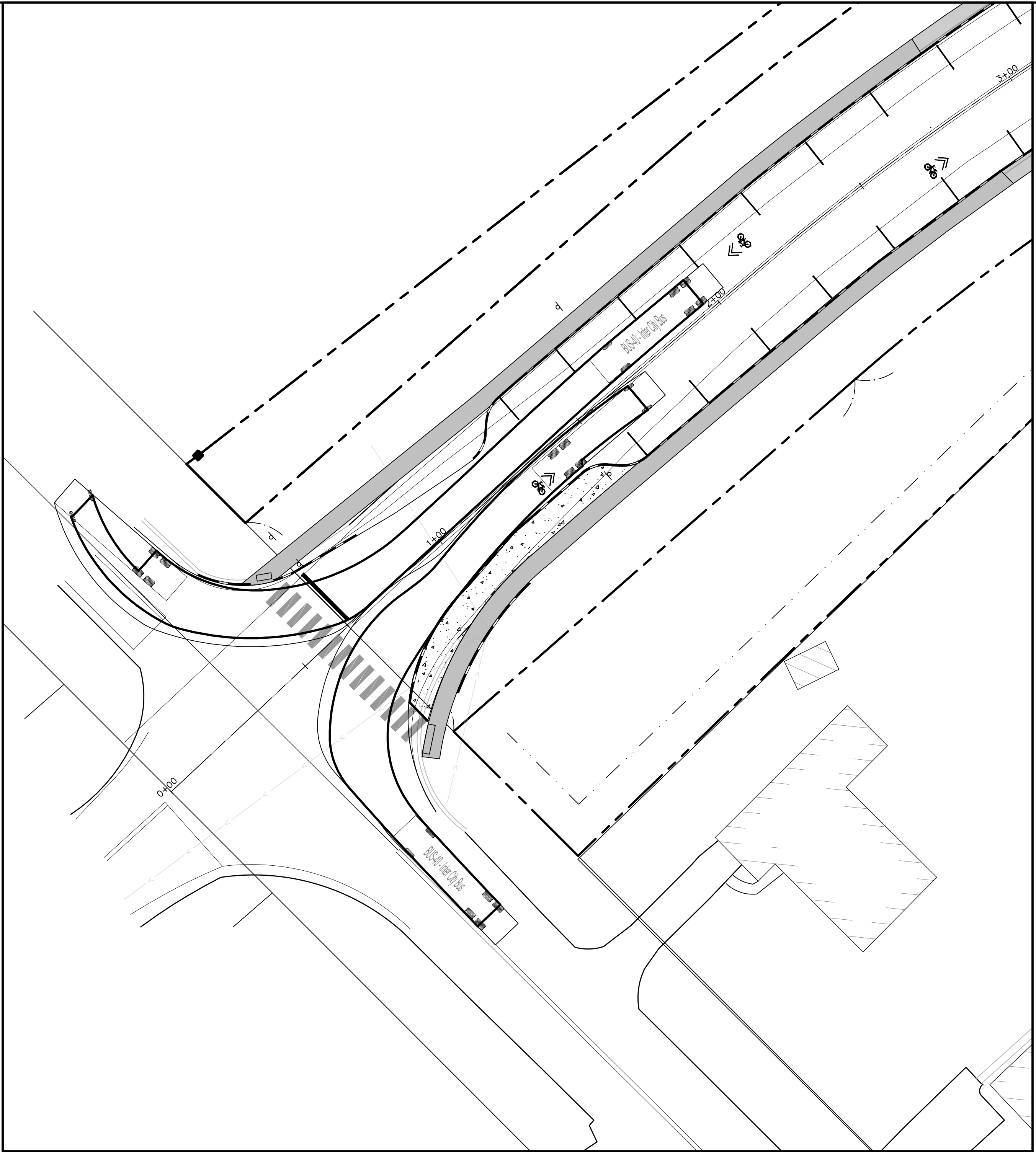
DRAWING NO.

TT2

Page 557



40' BUS LEFT HAND TURN TEMPLATE



40' BUS RIGHT HAND TURN TEMPLATE

BUS-40 - Inter City Bus

Overall Length	40.500ft
Overall Width	8.500ft
Overall Body Height	12.000ft
Min Body Ground Clearance	1.580ft
Track Width	8.500ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	41.90°



SCALE: 1"=20'

PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR
BY
DATE

LAMBERT STREET BUS TURN TEMPLATE

PROJECT NAME/ADDRESS:
165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD:
MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

ENGINEERING, INC.

ACORN ENGINEERING, INC.
P.O. BOX 3372, PORTLAND MAINE 04101
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FILE: 1145_CIVIL

JN: 1145

SCALE: AS NOTED

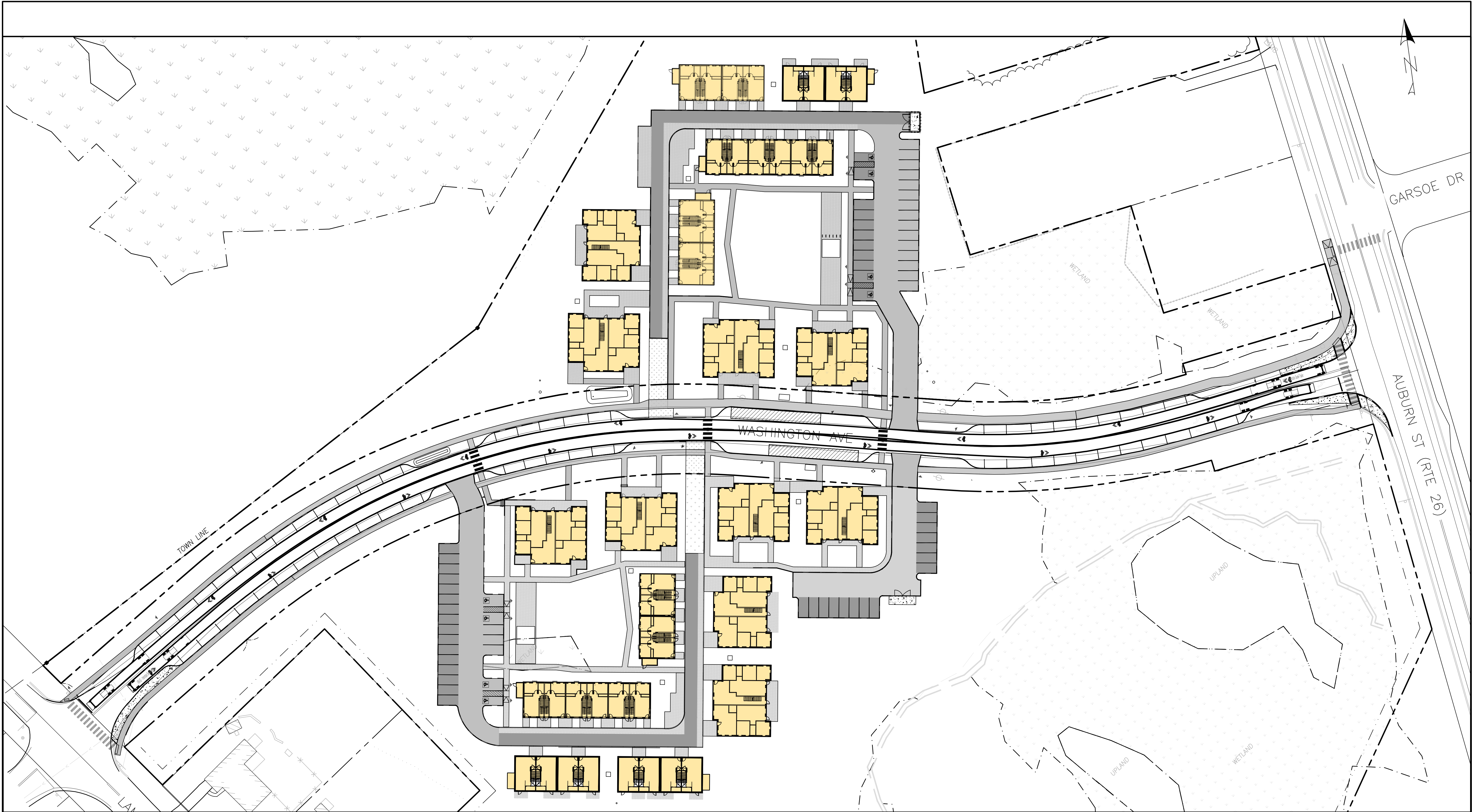
DESIGNED BY: SJL

DRAWN BY: NPH

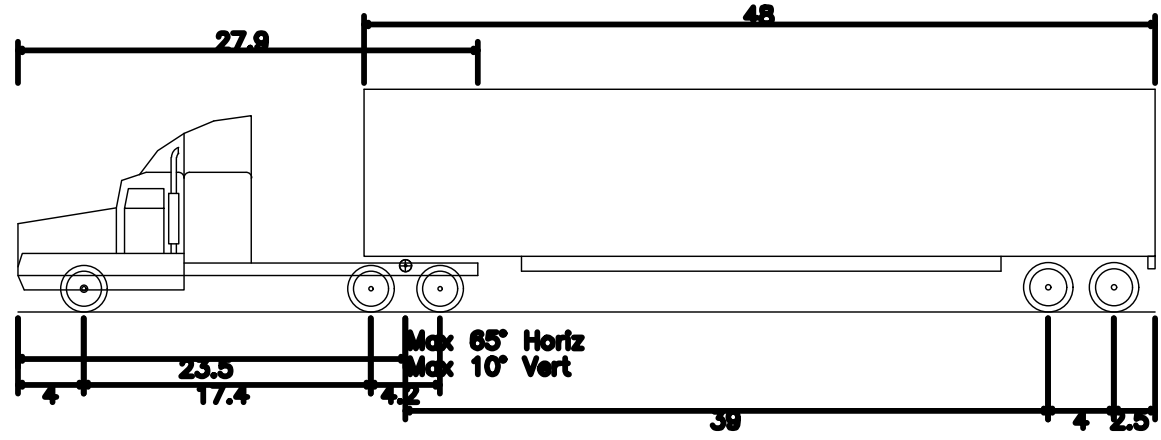
CHECKED BY: WHS

STATE OF MAINE
SAMUEL J. LEBEL
REGISTERED PROFESSIONAL ENGINEER
6/1/2020

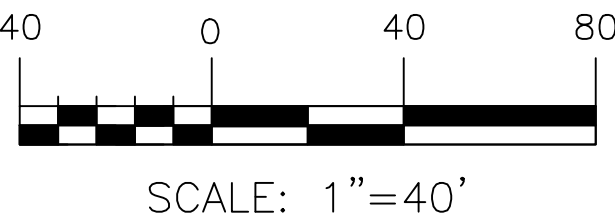
DRAWING NO.
TT3



WB-62 TEMPLATE ON WASHINGTON AVE. EXTENSION



WB-62 - Interstate Semi-Trailer	
Overall Length	69.00ft
Overall Width	8.50ft
Overall Body Height	13.50ft
Min Body Ground Clearance	1.34ft
Max Track Width	8.50ft
Lock-to-lock width	6.00ft
Max Steering Angle (Virtual)	28.40°



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ISSUED FOR

BY DATE

DRAWING NAME

WB 62 WASHINGTON EXTENSION TEMPLATE

PROJECT NAME/ADDRESS

165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD

MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

ACORN ENGINEERING, INC.

ACORN ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101
(207) 775-2655

FILE:

1145_CIVIL

JN:

1145

SCALE:

AS NOTED

DESIGNED BY:

SJL

DRAWN BY:

NPH

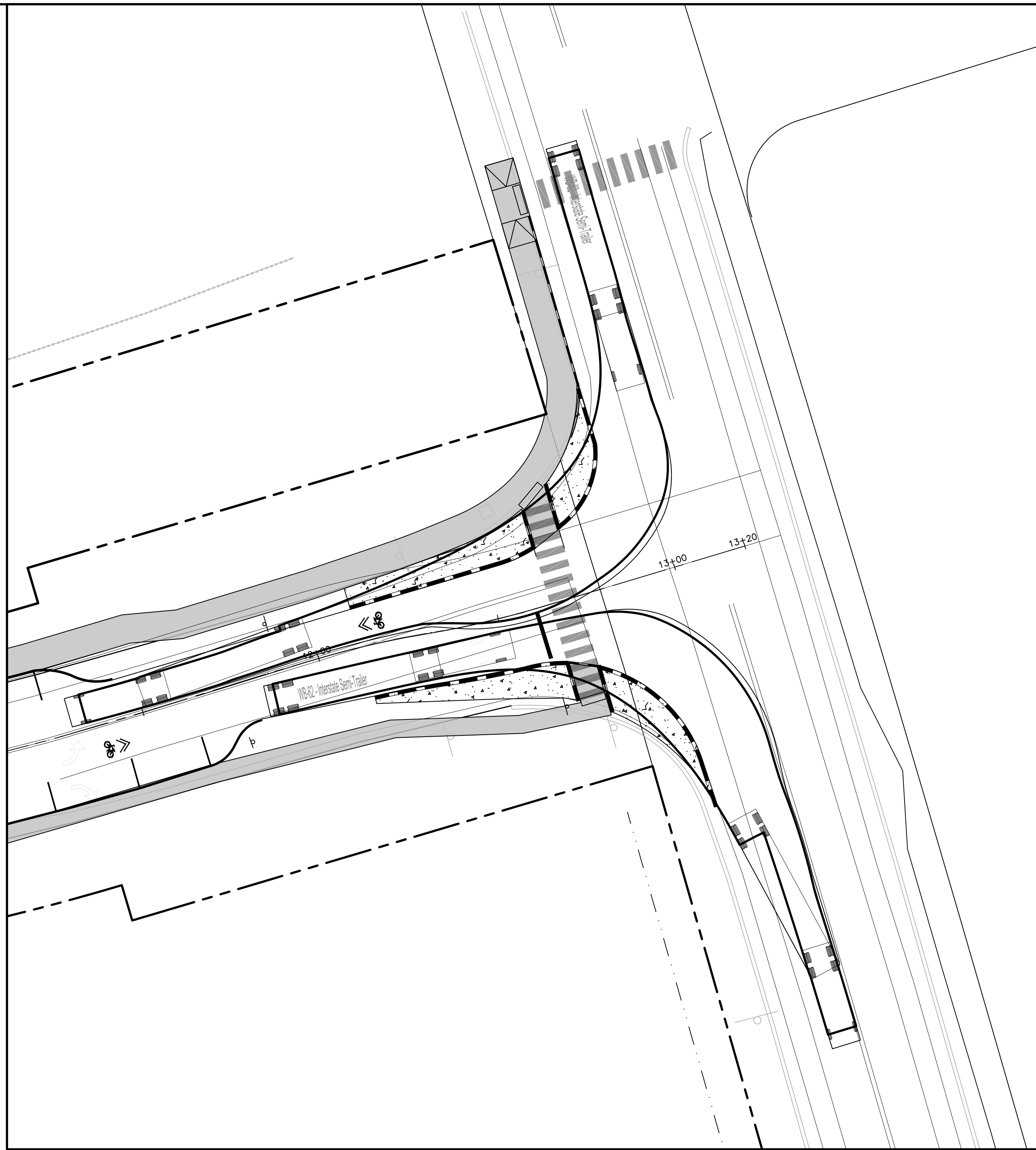
CHECKED BY:

WHS

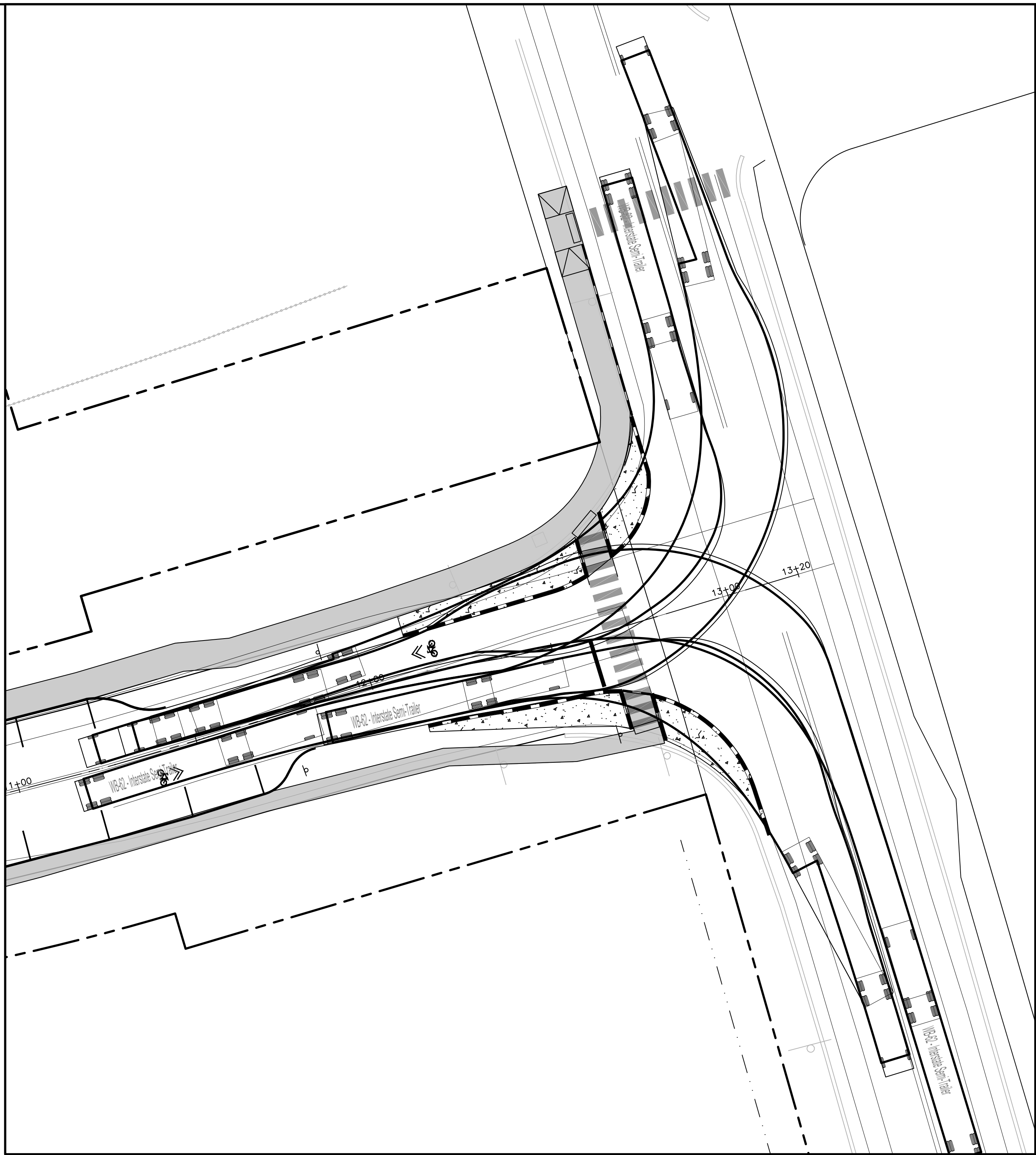
STATE OF MAINE
SAMUEL J. LEBEL
REGISTERED PROFESSIONAL ENGINEER
6/15/21

DRAWING NO.

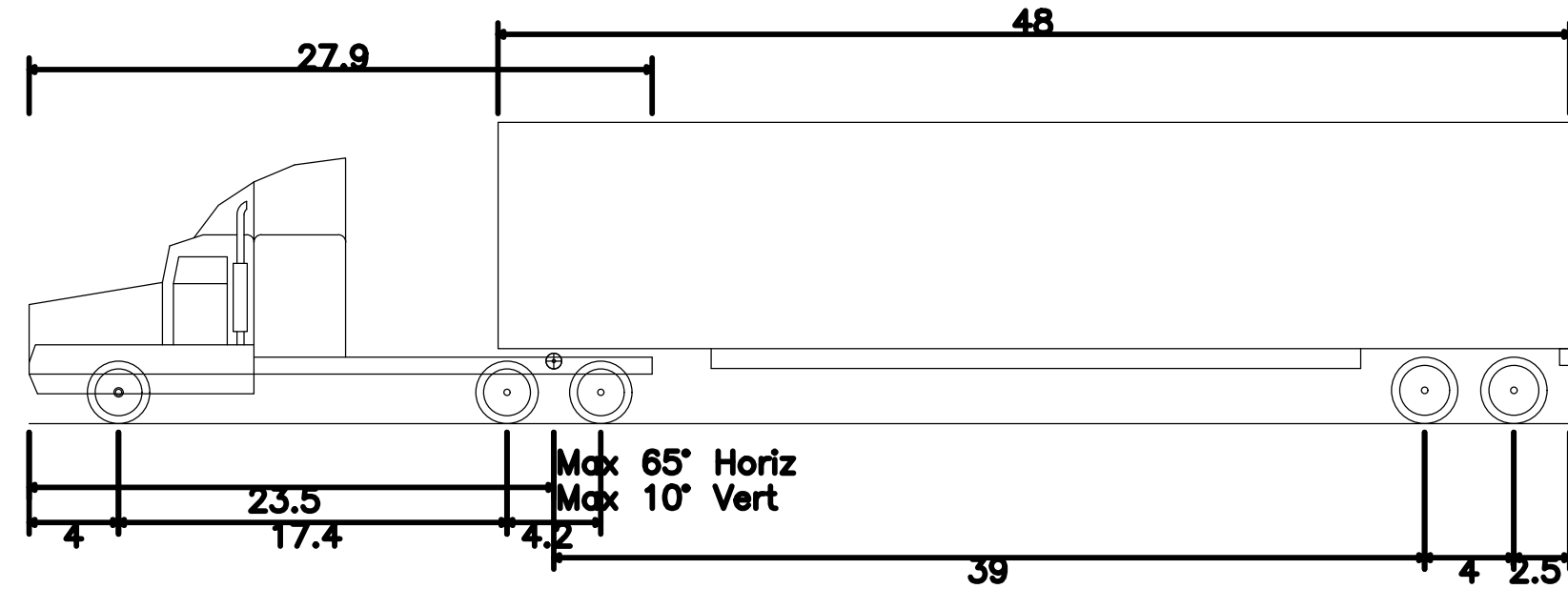
TT4



WB-62 RIGHT HAND TURN TEMPLATES



WB-62 LEFT HAND TURN TEMPLATES



WB-62 — Interstate Semi-Trailer
Overall Length 69.000ft
Overall Width 8.500ft
Overall Body Height 13.500ft
Min Body Ground Clearance 1.334ft
Max Track Width 8.500ft
Lock-to-lock time 6.00s
Max Steering Angle (Virtual) 28.40°



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DATE

AUBURN STREET WB-62 TURN TEMPLATE

PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD: MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

ENGINEERING, INC.

ACORN ENGINEERING, INC.

PO BOX 3372, PORTLAND MAINE 04101

(207) 775-2655

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FILE: 1145_CIVIL

JN: 1145

SCALE: AS NOTED

DESIGNED BY: SJL

DRAWN BY: NPH

CHECKED BY: WHS

STATE OF MAINE

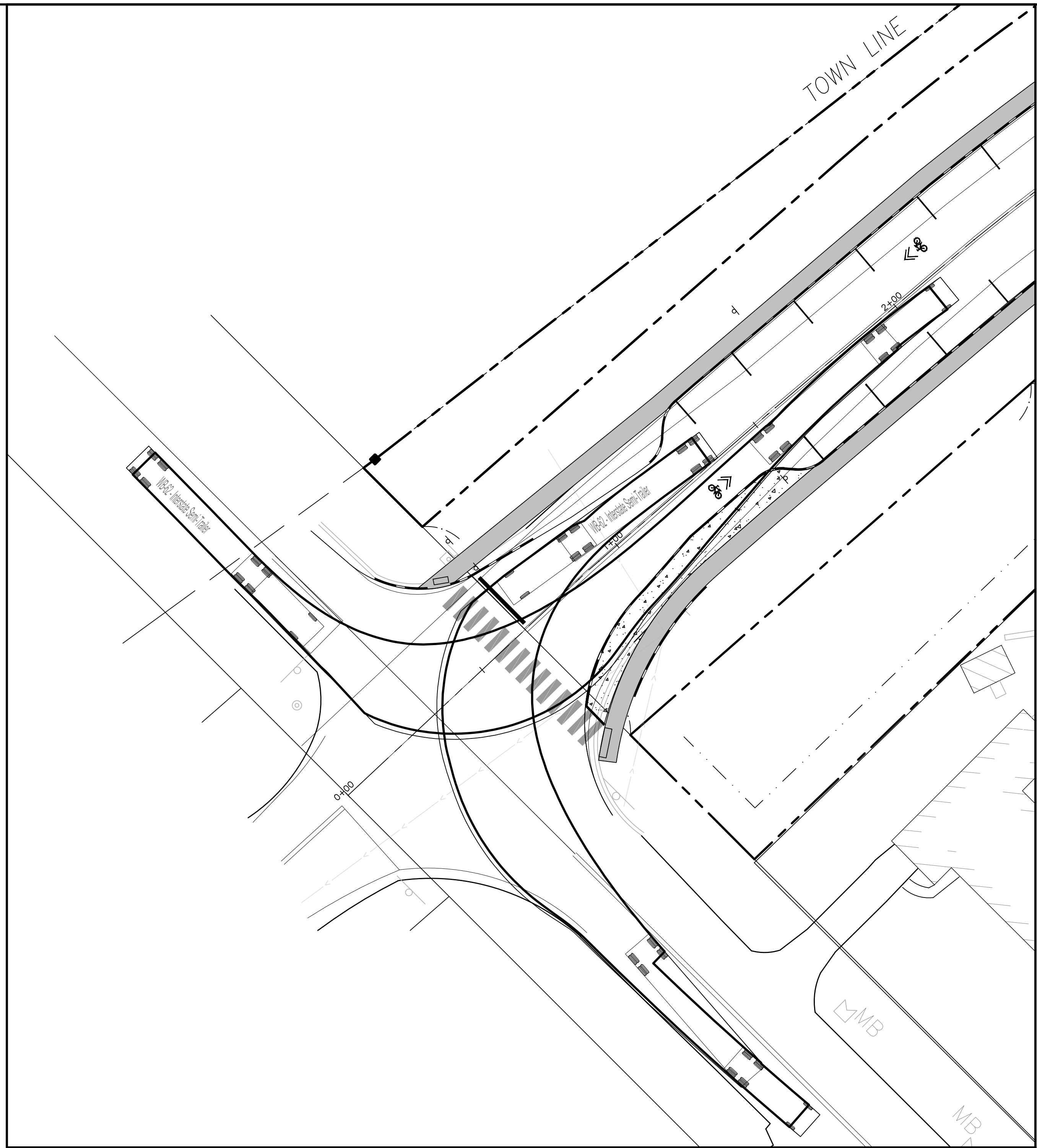
SAMUEL J. LEBEL

REGISTERED PROFESSIONAL ENGINEER

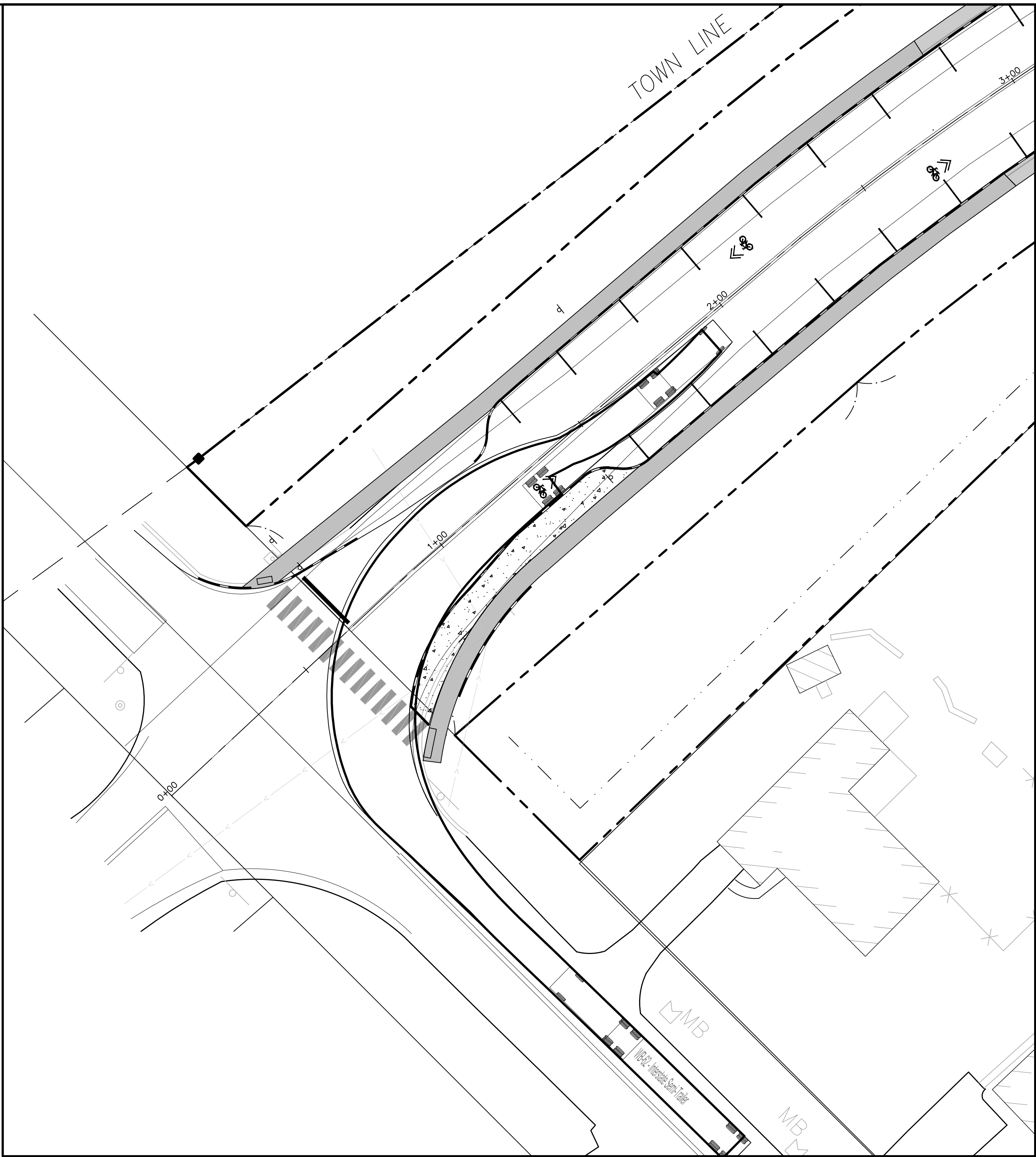
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DRAWING NO.

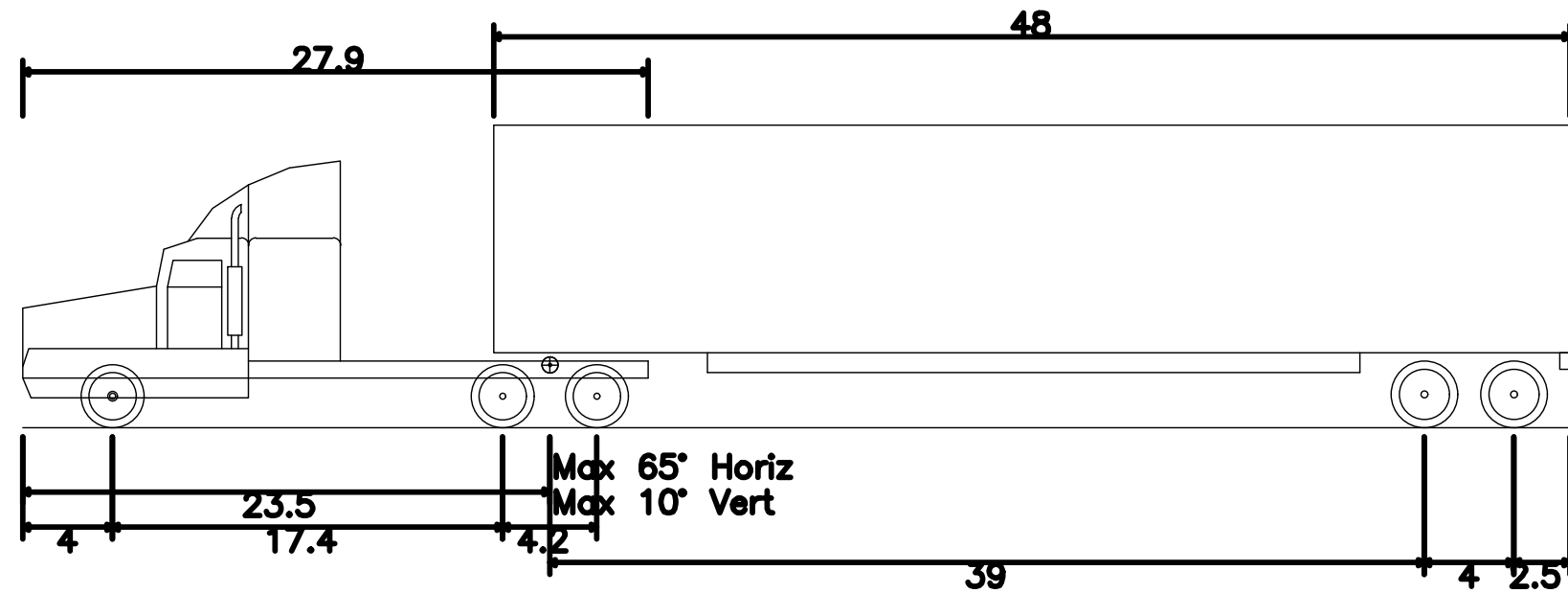
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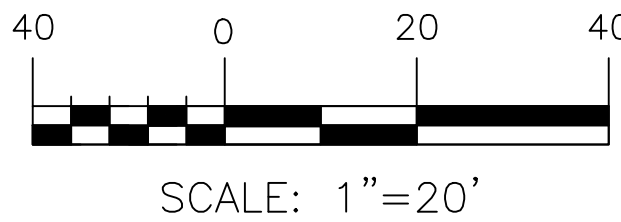
WB-62 LEFT HAND TURN TEMPLATES



WB-62 RIGHT HAND TURN TEMPLATES



WB-62 — Interstate Semi-Trailer
Overall Length 69.000ft
Overall Width 8.500ft
Overall Body Height 13.500ft
Min Body Ground Clearance 1.334ft
Max Track Width 8.500ft
Lock-to-lock time 6.00s
Max Steering Angle (Virtual) 28.40°



PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR		BY
DATE		DATE
LAMBERT STREET WB-62 TURN TEMPLATE		
PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP PORTLAND, MAINE 04103		
CLIENT/OWNER OF RECORD: MAINE COOPERATIVE DEVELOPMENT PARTNERS PORTLAND, MAINE		
DRAWING NAME: LAMBERT STREET WB-62 TURN TEMPLATE		
PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP PORTLAND, MAINE 04103		
CLIENT/OWNER OF RECORD: MAINE COOPERATIVE DEVELOPMENT PARTNERS PORTLAND, MAINE		
FILE: 1145_CIVIL		
JN: 1145		
SCALE: AS NOTED		
DESIGNED BY: SJL		
DRAWN BY: NPH		
CHECKED BY: WHS		
DRAWING NO. TT6		



Lambert Woods Cooperative Housing Transportation Demand Management Plan

September 20, 2022

Summary

Cushman Transportation Consulting, LLC provides this Transportation Demand Management (TDM) Plan for Maine Cooperative Development Partner's (MCDP) Lambert Woods Housing Development, located on two former city parcels at 165 Lambert and 622 Auburn Streets. Specifically, this is the construction of 162 new transit-oriented, income-restricted, cooperatively owned housing units – as well as transportation infrastructure improvements and open space - on what until now has been undeveloped and underutilized municipal property. The Portland Housing Authority (PHA) will be hired to manage the property long-term.

Site Overview at Lambert Woods

- **Residential housing:** a total of 125,338 square feet and 162 dwelling units:
 - 8 three-story rowhomes, and 6 three-story flats
 - 2 studios, 74 one-bedroom, 30 two-bedroom, and 56 three-bedroom units
 - 25% of units are for people with incomes of up to 80% of Area Median Income (AMI) and 75% of units are for people with incomes of up to 100% of AMI
- **Parking:** 67 off-street surface parking spaces and 56 new on-street spaces
- **Transportation improvements:** bus shelters and seating, multi-use and pedestrian paths, lighting, crosswalks, pedestrian and bicycle signage, on-street parking and reduced lane widths and intersection traffic calming, and unloading zone for package deliveries and restricted driving areas to reduce on-site vehicle traffic

TDM Plan & Targets

This project is a key opportunity for transit-oriented and more affordable housing in the City of Portland, for people who are employed locally, have children, are disabled, and/or are retired. The site's TDM Plan works further to encourage multimodal trips to and from the site, reduce parking demand, and significantly benefit the local transportation system. This includes marketing the housing to nearby employees; reducing parking; offering on-site amenities; and supporting transportation alternatives such as walking, bicycling and using public transportation.

The plan sets the following TDM targets for 3 years after Lambert Woods is fully occupied. These targets will be reassessed after the first full year of occupancy by tenants:

- 25% of all resident trips to be multimodal
- maintain up to .45 parking space per unit ratio

COVID-19 NOTE: Site occupancy is forecast for 2024 and, while COVID-19 variants continue to be disruptive, we have learned much in the past two years regarding managing the virus' impact on daily life – including through vaccinations first made available last year and consistent use of non-pharmaceutical interventions such as wearing masks. Transportation alternatives that were deemed less viable during the early wave of the pandemic - such as transit and carpooling – are anticipated to continue to make significant recoveries, with marketing and other efforts. COVID-related parking demand increases due to driving alone are also expected to decline. In addition, TDM efforts will likely be supported by long-term cultural changes in walking, bicycling, use of teleservices and working from home.

Interim Site TDM Coordinator:

Brian Eng, Maine Cooperative Development Partners, bri.d.eng@gmail.com, (413) 262-2610

TDM Table of Contents

A.	Property Description & Transportation Context	2
B.	Lambert Woods TDM Coordination	18
C.	Site Transportation Projections & TDM Targets	19
D.	Trip and Parking Reduction Strategies	21
E.	Plan for Monitoring, Data Collection and Reporting	26

Cushman Transportation Consulting, LLC, 94 Beckett Street, 2nd Floor, Portland, ME 04101
Tel: (207) 200-1910 E-mail: sarah@sarahcushman.com www.sarahcushman.com

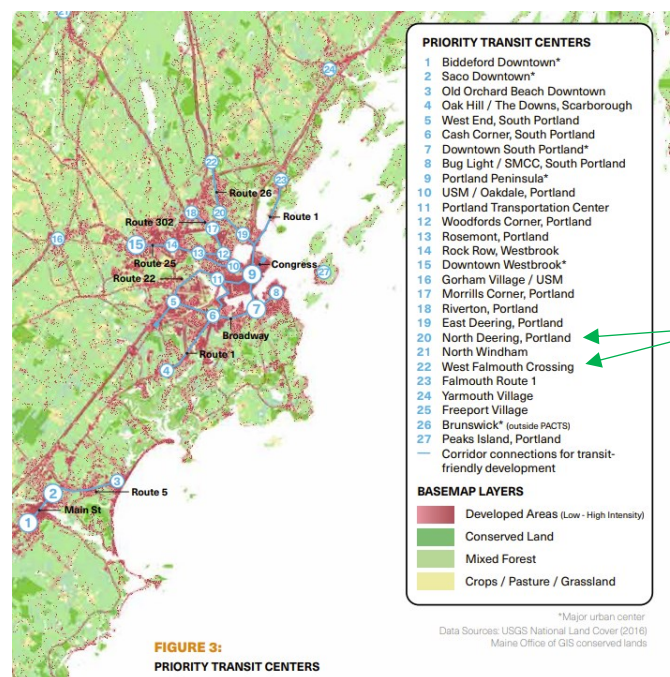


A. Property Description & Transportation Context

The Lambert Woods development is comprised of 165 Lambert Street and 622 Auburn Street - two of four parcels chosen by the City of Portland in separate RFPs from 2020 and 2021, to be redeveloped as robust mixed-income, multi-generational housing. Maine Cooperative Development Partners was chosen to develop the property included in the 2020 RFP (165 Lambert Street). MCDP was then also awarded the 2021 RFP, which included 622 Auburn Street and 0 Gray Road (located in Falmouth). Of the awarded parcels, the development will occur on the 165 Lambert Street and 622 Auburn Street properties. The project is expected to be completed in 2024.

Located in Portland's North Deering Neighborhood on the Portland/Falmouth town line, Lambert Woods is on a quiet stretch of Washington Avenue Extension, that is also part of the regional Sebago to the Sea Trail. Just beyond the development on both sides are two busy north-south commuter corridors – Lambert Street/Blackstrap Road and Auburn Street/Gray Road (State Routes 26 and 100).

One of these, Route 26/100, is a Priority Transit Corridor of the Portland Area Comprehensive Transportation System (PACTS). In addition, the site is positioned between two of PACTS' Priority Transit Centers: West Falmouth Crossing and the center of



North Deering (see graphic above right). Perhaps most significantly, Lambert Woods sits right at the outer terminus of the #9A/9B METRO bus route loop, which serves most of the city’s neighborhoods, schools, service centers, and runs on Congress Street through all of downtown Portland. Finally, the site is a mile from Exit 53 of the Maine Turnpike, with a quick connection to the Falmouth Spur to access Interstate 295.

Lambert Woods has been rezoned as R-3 to allow for this Planned Residential Unit Development and is adjacent to residential areas and light industrial uses. The development team proposed a B-1 designation to the city, to enable more mixed use on the site, which unfortunately was denied. However, this is an indication of the progressive nature of this development, in terms of smart growth and sustainable transportation.

Consisting of almost 18 acres of forested land in Portland, about 5.6 acres of Lambert Woods are wetlands or exceed a 25% slope and can be excluded from a net residential density calculation. Five to seven acres of the site will ultimately be developed. Conservatively, this will result in a residential density of 13.3 units per acre. In terms of encouraging less driving, this is an incredibly beneficial improvement to the existing land use pattern. For comparison, see the following table from Portland and South Portland’s *One Climate Future* plan. North Deering currently is in the 2.5-5 dwelling units per acre category, with a significantly higher associated Vehicle Miles Traveled (VMT), versus helping the area move more toward the greater-than-12 units per acre that dramatically decreases VMT. Furthermore – and perhaps counter intuitively – research has shown that the greatest VMT reductions can actually happen at the level of lowest density. (Holtzclaw, 1994)

How does density relate to how much we drive?

Research has shown that people who live in denser areas drive fewer miles, on average, resulting in lower vehicle miles traveled (VMT) per capita in areas with higher densities (persons per square mile, or ppsm). For reference, much of Portland’s East End reaches densities over 10,000 ppsm, while Ferry Village (South Portland), Thornton Heights (South Portland), and North Deering (Portland) fall in the 2,000 – 3,999 ppsm range.

Table 3. Vehicle miles traveled (VMT) forecasts by Census Tract Density

Persons per Square Mile (ppsm)	Approximate dwelling units per acre	2005 VMT	VMT Compared to < 500 ppsm	2035 VMT	VMT Compared to < 500 ppsm
0-499	< 0.6	11,422	0.0%	13,798	0.0%
500-1,999	0.6-2.5	10,083	-11.7%	12,196	-11.6%
2,000-3,999	2.5-5	9,345	-18.2%	11,345	-17.8%
4,000-9,999	5-12	7,986	-30.1%	9,792	-29.1%
10,000+	> 12	4,437	-61.2%	5,651	-59.0%

Table adapted from Cambridge Systematics. (2013).⁸² Dwelling units per acre conversions are gross densities estimated at roughly 50% residential land per tract.



One Climate Future: charting a course for Portland and South Portland, 2021





Recent site visits and Google Street View images show that, despite the current car-dominated infrastructure, local people already walk, run and bicycle regularly on this street. Lambert Woods will dramatically improve the human scale of the pedestrian environment along both the north and south frontages of Washington Avenue Extension. This includes the proposed narrowing gateway feel to the street: with reduced lane widths, on-street parking and shared lane markings; proposed 8-foot multi-use paths on both sides of the street; active building facades; bus shelters and seating; lighting, crossings and signage; street trees and landscaping; trail connections and emergency vehicle access points that will be able to be used by walkers and bicyclists; and an intentional choice to not align both driving entrances, to discourage cross-development motor vehicle traffic. Furthermore, the development team will build a short section of connecting sidewalk on the south side of Auburn Street with a crossing to the existing sidewalk on the north side - complete with curb extensions, travel paths for the existing bicycle lanes and Rectangular Rapid Flashing Beacons (RRFBs).



Residential Housing at Lambert Woods

In addition to the density improvements named above, neighborhood infill development of any kind contributes to single-occupancy automobile trip reduction. That much more so in the case of transit-oriented and income-restricted housing, which is the use proposed for Lambert Woods.

In direct support of increasing housing stock and people's ability to afford to live in Portland, all of the residential units at Lambert Woods will be income-restricted. Twenty-five percent of the units will be for people with incomes of up to 80% of Area Median Income (AMI) and 75% for people with incomes of up to 100% of AMI. A total of 125,338 square feet in housing – 162 dwelling units - are proposed. There will be 8 three-story rowhomes, and 6 three-story flats - consisting of a total of 2 studios, 74 one-bedroom, 30 two-bedroom, and 56 three-bedroom units.



Moreover, Lambert Woods is being developed as a Limited Equity Housing Cooperative - that is, as a legal entity where residents jointly own and democratically manage a residential property. A Limited Equity Housing Cooperative indicates that part of the equity is owned by individual residents and the remainder is owned by the cooperative as a whole. This ensures that homes remain permanently affordable for future residents. Ultimately, Portland Housing Authority and the Lambert Woods Co-op will manage the buildings on site.



New residential sites like Lambert Woods also provide a significant opportunity to help meet the city's goals for population growth. In *Portland's Plan 2030* (2017 Comprehensive Plan), analysis showed the number of people both living and working in the city decreased between 2002 and 2014. The Comprehensive Plan "supports the principle that all who work in Portland should have the option of living in Portland." The city set a 10-year population goal of 75% of the municipality's approximate daytime population of 96,000.

Furthermore, the development proposes a number of on-site features that encourage the use of alternate transportation and teleservices, as well as working from home. These include:

- 8-foot paved multi-use paths along the north and south sides of Washington Avenue Extension
- bus shelters and seating
- pathways and trail connections within and across the site
- covered bicycle/stroller/handcart storage areas
- bike repair station
- package delivery and storage locations
- free basic wifi in all units and community areas and hardwired infrastructure for broadband
- communal gathering spaces, including those that can be used to do telework
- fitness room/gym
- community terraces and pavilions
- kitchen garden
- dog runs
- drop-off and pick-up areas with ADA access and opportunities for residents and visitors to more easily carpool and use taxis and Transportation Network Companies (such as Uber and Lyft)

...One of the more interesting studies found in reviewing the literature was a 2003 German social science experiment conducted by three researchers (Bamberg, Rolle and Weber) where an individualized marketing intervention was used at a time of what they called a "changed decision" context, meaning immediately after relocation. The research found that if, when in a new situation, people received personally relevant and persuasive information, they were more likely to use it for making new behavioral decisions.

Portland Oregon SmartTrips Welcome Program, Tools of Change Landmark Case Study, 2012

Finally, behavioral research illuminates an additional reason for vehicle trip reduction. When people move from one specific residence to another, this disrupts their habitual daily living and travel patterns. This provides a key opportunity and critical juncture at which to help them understand their transportation choices and the benefits of using public transportation, walking and bicycling, carpooling and telecommuting. (Kirkman, 2019; Thøgersen, 2012; Verplanken, Walker, Davis & Jurasek, 2008; Bamberg, 2006; Fujii, Gärling & Kitamura, 2001)



Parking

On-site parking that is both more limited and also not immediately adjacent to dwelling units makes car ownership less convenient, and further encourages the use of alternate modes. Lambert Woods proposes a forward-thinking balance between previous parking minimums and providing no parking. The developers will build and maintain 67 surface parking spaces on site, with a parking per unit ratio of .41. (Of note, in addition to the on-site spaces, MCDP will construct 56 new public on-street parking spaces along Washington Avenue Extension.)

Research has shown that abundant and free or low-cost parking is the main reason people are more likely to drive for most of their trips. (Kirkman, 2019; McCahill, et al, 2016; Chatman, 2013; McCahill and Garrick, 2010 & 2014; Thøgersen, 2012; Weinberger, 2008, 2012; Higgins, 1990) A number of larger cities across North America have started tying their TDM targets and mitigation efforts primarily to parking. One example can be seen in the following table from Los Angeles' growing TDM program – where small projects that have a parking ratio of less than 0.5 spaces per unit require fewer TDM mitigation “points” or set of TDM strategies.

Table 1. Relation of project size and parking capacity to TDM mitigation requirements, based on preliminary program development in Los Angeles.

Parking capacity (stalls per housing unit or 500 sf of non-residential space)			Mitigation points required
Small project	Medium project	Large project	
Less than 0.5			5
0.5-.99	Less than 0.5		10
1-1.49	0.5-.99	Less than 0.5	15
1.5-1.99	1-1.49	0.5-.99	20
2 or more	1.5-1.99	1-1.49	25
	2 or more	1.5-1.99	30
		2 or more	35

Source: State Smart Transportation Initiative

Modernizing Mitigation: A Demand-Centered Approach, State Smart Transportation Initiative, 2018

Closer to home, in 2019, Boston's Metropolitan Area Planning Council (MAPC) conducted its *Perfect Fit Parking Study* across multiple municipalities and suburban contexts. They found similar conclusions:

In the vast majority of developments we studied, the average parking use was less than one space per household, and across the entire sample, only 70 percent of the available spaces were full when surveyed. In affordable housing developments (sites where 50 percent or more of the apartments are deed restricted) demand was even lower: only 0.55 cars were parked per household.



Overall, 30 percent of the available parking we surveyed was not being used. At a quarter of the sites, less than half the parking was occupied. The pattern of oversupply was observed in all 14 cities and towns...

Of course, supply and demand differed at every site. To help explain the variation, we measured 25 neighborhood and building characteristics and investigated their correlation with parking demand (defined as parked cars per occupied housing unit).

After exploring all of those variables and their interactions, **we identified three factors as strongly predictive of parking demand: transit connectivity (jobs within a 30-minute transit commute); percentage of deed-restricted affordable units; and the amount of parking supplied. In fact, supply (spaces per unit) was the single biggest predictor of demand, suggesting that the availability of parking is attracting car-owning households and influencing their behavior. The more parking is provided, the more likely it is that a household will use it.** (emphasis added)



Similarly, the City of Portland has been working to reduce the impact of required parking minimums that historically have induced more vehicle trips. A primary example, and the impetus for this TDM plan, is the city's recently amended *Land Use Code*, Article 19, Table 19-B: Categorical Exceptions to Off-Street Parking Minimums, "No off-street parking shall be required within ¼ mile of fixed route transit service. New uses or changes of use of more than 10,000 SF taking advantage of this exception shall be required to provide a Transportation Demand Management Plan if they use this provision in lieu of parking requirements."

For some additional background on how the number of on-site spaces at Lambert Woods has been determined, this ratio is generally consistent with other comparable affordable housing projects in the region. In addition, the parking analysis and design included work to maximize housing on the site and reduce environmental impacts within the wetland and slope confines of both parcels. MCDP also has sought intentionally to minimize the car-dominance and feeling of endless pavement typically found in suburban residential projects. For example, within the development, there will be no parking in the mews, to ensure the pedestrian friendly nature of these areas. Instead, parking will be primarily at a distance from the housing units on site, with one communal parking area in Lambert North and two in Lambert South. For similar reasons, passenger vehicles are not permitted to drive through the Lambert South site from the parking area on one side to the parking area on the other. (See site plan image on next page.)

Strong parking management is another linchpin strategy to discourage drive alone trips. All residential leases at Lambert Woods will be exclusive of parking. Units designated for residents with incomes at 100% and 80% AMI levels will be charged \$125 per month per parking space. Residents with incomes under 60% AMI will get parking first-come first serve and not be charged. Under the affordable housing financing regulations, low-income tenants are not permitted to be charged for parking. However, simply unbundling parking from tenant leases is of benefit to site TDM efforts. The 67 off-street spaces will be managed by the Portland Housing Authority and the Lambert Woods Co-op.





In terms of equity, the site has a Housing + Transportation Affordability Index (HTA) rate of 42%; that is, housing (23%) and transportation (19%) costs, combined, equal 42% of household income. This meets the definition of affordability, which is considered to be combined housing and transportation costs equaling 45% or less of income. For comparison, the average Cumberland County household spends 52% of income on housing and transportation; the average Maine household spends 58%. Often lower transportation costs at sites like Lambert Woods are because people don't need to own as many (or any) private vehicles; that is, vehicle ownership rates are lower for people who live closer to urban centers. They are also lower for people with less income.

In addition, Lambert Woods has a good Job Access Score of 7.7 out of 10. This is based on employment location and the variety of employment types, similarly provided through the HTA Index utilizing census data. Of major significance to the site's TDM program, Maine Cooperative Development Partners will develop a list of major employers within a 1/4 mile of bus stops on the 9A/9B, to conduct outreach to those employers regarding housing availability at Lambert Woods, to encourage these worksites to offer transit passes to their employees, and for sharing with Lambert residents seeking employment.

This may assist with what can be a challenge to robust transit use for residents living in a suburban context, who often need to transfer between routes to access their place of employment. On the other hand, a number of low-income earners have to travel quickly between multiple jobs or work off-peak shifts outside of public transportation run times – and both situations often require the use of a private vehicle. However, at least these varied tenant occupations and timing of work shifts often lead to drive alone travel that is outside the peak weekday morning and afternoon commute hours.

Co-op residents who are students are well served by multiple transportation options. The Portland Public Schools provides bus transportation for elementary school students and requires middle school students to walk up to two miles to school. Lambert Woods is just 1.3 miles from the Lyman Moore Middle School campus and, as mentioned previously, in an effort to serve these middle schoolers and the public in general, MCDP will build a short section of sidewalk on the south side of Auburn Street near the Washington Ave. Extension intersection. This will connect via a crosswalk to the existing sidewalk on the north side of Auburn. The crossing will include curb extensions, travel paths for the existing bicycle lanes and Rectangular Rapid Flashing Beacons (RRFBs). Finally, all high schoolers receive a METRO bus pass and they are well served to attend any of the Portland high schools; Casco Bay, Deering, Portland Arts & Technology, and Portland High are each situated directly on the 9A/9B. Post-secondary education, such as at the University of New England, Maine College of Art, University of Southern Maine, and Portland Adult Education are also readily accessible from the site by bike and via public transportation.



Per U.S. Census data, Generation Z and Millennials have been shown to prefer more urban environments; they also tend to be more comfortable using modes other than the single-occupancy automobile for transportation. These multimodal habits were heavily influenced by the Great Recession and driving by these generations increased slowly as the economy improved. Travel behavior has been impacted once again by the COVID-19 pandemic – which has negatively affected bus and carpool rates; although it has positively impacted the number of people who walk, bicycle, use teleservices and work from home. Overall, from a behavior change perspective, this familiarity with different ways of getting around will greatly facilitate tenants' participation in the Lambert Woods TDM program.

Larger Transportation Setting

The Lambert Woods Co-op and its TDM initiatives bring to fruition of number of the housing, urban form, and transportation goals of several recent and historically important Portland and regional studies and planning efforts. These include:

- *A Time of Change: Portland Transportation Plan* (1993)
- *Green Spaces Blue Edges* (2001)
- *Housing, Sustaining Portland's Future* (2002)
- *Sustainable Portland* (2009)
- *Lyseth-Lyman Moore School Travel Plan* (2011)
- *Falmouth Bicycle & Pedestrian Plan* (2015)
- *Comprehensive Plan, Portland's Plan 2030* (2017)
- *Getting There from Here: an active transportation plan* for the region (Greater Portland Council of Governments (GPCOG) and PACTS, 2018)
- *Cultural Plan Update* (2018)
- *Transit Tomorrow* (PACTS and GPCOG, 2021)
- *One Climate Future: charting a course for Portland and South Portland* (2021)
- *Connect 2045* (update to PACTS Long-Range Transportation Plan, expected 2022)
- *Transit Together* (GPCOG, expected 2022)

For example, the development of this site addresses several of the Future Land Use principles outlined in *Portland's Plan* (2017) and in the image on the next page – described further as:

- Connect the Chain – “physically integrated transportation systems and open spaces”
- One Portland – “all areas can expect appropriate City services and amenities”



LOCAL GOALS

WE WILL:

Increase, preserve, and modify the overall supply of housing city-wide to meet the needs, preferences and financial capabilities of all Portland residents.

Encourage additional contextually appropriate housing density in and proximate to neighborhood centers, concentrations of services, and transit nodes and corridors as a means of supporting complete neighborhoods.

Pursue policies to enable people who work in Portland to have the option to live in Portland.

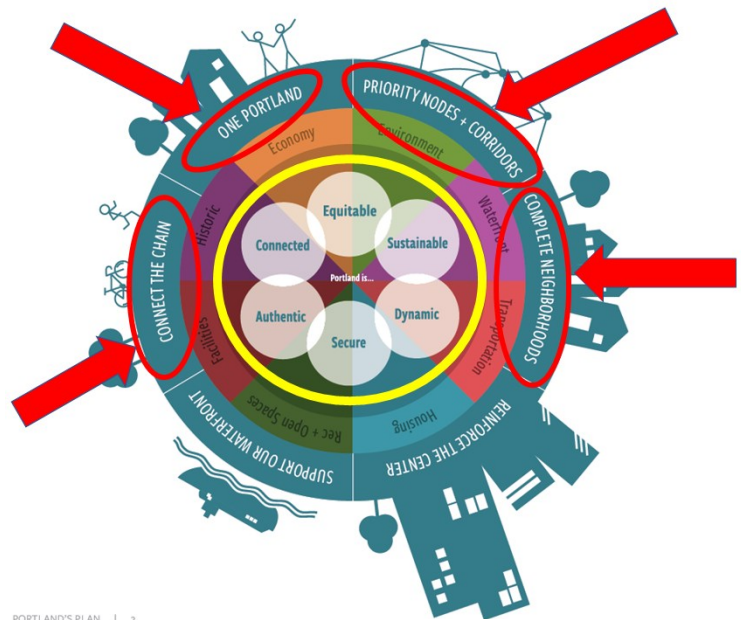
Collaborate with surrounding communities on regional housing solutions.

Encourage quality, sustainable design in new housing development.

Portland's Plan 2030 (2017 Comprehensive Plan)



- Priority Nodes and Corridors – “areas that would be appropriate for new development to provide needed housing, business and services proximate to transit”
- Complete Neighborhoods – “where all residents regardless of age, ability, or income have access to the basic necessities of daily life - high quality and affordable housing, schools and other civic functions, food, open space, other amenities and services - within a walkable, bikeable distance”



Moreover, Lambert Woods’s transit-oriented development efforts align well with the 2050 Vision from the regional *Transit Tomorrow* plan at right. These public transportation efforts are being developed further as part of PACTS’ *Transit Together* and *Connect 2045* planning processes this year.

In addition, TDM efforts are part of several aspects of Portland and South Portland’s *One Climate Future* plan. This includes the overarching multimodal target the plan has set: “By 2035, 26% of trips in the cities will use public transit or active transportation (up from 12% today).”

2050 VISION FOR TRANSIT

Using our region’s public transportation is faster and more affordable than driving a car. Our system is funded sustainably and provides reliable and seamless transportation for our community, including commuters, mainland and island residents, and people with mobility challenges. Our communities support the long-term viability of public transportation by focusing new homes and jobs where people already live and work.

Transit Tomorrow, March 2021

2.

Connect people to places, to opportunity.

We will create connected neighborhoods—where it is easy to push a stroller to the park, roll a wheelchair to the grocery store, ride your bike to school, and take the bus to a new job opportunity. To reach this goal, we will implement safer street designs, build out our network of bikeways, and radically expand our public transit system, while making travel on transit more accessible and seamless. Supported by land use policy, we will cluster a mix of housing and businesses near transit, and increase housing in the cities to bring people closer to jobs. And we will ensure that the people who most rely on public transit systems, due to income, disability, or otherwise, are part of the decision-making teams connecting our homes, businesses, open spaces, and community resources.

- Key milestones:**
- a By 2035, 26% of trips in the cities will use public transit or active transportation (up from 12% today).
 - b Housing stock meets workforce demand within the cities by 2035.

Looking to read more?

Check out these strategies, in particular:

- TLU 1.1 Public Transit Networks
- TLU 1.2 Inclusive Transit-Oriented Development
- TLU 1.3 Bike Accessibility
- TLU 1.4 Complete Streets
- TLU 1.5 Employer Transit Partnerships
- TLU 1.7 Land Use for a Smaller Carbon Footprint
- CR 2.4 Transportation Access



The following table breaks out commute travel data by the metropolitan region, City of Portland and the North Deering neighborhood, using census information assessed by local data analyst Abraham Dailey. The existing neighborhood context does not show strong current multimodal use. However, the Lambert Woods transit-oriented development, its associated infrastructure improvements and TDM program, plus the larger METRO transit improvements in the works (more about this in the Public Transportation Access section on page 15) should result in significantly higher multimodal numbers for Co-op residents. In addition, telecommute percentages for about 40% of the population have increased significantly during the pandemic and are expected to continue at a higher rate than before COVID-19 (for example, continuing to work from home 2-3 days per week, for those who can).

Commute Mode Share Trends by Home Origin

	Commuter Home Location	Drive Alone	Carpool	Transit	Bicycle	Walked	Work from Home
2019 5-year sample	Portland-South Portland MSA	79%	8%	1%	1%	4%	7%
	City of Portland	66%	8%	3%	2%	13%	7%
	North Deering	87%	2%	1%	1%	4%	5%

Bicycle & Pedestrian Access

The numbers in the table above reference commute trips, which generally represent only about 30% of total vehicle trips. A greater percentage of non-commute trips are typically taken by walking and bicycling. Therefore, the 5% combined figure for active transportation use in the North Deering census block does not paint a complete picture of the amount of walking and bicycling that occurs on a daily basis in the neighborhood at this point in time.

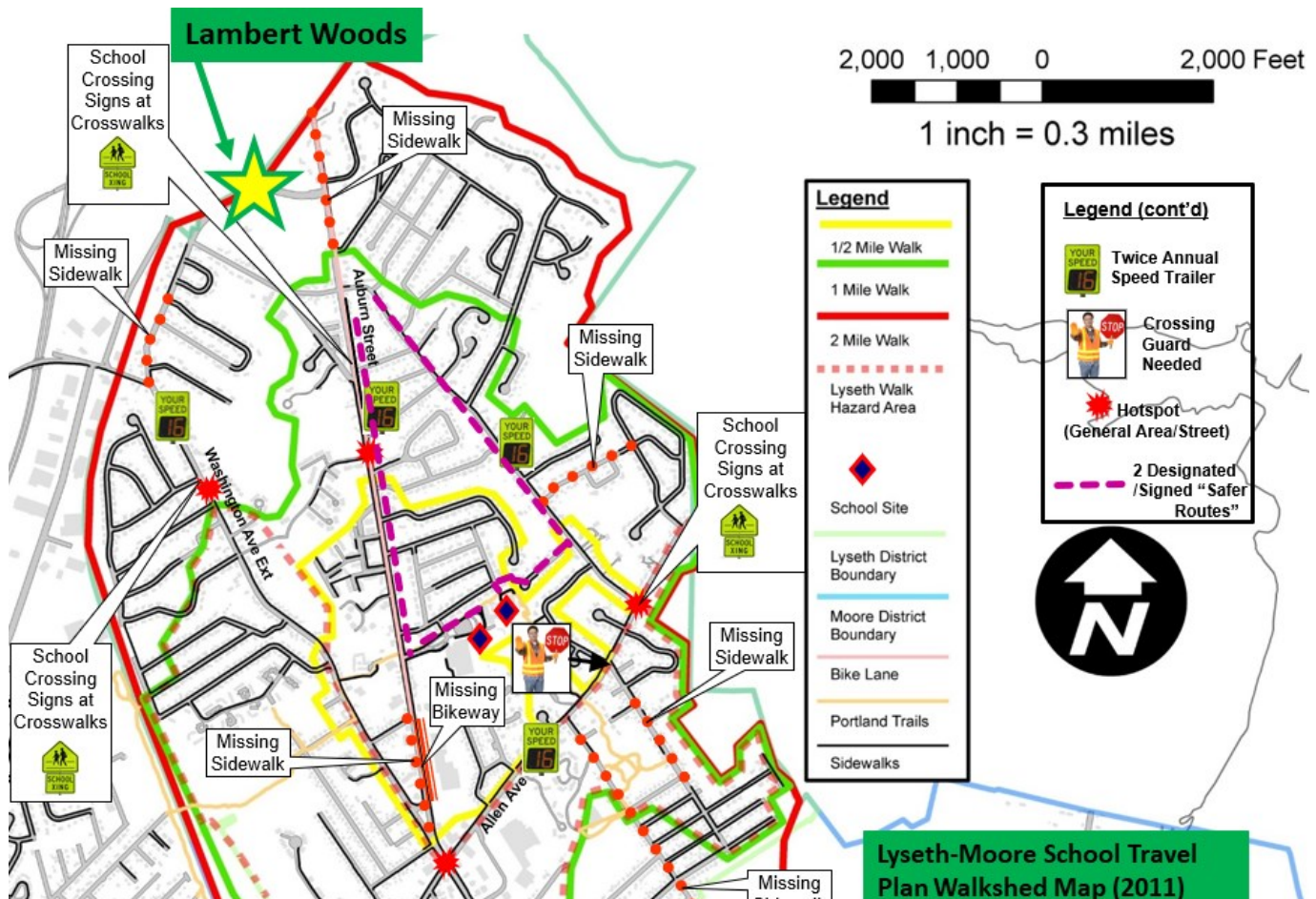
In addition, and perhaps surprisingly with the more suburban context of this location, the site has a Compact Neighborhood Score (CNS) of 7.9 out of 10; the CNS is a measure of walkability. This scoring is based on a natural logarithm of household density and census data, also provided through the Housing + Transportation Affordability Index. Still, from a pedestrian and bicycling perspective, the area can feel rather auto-centric.



As mentioned in the previous section, the Lambert Woods development itself will significantly improve the walking and bicycling experience on Washington Avenue Extension. Moreover, none of the nearby streets are multi-lane corridors and there is a relatively robust sidewalk and crossing network in the



neighborhood. The city has worked consistently to improve these conditions over the years. For example, as a result of the *Lyseth-Lyman Moore Campus School Travel Plan* process (2011), Portland has made a number of the North Deering pedestrian and bicycle safety improvements originally identified in the following map.



In addition to the Lambert Woods active transportation infrastructure efforts, the development sits in close proximity to the following existing and proposed bicycle and pedestrian facilities from the *Portland Bicycle & Pedestrian Network* (map on next page) and the *Falmouth Bicycle & Pedestrian Plan*:

- Auburn Street (Portland) and Gray Road (Falmouth) bicycle lanes and sidewalks
- Planned on-road bikeways on Washington Avenue Extension (which the Lambert Woods' improvements will create on that section of the roadway), Riverside Street and Allen Avenue
- Planned sections of the Neighborhood Byway network – i.e., Summit-Lambert and Parsons Pond-Shepherd Lane
- Proposed bicycle lane or other designated shared access on Blackstrap Road from Brook Road to Hurricane Road
- Proposed shared-use pathway along the rail line adjacent to the site's 0 Gray Road, Falmouth parcel
- Potential multi-use trail along the Falmouth Spur





In the context of the 20-Minute Neighborhoods mentioned in the previous section, significant area amenities and recreational facilities also provide people with a full-service living environment. This does much to encourage individuals to walk or bike instead of choosing to drive. Those features within walking and bicycling distance of the Co-op include:

- Two daycare facilities within a one-mile radius (15-minute walk) and the neighborhood elementary and middle schools are 1.3 miles from the site (25 minutes)
- Markets such as Eddie's (3-minute bike ride or 11-minute walk), Hannaford (7-minute bike ride or 22-minute walk), and Shaw's (7-minute bike ride)
- Home product suppliers such as Cherished Possessions and the Dollar Store



- Services such as several pharmacies, the U.S. Post Office at the UPS Store; dentist and medical offices, veterinarian services, tax preparation services, hair salons, banks, yoga and other exercise classes, etc.
- Recreational spaces such as the Sebago to the Sea Trail, Presumpscot River Preserve, Haverty Track, Oat Nuts Park, Riverside Golf Course, River Point Conservation Area, and the Lyseth Elementary and Lyman Moore Middle campus playground, basketball court and fields
- Food and beverage locations such as Lib's Ice Cream, Starbucks, Dunkin Donuts, Portland House of Pizza, Taco Bell, etc.



Public Transportation Access

As mentioned previously, Lambert Woods is strategically located on the important on-off Peninsula, crosstown, bidirectional METRO Route 9A/9B. The 9A/9B serves the vast majority of the city's neighborhoods, service centers, and downtown. In addition, it provides direct connections at different points to most other routes. For example, it is timed to intersect well for transfer to the Husky route, with express service to Westbrook and Gorham.



In general, transit is considered by the public to be a reasonable alternative to driving when the bus comes every 15 minutes or so. METRO currently operates with 25-35-minute peak hour headways on both the 9A and 9B (more frequently on school days). Off-peak headways on the Route 9A/9B are as low as 60 minutes.

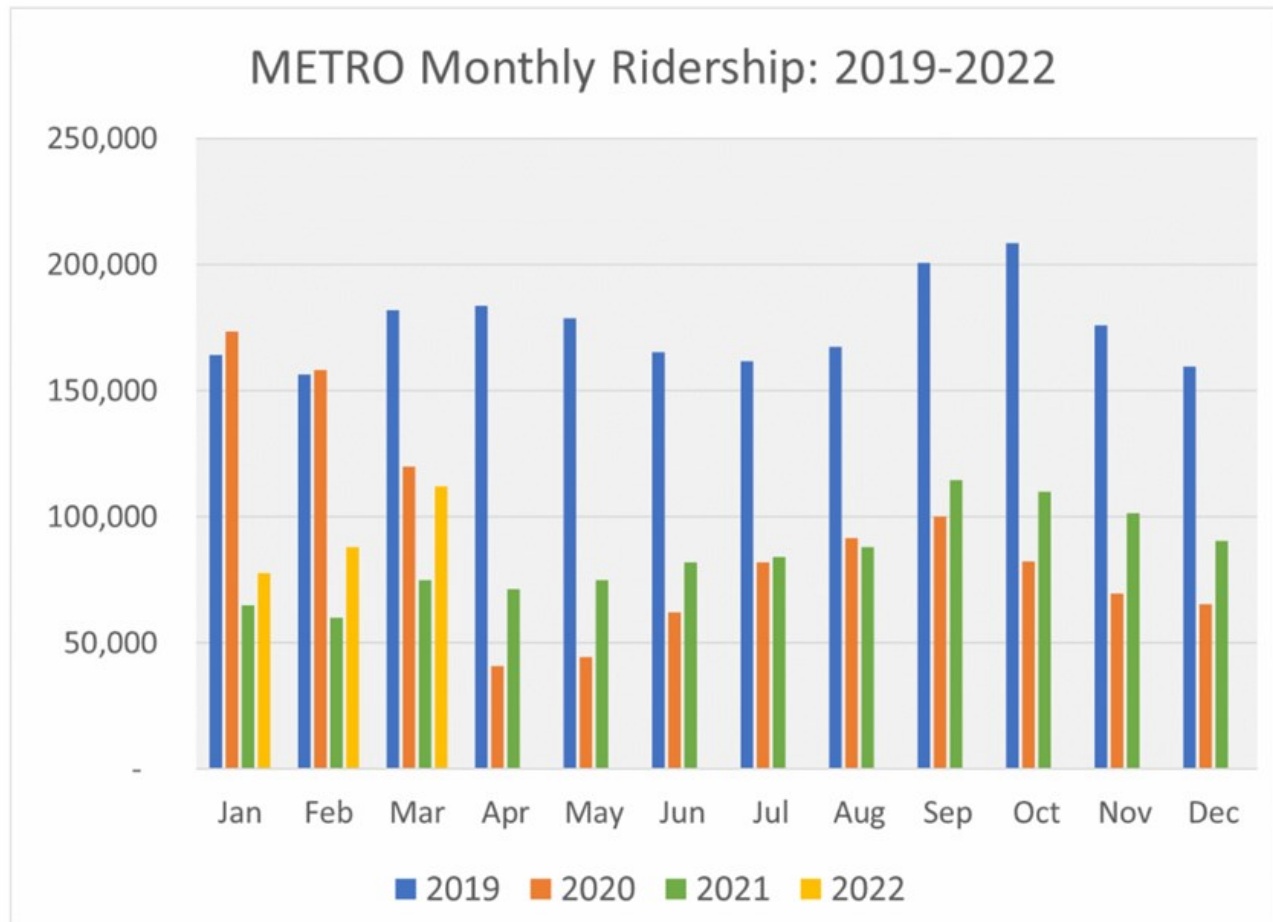
However – and to the tremendous benefit of Lambert Woods and all residents, employers and services along the 9A/9B – METRO staff recently shared the following update:

METRO is in the process of securing American Rescue Plan Act (ARPA) funding which will, among other things, improve Route 9A/9B service to every 30 minutes during off-peak periods. Staggered well, the Route 9A or 9B would depart the Lambert Woods project every ~15 minutes all day, so a resident traveling downtown could take either bus and arrive downtown in 20-30 minutes. This funding strategy will fund these headways for 2-3 years, after which the funding would be picked up by other federal funding options and local contributions in order to remain permanent. In



short, METRO anticipates that headways of about 30 minutes or better throughout the day will be the norm by the time the Lambert Woods project is occupied sometime in 2024-2025.

Despite the dramatic declines in transit use earlier in the pandemic on a number of METRO routes, analyst Abraham Dailey assessed 2019-2021 METRO data and found the ridership on Routes 9A/9B has actually grown over that period, and at a higher rate than any route except for the Husky Line. In further good news, one can see in this April 2022 *METRO Connects* graph and newsletter item that broader ridership behavior is really starting to change from its early pandemic lows.



Let's do the (Ridership) Numbers -- In March, METRO had our best month in terms of relative ridership compared to pre-pandemic levels, with over 112,000 rides taken. For the first time since the start of the pandemic, ridership exceeded 60% of 2019 ridership.

Each route had more riders in March than in January or February of this year, and several routes (Routes 2, 4, 8, 9A/9B, and BREEZ) had more ridership in March 2022 than any month since the start of the pandemic.

As we get further into 2022, we hope that strong ridership trends continue as we roll out new buses, new stops, and new ridership recovery initiatives.



On-site at Lambert Woods, a number of transit infrastructure enhancements will greatly improve upon the existing transit landscape and encourage residents to ride. First, the stops will be slightly relocated on Washington Avenue Extension to be right at the entrance to Lambert North (the 9B stop) and South (the 9A stop). Each stop will have a shelter and seating for riders. In addition, the development is collaborating to provide access to the lobby restroom nearest the bus stops for METRO driver use; drivers currently do not have any facilities when they pause the buses for a quick break at the outer terminus of Routes 9A/9B.



METRO and all other area transit providers provide real-time arrival information via agency websites, the Southern Maine Transit Tracker site, and/or smartphone apps such as Google Maps, Transit and Moovit. The bus shelters on Washington Avenue Extension will be hardwired for power, to allow METRO to potentially provide real-time arrival information at each stop. In the meantime, Lambert Woods plans to offer a live transit update screen in their lobby space near the 9A/9B stops. All local and express buses are equipped with bicycle racks with space for 2-3 bikes. In addition, METRO buses offer Wi-Fi access and some provide in-seat USB ports.

In further support of Co-op ridership, Maine Cooperative Development Partners has been in discussions with METRO regarding the possibility of utilizing up-front project financing capabilities to secure the equivalent of free passes for every resident, for a certain number of years. In addition, the site's Property Manager/Residential Services Coordinator will be able to assist residents with applying for reduced-fare passes at METRO and other area transit providers.



Shared Mobility Access

With the end of UhaulCarshare service in Portland in February 2020, Lambert Woods and other developers have been exploring new carshare possibilities for diverse sites across the city. A newly promising opportunity may be with Mobility Development, a nonprofit that helps set up equity-focused, all-electric carsharing programs. For example, they have a new program in Boston called Good2Go. The organization has recently entered into a contract with the U.S. Department of Energy to start more partnerships with affordable housing providers, and it seems to think that Portland could be a promising market. If a local organization such as the Portland Housing Authority could feasibly partner with other entities like Lambert Woods to set up a carshare at various locations, the Co-op will provide up to four parking spaces on-site and offer a discount for resident carshare vehicle use for the first year of residency.

For the past decade, the City of Portland has persisted in exploring various bikeshare possibilities. The city has just launched a pilot bikeshare program in August 2022 via an agreement with Tandem Mobility, a bikeshare company with national experience. The systems of bikes will be located primarily on and just off the Peninsula (e.g., at University of Southern Maine). PHA will explore with the municipality whether bikeshare might eventually be an option for Riverton Park residents, if and when the system is expanded further. This would include encouragement for the city to consider cargo bikeshare options for area families.

The use of transportation network companies (TNCs) such as Uber and Lyft has grown substantially in recent years – although there have been setbacks to sharing rides and also driver availability during the pandemic. A TNC trip does not reduce traffic congestion, unless users are carpooling; however, it does reduce parking demand.



B. Lambert Woods TDM

Coordination

Maine Cooperative Development Partners and the Portland Housing Authority are committed to reducing drive-alone resident automobile trips, improving multimodal safety, easing area traffic congestion and lowering parking demand at Lambert Woods through their TDM efforts. They see this site's TDM program as part of their larger affordable housing, sustainability, and quality-of-life missions.

Highly successful TDM programs share three vital characteristics – they are:

1. Dynamic - piloting strategies, assessing impacts, and modifying tactics as needed;
2. Rigorously supported and monitored by local governing bodies, in this case, the City of Portland;
3. Managed by committed and enthusiastic staff who are responsible for overseeing, promoting and sustaining the program.



Both the MCDP and PHA teams have a history of in-fill and workforce housing development projects. They have encouraged residents' mobility and financial wellness through initiatives such as offering rent reductions for tenants who are car-free and separating housing leases and sales from parking space rental or purchase, providing bus pass subsidies, and constructing on-site bicycle/stroller/handcart rooms. Both groups have experience with TDM plan development and/or implementation at other locations in Portland.

Brian Eng will serve as the interim TDM Coordinator until Certificate of Occupancy, when the eventual property manager for the Co-op will be made the long-term TDM Coordinator. His contact information is: Brian Eng, Maine Cooperative Development Partners, bri.d.eng@gmail.com, (413) 262-2610

Acknowledging that roles and responsibilities change over time in any position, the two organizations and their future site property manager will use the first year of TDM implementation to enumerate the TDM Coordinator's responsibilities in detail for any future staff to uphold the responsibility of the position. The Co-op will notify the city within 60 days whenever there is a change in the TDM Coordinator.

In addition, the Co-op will have a Resident Engagement Committee that supports this work with an annual \$4,000 discretionary budget for incentives. Day-to-day operations and monitoring of the TDM plan will be conducted in-house by the TDM Coordinator and the committee longer-term. The TDM Plan and contact information for the TDM Coordinator and City transportation program will be posted at the TDM Kiosk in the community building for resident education and access. Lambert Woods will retain the services of a TDM consultant to review initiatives, problem-solve and develop new strategies if and when necessary.

The Lambert Woods TDM Coordinator is responsible for:

- Ensuring strategic parking management and monitoring parking usage
- Coordinating tenant TDM policies and incentives
- Connecting tenants with nearby transportation resources
- Encouraging greater use of preferred modes – walking, bicycling, carpooling, taking bus or rail transit, and telecommuting-through transportation kiosk and site-wide promotion
- Overseeing/conducting surveying of tenants
- Filing annual reports and updating the plan with the City
- Exploration of additional TDM strategies, as needed

C. Site Transportation Projections & TDM Targets

Maine Cooperative Development Partners has hired Cushman Transportation Consulting, LLC (CTC) to assist with its transportation demand management process. CTC specializes in TDM efforts locally and connects with TDM research and programs across North America – including aspects of setting and managing TDM targets.

Target Setting Context

The Lambert Woods TDM Plan is one of the first to be created under the city's progressive *ReCode* provision mentioned previously, in Land Use Code Article 19, Table 19-B: Categorical Exceptions to Off-Street Parking Minimums:



No off-street parking shall be required within ¼ mile of fixed route transit service. New uses or changes of use of more than 10,000 SF taking advantage of this exception shall be required to provide a Transportation Demand Management Plan if they use this provision in lieu of parking requirements.

Because of this exception - and given the strong strategies of limiting on-site parking, charging for parking for households at 80-100% of AMI, the implementation of other TDM strategies in Section D that follows, the likely off-peak travel demographics of tenants, and the generally lower vehicle ownership rate of households with more limited financial resources - this plan proposes a Multimodal Target as the most tangible gauge of program success, in contrast with the vehicle trip and parking reduction goals traditionally utilized under the city's original TDM ordinance. For example:

- With the range of potential tenants and tenant activities, as well as likely non-9am-5pm work shifts, a multimodal target assesses the broader drive alone rate for the site, including those trips that occur outside of the morning and evening peak periods;
- With a desirable parking ratio of .41 spaces per unit built into the site plan, it would be difficult to reduce parking demand below that level.

Nevertheless, the development team has also contracted with Barton & Laguidice, to produce the required TDM-related trip generation and parking demand projections for the site for the original June 2022 site plan application submission of 165 units (September 2022 update: now 162 units). The firm utilized the latest data from the Institute for Transportation Engineers (ITE) *Trip Generation Manual* (11th Edition) and the ITE *Parking Generation Manual* (5th Edition). While both manuals do not currently have data that well represents cooperative housing, the traffic and parking assessments do each include distinctions for the income-restricted context of the site.

According to the traffic assessment, full occupancy of 165 units at Lambert Woods would expect to generate 60 vehicle trips in the weekday morning peak hour, 83 vehicle trips during the weekday evening peak hour, and 83 trips during the Saturday peak hour. Per the parking demand projection assessment for the same number of units, the average peak demand for parking at the site would be 164 spaces on weekdays, 131 on Saturdays, and 159 on Sundays.

Multimodal Target

To best measure residents' varied transportation behavior, Lambert Woods is setting an initial target of 25% of resident trips to and from the site being multimodal, by 3 years after full occupancy of the Co-op. This pertains to *all* trips; that is, to access work, school, services, recreational activities, and run errands, etc. In this context, the term multimodal indicates using transit, carpooling or vanpooling, bicycling, walking, and telecommuting or using teleservices - or some combination of these.

This target balances the site's:

- reduced parking, TDM infrastructure improvements and programming
- with its suburban context, the current rate of alternate transportation use for commuting by those living in the area (12%), and the mixed transportation demographics of expected tenants

TDM Targets

The TDM Plan sets the following targets:

- **Multimodal target:** 25% of all resident trips will be via transit, carpooling, by bicycle, on foot or telecommuting within 3 years after full occupancy
- **Parking ratio target:** a maintain a progressive site parking ratio of up to .45 spaces per unit
- Will reassess targets after the first full year of occupancy



(e.g., if working multiple jobs, shifts starting or ending outside transit service hours, or at employers without transit access).

Per most recent city TDM practices, the multimodal rate will be measured via the annual resident survey. In addition, the Co-op plans to closely monitor existing trends to attain a reasonable mode-shift goal over time.

It is most useful for the site's TDM efforts to address the specific needs of transit users, carpoolers, bicyclists, walkers and telecommuters and set an overarching multimodal trip target – versus targets for each mode. From other TDM experiments across the U.S., it is clear that individuals' use of various alternate modes changes over time, as different residents come and go and/or their needs change. For example, a tenant who uses transit might move to another location or an employee who walks might switch primarily to bicycling. In another instance, a tenant who was able to drive may lose the ability to do so and switch to using transit or carpooling for errands.

Parking Ratio Target

Per the tremendous impact of reduced parking discussed in Section A, page 6, Lambert Woods will maintain a progressive site parking ratio of up to .45 spaces per unit. Property management records of tenant parking space usage and the annual resident survey (more in Section E, page 25) will provide this data moving forward.



D. Trip and Parking Reduction Strategies

In the table on the following page, Lambert Woods proposes a number of best-practice and sensible parking and trip reduction strategies for the site's TDM Plan. These are based on the development team's



understanding of the transportation context, likely residents and the usefulness of various TDM efforts. For example – as mentioned above in Section A: Parking - limited, unbundled and unsubsidized parking will produce the strongest results for decreasing drive alone trips to and from the site.

In addition, the team acknowledges the various needs of different multimodal commuters. For instance, tenants who use transit, walk or bicycle are more able to do so if they have on-site, secure storage for larger commuting gear like strollers, car seats, bicycle trailers and cargo bikes. Moreover, even if a number of current drive-alone residents have to pay for parking, likely this will need to be combined with TDM promotion and setting of social norms. These are vital to encourage people to experiment with other ways of getting around.

Another critical component for the success of the Lambert Woods TDM program is a carefully thought-out marketing effort that engages tenants from when they first move in regarding preferred modes of transportation, and provides easily accessible information and any subsidies. As shared by Portland, Oregon’s SmartTrips Welcome program and other research, a residential move is a unique and powerful opportunity for mode experimentation and change. This also builds the site’s TDM culture. As Lambert Woods is developed and under construction, the team will design a promotion strategy to encourage walking, bicycling, telework and teleservices, carpooling and the use of public transit.

Finally, the region recently reexamined the need for a Transportation Management Association (TMA) to benefit employers and residential sites like Lambert Woods - and this is now a recommendation in the Portland Area Comprehensive Transportation System’s *Transit Tomorrow Plan*. TMAs are public-private entities that assist sites with TDM implementation, outreach and monitoring; advocate for improved transit and act as brokers for various alternate transportation services. The Co-op plans to support the development of a local TMA and have Lambert Woods participate as a member.

Infrastructure	
Reduced Parking/Remote Parking	<i>Reduced parking:</i> Lambert Woods is limiting parking supply by providing fewer spaces than currently required under the City's land use ordinance and providing this TDM Plan as part of Article 19, Table 19-B: Categorical Exceptions to Off-Street Parking Minimums, "No off-street parking shall be required within ¼ mile of fixed route transit service. New uses or changes of use of more than 10,000 SF taking advantage of this exception shall be required to provide a Transportation Demand Management Plan if they use this provision in lieu of parking requirements." Instead of 1 space per unit, off-street parking for residents will be limited to a .41 to unit ratio.
	<i>Remote parking:</i> Parking for site residents will be available for lease in communal parking areas, with the vast majority of spaces located at a distance from the housing units on site. Parking that is not immediately adjacent to dwelling units makes car ownership less convenient and further encourages the use of alternate modes.

...When a person changes residence, everything changes: the way to the store, the way to work, even the steps to the fridge.

This time of change offers a unique opportunity to create new neural pathways or reinforce old ones that haven't been used for a while and make these stronger than habitual pathways.

Andrew Pelsma, SmartTrips Program Specialist, Portland, Oregon

...To us, this represents a significant number of people with an immediate gap in knowledge about their local travel options.

Linda Ginenthal, SmartTrips Program Manager



Income- Restricted Housing	All Lambert Woods dwelling units will be income and rent restricted. 25% of units will be for people with incomes of up to 80% of Area Median Income (AMI) and 75% for people with incomes of up to 100% of AMI. Income-restricted housing generates fewer vehicle trips and less parking demand than market-rate units.
Transit & Other TDM Access	Provide live feed time transit screen in community space. Also, provide transportation kiosk in community space with multimodal map of transit routes, bicycle routes and trails, and walk and bike distances/times; information on the Southern Maine Transit Tracker; listing of bicycle facilities and locations on site; carshare locations and membership information, if applicable; information on GO MAINE ride-matching, rewards and Emergency Ride Home benefit for all alternate modes of transportation; all TDM benefits available for residents; copy of the site TDM plan and contact information for TDM Coordinator.
	Relocation of METRO 9A & 9B bus stops immediately adjacent to the entrances to Lambert North and South.
	Bus shelters and seating to be installed at each stop
	Bathroom break space available for METRO driver use
Pedestrian & Bicycle Access	<i>Multi-use path and sidewalks:</i> Construction of multi-use and sidewalk paths and wayfinding, abutting the development on Washington Avenue Extension
	<i>ADA-accessible pedestrian amenities:</i> Barrier-free ramp improvements
	<i>Crosswalks:</i> Installation of crosswalks and signage across Washington Avenue Extension.
	<i>Other pedestrian amenities:</i> e.g., benches, weather awning protection on community buildings
	<i>Outdoor, within-site bicycle parking:</i> 1 lollipop style bicycle rack (2 bike parking spaces) per every 10 units, located near the main entrance of each of the buildings
	<i>Bicycle sheds and/or under-cover bicycle/stroller/handcart parking:</i> for 66 bicycles, electric bikes, cargo bikes or trailers, handcarts and strollers.
	<i>On-street bicycle parking (e.g., adjacent to sidewalks/paths and bus shelters):</i> 1 lollipop style bicycle rack (2 bike parking spaces) in front of each of the seven buildings along Washington Avenue Extension
	<i>Electric bicycle charging:</i> Provide charging outlets for resident electric bikes in storage areas
	<i>Bicycle repair station:</i> Provide one bike repair stand convenient to bicycle parking
Shared Mobility	<i>Flexible passenger loading curb space(s)</i> for resident and visitor pick-up, drop-off and carpooling
	<i>Carshare possibilities:</i> With the end of UhaulCarshare service in Portland in February 2020, site owners will continue exploring other possibilities for Lambert Woods. Commit to providing two spots per side of Washington Avenue if/when a carshare program is established.
	<i>Handcarts:</i> To assist with loading/unloading vehicles that are parked remotely - and cargo carried on bicycles - two garden carts will be located at Lambert North and two at Lambert South for resident use



On-Site Amenities	<i>Co-working/community space:</i> Seating areas in the lobby of each and site conference room will be available for residents' use, to encourage community-building and telecommuting
	<i>Broadband access:</i> Hardwired infrastructure for broadband and WiFi - and free basic internet access will be available in all units and community areas
	<i>Recreation areas:</i> The site will include an indoor child playroom and outdoor play areas, which help reduce vehicle trips for these activities
	<i>Fitness room:</i> Provide on-site fitness room to reduce vehicle trips and improve resident physical fitness for active transportation
Delivery Supportive Amenities	Provide a temporary storage area on the Washington Avenue Extension frontage for daily package deliveries by FedEx and UPS, etc., laundry deliveries, and other deliveries. On-site deliveries to dwelling units will be confined to specialty deliveries such as for appliances and furniture, etc.
General Contribution to Area Transportation Improvements	Per Chapter 14 of the City of Portland Code, the property is contributing to transportation impact fees that will improve traffic operations and transportation in and around downtown Portland.
Incentives	
Parking Pricing/Incentives	<i>Unbundled and paid-for parking:</i> All residential leases at Lambert Woods will be exclusive of parking. Units designated for residents with incomes at 100% and 80% AMI levels will be charged \$125 per month per parking space. Residents with incomes under 60% AMI will get parking first-come first serve and not be charged. Under the affordable housing financing regulations, low-income tenants are not permitted to be charged for parking.
Transit Subsidies/Pass Management	<i>Transit pass purchase assistance:</i> Co-op Residential Services Coordinator will be able to work with residents to apply for and receive reduced-fare passes.
	<i>Transit pass reduced payments and processing:</i> Site owners are in the midst of and will continue discussions with METRO regarding the possibility of using up-front project financing capabilities to pay for the equivalent of a free transit pass for every resident for several years (e.g., 10 years)
Pedestrian/ Bicycling Subsidies	<i>Bicycle safety courses:</i> Explore reimbursing residents for bicycle safety courses
	<i>Bicycle Benefits:</i> Explore purchase of Bicycle Benefits memberships (\$5) for residents who bicycle
Shared Mobility Subsidies	<i>Carshare:</i> Explore discount for resident vehicle use of any future on-site or near-site hourly carshare, for first year of residency.
	<i>Carshare:</i> Explore discounted parking leases for co-op members who make their vehicle(s) available for rental via Turo peer-to-peer carshare: https://turo.com/us/en/car-rental/united-states/portland-me
	<i>Bikeshare:</i> Explore monthly bikeshare memberships for residents when/if future City of Portland bikeshare is made available in Lambert Woods neighborhood
Targeted Promotions	<i>1st year Prize Drawings starting at 85%+ occupancy:</i> Recommend Co-op committee overseeing TDM program conduct monthly prize drawing for multi-modal residents - with benefits such as movie tickets, gift cards, etc.
	<i>Discounts and coupons to nearby businesses - ongoing:</i> Recommend Co-op committee work with local businesses to offer residents discounts and coupons to North Deering and West Falmouth establishments within walk/bicycling distance



TDM Coordinator	Property Manager for Lambert Woods will be TDM Coordinator for the site. The Coordinator will work with Co-op Resident Engagement Committee responsible for the site's TDM program implementation.
Information	
Education for Travel Choice	<i>Webpage:</i> Maintain active transportation-related page on property management website for residents. Page to include same info as orientation packet below.
	<i>TDM orientation packets:</i> new residents and any sublettors will be provided with an orientation packet regarding the site's TDM program and access to site by various travel modes. Includes: (1) Map of the area, showing the destination, major streets, nearby landmarks and time to walk/bike to them, the closest bus stops and walking times, recommended cycling and walking routes, carshare locations, etc. (2) Information about transit service frequency, fares, first and last runs, and schedules if possible; plus phone numbers and web addresses for transit service providers and taxi companies. (3) How to reach the site from major transportation terminals (bus and train stations, airport, ferry terminal, etc.) (4) Access arrangements for people with disabilities; (5) Availability of bicycle facilities, including secure bike parking and bikeshare, if available; (6) Bicycle Benefits membership and bicycle safety courses; (7) Encouraging residents to become members of GO MAINE and access rewards system, carpool matching and Emergency Ride Home Benefit; (8) any carshare information and private automobile parking availability and price; (9) Information regarding the site's TDM program and contacting the TDM Coordinator.
	<i>New Resident & Employee TDM Engagement & Acknowledgement:</i> The TDM Coordinator will engage with each new resident to share about the TDM program as part of the site's sustainability initiatives. All new residents will be provided with the site's TDM program overview goals. They will be asked to sign an acknowledgement of the goals of the project and a commitment to participate in the annual resident transportation surveys. Language will be included in the Lambert Woods Covenant agreement regarding the City's requirement of the site's TDM plan, the resident TDM acknowledgement form and cooperation with annual surveying.
	<i>Ongoing TDM program education:</i> 1 or more times per year, TDM Coordinator or Co-op committee will email all residents (new and existing, including subletters) the same information as is in the TDM orientation packets.
	<i>Recommend Co-op committee experiment with walking tour of multi-modal options:</i> offer a hands-on walking tour of all the transportation options near the property. For example, a short experiential ride on the Route 9 to and from West Falmouth Crossing, including a demonstration of how to put a bicycle on the bus.
	<i>Recommend Co-op committee experiment with offering on-site bicycle safety class:</i> as residents show interest, host a bike safety/information class or bike repair event on-site. Recommend engage Bicycle Coalition of Maine and/or Portland Gear Hub.
	<i>Recommend Co-op committee encourage residents with private vehicles to experiment with rental hosting of their vehicles on Turo,</i> to expand local vehicle rental offerings and reduce the vehicle ownership needs of others
	<i>TDM surveying:</i> The required resident transportation surveys and reporting to City will also serve as an education tool



Promotion of Alternate Modes	<i>Outreach to employers on the Route 9A/9B:</i> Maine Cooperative Development Partners will develop a list of major employers within a 1/4 mile of bus stops on the 9A/9B to conduct outreach to those employers regarding housing availability at Lambert Woods, to encourage employers to offer transit passes to their employees, and for sharing with residents seeking employment
	<i>Storytelling, social proof and resident recognition:</i> Recommend Co-op committee build social proof of residents doing the desired TDM actions. Examples include: interviewing a multimodal resident for the Co-op newsletter, encouraging residents to post a photo of taking the bus to work, or the morning carpool, or walking or biking to the store on social media and tagging Lambert Woods, etc. 1-2 times per year, recognize individual residents who reduce the traffic impact of the site utilizing property management social media, community center door posters, newsletter, email or other announcements.



E. Plan for Monitoring, Data Collection and Reporting

Recognizing that the implementation of a TDM Plan is a dynamic process, the Lambert Woods TDM Coordinator and Co-op Resident Engagement Committee will work with the city to monitor the effectiveness of the site's TDM Plan components - and to assess whether the site is achieving the multimodal and parking ratio targets listed above. The coordinator and committee will work with residents to evaluate on-site parking use, drive alone rates, use of alternate modes of transportation, and the flexibility (and ability) of tenants to walk, bicycle, carpool, telecommute and take transit. They will also do an informal weekday overnight parking count of the on-street parking on Washington Avenue Extension. The team will utilize this information to plan for subsequent TDM efforts and improvements.

Tenant Surveys

The TDM Coordinator will conduct an annual resident survey, with at least 50% participation, that provides quantitative data (e.g., multimodal use and frequency, vehicle ownership, and parking) and qualitative data (e.g., perception of alternate transportation, area parking and the site's TDM programming). The survey will be developed in consultation with the city's TDM program manager and conform to overall city TDM modeling and planning.



Survey questions will include:

- Number of people in household
- Resident mode of travel for trips to and from the site – plus frequency of use of those modes
- Number of vehicles owned, if any
- If parking personal vehicle(s), where parked – including any assigned on-site parking spots
- Any driving during morning or afternoon peak periods
- Use of/participation in:
 - On-site multimodal support facilities (e.g., bike parking and repair stations, bus shelters, trail connections, future carshare or bikeshare, etc.)
 - Any use of site TDM benefits or programming
 - GO MAINE membership and participation
- Preferences/barriers/concerns with modes of travel and likelihood of behavior change with specific incentives
- Rating knowledge of walking, bicycling and using bus
- Space to add suggestions and comments



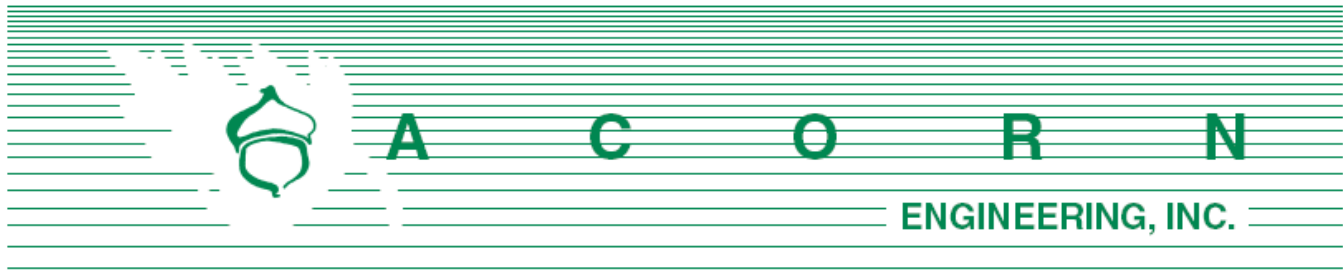
Note: the use of these survey tools will also assist Lambert Woods with its TDM education efforts. That is, the questions themselves help people think differently about their transportation behavior. The surveys will also provide a reminder of the TDM online/on-site information center and the TDM Coordinator for more information about options.

Annual Report

The TDM Coordinator will then produce an annual TDM Report to meet the city's monitoring requirements. This will be due every year on May 15, beginning within the first year after Certificate of Occupancy. The city has created a reporting template for consistency of site reports and the Co-op will utilize the most recent version of this template when beginning its reporting process. For now, it is recommended that the report include:

- a. the above survey data, percent of units occupied, site parking usage, and data from informal weekday overnight on-street parking count;
- b. how the data directly relates to the plan's TDM targets;
- c. overview of that year's TDM operations – including management, strategies, marketing, number of contact points with residents, and any new infrastructure development;
- d. lessons learned and any changes in the TDM plan during the year;
- e. plans for the following year.





Planning Division
City of Portland, Maine
Attn: Sean King
389 Congress Street, 4th Floor
Portland, ME 04101

July 27, 2022

Subject: 165 Lambert Street Co-Op – Notice of Public Meeting Certification

I, Sam Lebel, hereby certify that (3) notice of neighborhood meeting signs were posted on July 26, 2022, prior to the August 9, 2022 Planning Board Meeting for the proposed project PL-002078-2022 located in the vicinity of 165 Lambert Street and 622 Auburn Street. Photo documentation of sign in-situ:



Sign Location Along Washington Avenue



Sign Location Near Auburn Street



Sign Location Near Lambert Street

Note that it is the applicant's responsibility to remove the notice of public meeting sign within three days following the date of the meeting.

Sincerely,

A handwritten signature in cursive script that reads 'Sam Lebel'.

Samuel J. Lebel, P.E.
Project Manager
Acorn Engineering, Inc.



ADDRESS: IN THE VICINITY OF: 165 LAMBERT STREET

MEETING DATE:

AUGUST 9, 2022

APPLICATION ID: PL-002078-2022

NOTICE OF PUBLIC MEETING

CITY OF PORTLAND PLANNING BOARD

Find agenda at: www.portlandmaine.gov/agendas

For more information, call (207) 874-8719

ADDRESS: IN THE VICINITY OF: 622 AUBURN STREET

MEETING DATE:

AUGUST 9, 2022

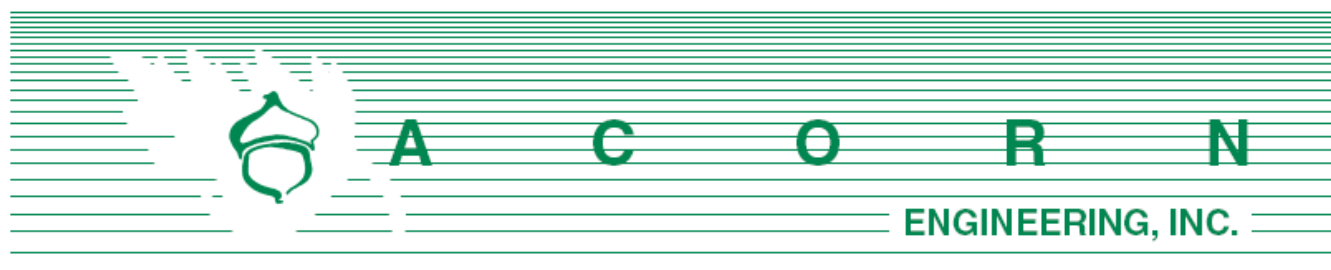
APPLICATION ID: PL-002078-2022

NOTICE OF PUBLIC MEETING

CITY OF PORTLAND PLANNING BOARD

Find agenda at: www.portlandmaine.gov/agendas

For more information, call (207) 874-8719



Sean King, PLA
Urban Designer
389 Congress Street
Portland, ME 04101

August 2, 2022

Subject: Comment Response Letter
165 Lambert Street – Portland, Maine

On behalf of Winchester Woods LLC and the rest of the project team, we are pleased to respond to the final round of comments received.

To facilitate the review, comments are provided below in italics followed by the project team's response.

Acorn Engineering (Sam Lebel, PE) Civil Engineer
Aceto Landscape Architecture (Nick Aceto, RLA)
Kaplan Thompson Architects (Adam Wallace, RA)
Maine Cooperative Development Partners (Matt Peters and Liz Trice)

City Planning Staff Comments

Comment – *Document the existing conditions by boundary and ownership of the 0 Gray Street property in Falmouth, ME. Indicate the property and acreage for conservation use on a surveyed plan.*

Response – This is currently in progress

Comment – *Advance design of proposed facilities for the Community Pavilion, and include the intent for use. With the majority of household services (ie. grocery, playground, community and social such as child care services) are beyond the 1-mile radius, consider community pavilion as building for access to essential goods and services within the development.*

Response – The design team is actively working with the client to solidify program and design of the community pavilions.

Comment – *Maine Cooperative Development Partners plans to provide a list of major employers within a 1/4 mile of bus stops on the 9A/9B, for sharing with residents and to conduct outreach to those employers regarding housing availability at Lambert Woods.*

Response – Noted.

Comment – *Provide rationale for the proposed surface material selection, consider the addition of more concrete pavers (potentially permeable) for the mews to connect building entries and assist to delineate vehicular and pedestrian use. Maintain parking and driveways as asphalt.*

Response – The design team is working to clarify the materials plan to better reflect the intended treatment—generally, the design intent is to utilize bituminous paving for all dedicated vehicular and general pedestrian circulation areas (sidewalks). Unit pavers will be utilized at dedicated pedestrian spaces, such as adjacent to building entries, landings, and terraces, as well as at community gathering areas. Grass-pave materials are intended to be utilized where emergency vehicles may require secondary access or additional maneuvering space.

Comment – *Clarify the interior circulation pathway materials, it appears asphalt is proposed at the north and concrete pavers proposed at the south. Consider a unified surface material of concrete for the interior pathways and building entries with concrete pavers.*

Response – The plan will be revised to reflect intended unified surface treatment design.

Comment – *Provide site lighting locations and photometrics. Provide street lighting locations and photometrics along Washington Ave Extension.*

Response – A photometric plan and specifications will be included.

Comment – *Indicate where storage is provided for each dwelling unit per building type.*

Response – Storage is provided within the individual units; the design team is working to develop an open-air pavilion that will include storage space for the tenants.

Comment – *Building design; Confirm Guest suite as Studio apartments in Community Flats.*

Response – There are two different ground floor plans of the Community Flats building. The first has a Studio apartment with a smaller community room space, and the second has a Guest Suite for visitors who are staying with tenants and do not require a kitchen. This allows for larger community space on the ground floor.

Comment – *Building design; Provide variation in façade character along building facades that face Common (Building B.5, B.4, B.2 & B.1) as a more activated elevation. Consider delineation of first floor (ie. window awning, secondary entry or variation in façade material) that breaks horizontal scale of buildings longer than 40 feet.*

Response – Our team is working to address the facade treatment with a variety of cladding that will help reduce the length of the visual appearance. We are also planning to utilize the undulating roof forms above the entrances to act as a horizontal break between the first and second floors.



Comment – *Outline the organization structure of the Co-op development to acknowledge common area maintenance vs. tenant responsibilities. Applicant to describe or direct planner to documents submitted.*

Response – *The tenants will be responsible for housekeeping in their unit, and the Cooperative will cover all other maintenance and property management, similar to a typical apartment complex.*

Transportation & Traffic Comments

Comment – *The Traffic Assessment did not identify any High Crash Locations. Although the Washington Avenue/Lambert Street intersection is not a High Crash Location (Historically it has been a High Crash Location), I would like to understand the contributing factors for crashes. The applicant shall provide the requested information.*

Response – *This request has been forwarded to the project's transportation engineer. A formal response and analysis is forthcoming.*

Comment – *Given the level of traffic generation by the project, the applicant shall conduct a traffic analysis at the Auburn Street/Washington Avenue Extension and Lambert Street/Washington Avenue Extension intersections. This shall include conducting existing traffic counts. The counts and analysis shall be performed for the weekday AM and PM peak hours.*

Response – *A traffic count will be performed and added to the traffic analysis report, this revised report will be provided at a later date.*

Comment – *Three driveways are proposed to the development. The applicant shall provide information in support of a waiver from the City's Technical Standards. I would note that Washington Avenue Extension is classified as a Major Collector and thus minimizing access points is preferred.*

Response – *Given the project is divided by Washington Ave into two distinct sites (not contiguous because of a public right-of-way), we believe that the City's Technical Standards 1.7.2.8 has been met, as no more than two driveways are proposed for each site. Additionally, both sites have been designed so that the eastern two driveways align along Washington Ave, with the western most curb cut being located as far as possible from the eastern driveways. We believe this approach to be ideal from a safety standpoint and align with the City's expectations. Although the road is a major collector, it's posted at 25mph and will be enhanced by a number of traffic calming measures.*

Comment – *The plans depict a shared use path from the site to Auburn Street. The minimum width for a shared use path without constraints is 10 feet, although existing constraints by drainage system shall be considered. Applicant shall provide the design intent of the proposed multi-use path on the north side of Washington Avenue Extension. Confirm if share use path provides linkage of the Portland Trails Sebago to the Sea trail head and the Presumpscot Falls portion of the trail.*

Response – *More information on the shared use path will be provided at a later date. We are studying on how to increase the width to 9' or 10'.*



Comment – *The use of on-street parking spaces to meet parking demand requirements for a project has not been permitted during project reviews, zoning requires parking demand to be accommodated on site. Applicant to provide rationale behind the proposal to include the amount of on-street parking along with further justification for the amount of total parking provided for the development with the exemption for 1/4 mile from a fixed transit route.*

Response – *The parking requirement is being met on site through the ¼ mile transit provision in tandem with a TDM plan. The on-street parking is generally meant for guests, traffic calming, and to ensure the project parking impacts do not encroach into the surrounding neighborhood.*

Comment – *Suggest on-road bike facilities in this section of Washington Avenue Extension with the following options;*

- *Eliminate the proposed curb extensions and on-street parking to provide a dedicated 8' wide bike facility (6' width bike lane, 2' width buffer) on each side of the street.*
- *Create a shared lane bike facility as they are proposing with additional traffic calming measures such as reducing the travel lane width's down to 10.5' to provide more space between the on-street parking stalls and the travel lane by striping an outer fog lane line.*

Response – *The project team is evaluating this comment.*

Comment – *The waiver for aisle width (24' to 22') is being justified on reducing impervious surface. Any project can make this case – reducing pavement. The development is proposing to create 2.69 acres of impervious area. The threshold of a Maine DEP SLODA permit is the creation of 3 acres of impervious area. So that could be the angle here.*

Response – *In a residential development where the vehicular users would be both familiar with the site, and experience low turnover, we believe a 22' wide drive aisle is appropriate to reduce impervious area while still providing a functional driving experience. Site constraints include grading concerns, abutter buffers, and natural resource protection given the wetlands and streams.*

Public Works & Engineering

Note: Additional comments from DPW have been received as of 7/27/2022, responses to the comments are forthcoming.

Comment – *Recommend to eliminate the easterly and westerly crossing and have one dedicated crossing at the middle location with an RRFB, it seems like westerly and easterly crossing locations are in very close proximity to driveways being proposed.*

Response – *More information on this comment will be provided at a later date.*

Comment – *DPW will not be supportive of slip form curbing to be installed on a major collector such as Washington Avenue Extension.*

Response – *The project will revise the curb type to granite.*



Comment – *Current configuration of Washington Ave Ext. not sufficient. Cross section needs revisions by the applicant to consider curb bump out to account for a reduced bike lane width, striping travel lane and reduce to 10', elevated crosswalks for traffic calming. On-street parking should accommodate the development and not create overflow into the adjacent neighborhood.*

Response – More information on this comment will be provided at a later date.

Stormwater

Note: Additional comments from DPW have been received as of 7/27/2022, responses to the comments are forthcoming.

Comment – *Recommends a realistic limit of work to include staging, equipment and earthwork anticipated adjacent to wetlands to accurately depict disturbance area. Riprap is not recommended as a permanent solution and promotes a robust vegetated solution and erosion matting solution at steep grades adjacent to wetland. Consider appropriate vegetated buffers at wetland edges.*

Response – More information on this comment will be provided at a later date after further evaluation of grading constraints and the desire to minimize wetlands impacts.

Open Space & Trails

Comment – *Advocate for trails in passive wooded areas, applicant to clarify how open space requirement is being met. Coordinate with Falmouth Land Trust & Portland Trails for potential opportunities for trail connections and future recreation use.*

Response – More information on this comment will be provided at a later date. Portland Trails is currently working on a trail location through the sites.

Comment – **TREE SAVE / Limit of Work** - *The final plan should include a 'Tree Save' / Limit of Work designation and plan to be used prior to clearing and during construction. This would include a written plan, signage and construction fencing to prevent off site storage or materials and equipment. "Tree Save" trees should be protected with signage and fencing around the drip line. To date the plan does not show either a tree save or limit of work. The proposed project clears an extensive amount of existing forest without any tree saves or forest management suggestions? The site workclearing should include nearby forest thinning improvements for sustainable landscape and safety.*

Response – More information on this comment will be provided at a later date. A forester has been engaged and will consult with the project team on tree saves.

Comment – **Invasive plant management** - *The northern side of the project especially contains extensive Common Buckthorn shrubs, the project should identify, plan and remove all invasive plants as part of their clearing portion of site work. This has been a standard on other project sites where high numbers of invasive plants are located.*

Response – More information on this comment will be provided at a later date.



Comment – Tree & Landscape treatment - We encourage high percentage use of native plants on wood sites like the proposed 165 Lambert Street project. Stevens Commons for example next to Baxter Woods successfully modified their landscape plan to a higher percentage of native species. This should be a condition of approval. The site is surrounded by natural appearing woodlands, the project should appear part of the surrounding landscape vs 'suburban'. The 'Woods at Canco' development is another successful landscape example. Thus we would ask the project not to use plants like 'Feather Reed Grass' and 'Maiden Grass' for example, and increase the native grasses like 'Little Bluestem', 'Prairie Dropseed' and other plants compatible to the New England region. The proposed tree pallet should also diversify, currently over 100 trees using only four species, recommend reducing numbers on the 'Armstrong' Red Maples from 40 to perhaps half of that and consider other tree types like the 'Beacon' and 'Regal Prince' Oak, though they are cultivars it would be nice to have a greater mix of tree types. Tree types missing: Red Oak, Swamp White Oak (use instead of the hard to establish White Oak), Tupelo, Shagbark Hickory, River Birch, Yellow Birch, White Spruce, Larch, 'Bowall', 'Red Pointe', 'Karpick' Red Maples offer a variety of other maple types depending on the desired planting space size.

Response – A revised planting plan will be included indicating a broader variety of trees and mix of native shrubs and grasses. The design team looks forward to working with the city on more detailed design of any Public ROW improvements.

Comment – Tree planting spacing and sizes - While regular spaced trees all in certain order adds a degree of structure to the landscape, this site might be better served by including groves of trees in a more natural arrangement. This might include a mix of plant heights like 5-6' conifers and 2" caliper trees with the larger sizes proposed. Knowing the more orderly plantings might be closer to the buildings and the natural groves of trees near the edges.

Response – A revised planting plan will include a greater variety of native material, as well as revised layout indicating more naturalistic transitional plantings along site limits.

Comment – Street trees - We would like to work closer with the project team to review the public 'Street tree' portion of the project. This would include species types, spacing. Applicant to include total tree count proposed.

Response – ALA looks forward to working with the City on more detailed design and tree selection for public ROW improvements.

Comment – Buffering - The proposed site contains existing residential boundaries with Auburn Street, and Falmouth properties on the North side and Auburn Street and Lambert Street residents on the South side, the landscape plan should address adequate buffer planting and treatment.

Response – A revised planting plan will be provided to include considerations for buffering adjacent sites.



Comment – *Wetlands / drainage treatment* - the use of restored wetlands, intermittent streams, raingardens was not noticed during my review and wanted to check to see if the project is favoring natural drainage features?

Response – A formal stormwater drainage system has been designed for this project, the stormwater water will be detained, treated, and cooled through the use of underground chambers and utilization of porous pavement. The stormwater will be released back into the surrounding environment at a controlled rate to ensure the post development peak flow rates do not exceed the pre development rates. The development has been designed to be tight and compact, consolidating the infrastructure such that the overall development footprint remains minimized. As a result, intermittent rain gardens and natural drainage features are difficult to incorporate into the core site design given the competing list of site elements.

Comment – *Recreational / Open Space* - It is essential to include a variety of onsite recreational and trail amenities for this project. The geographic location is out of walking distance to existing playgrounds and trails. (The future Haverty Field may in time offer somewhat close trails). Recreation features for youngsters could include playground structure, adventure play items, benches. Walking trails on or around the existing site should be a requirement and could match up with Fire Safety access.

Response – The design team is actively working with the client to solidify program and design of the community spaces. The site design goals include creation of community amenities which provide benefits and may be accessible both for residents of this project as well as adjacent neighbors insofar as budget, spatial constraints, and project sequence allows.

Fire & Life Safety

Comment – Fire truck access shall be well marked and visible from public street.

Response – Noted, appropriate signage will be added to the plans and updated at a later date.

Comment – Indicate appropriate snow storage and maintenance agreement to ensure fire access is clear at all times.

Response – Noted, proposed snow storage has been depicted on the plans and is not proposed within the fire access lane. A maintenance agreement shall be prepared at a later date.

Comment – Consider loop connection at the south development lot to gain access behind back of buildings to eliminate backing out onto Washington Ave Extension.

Response – More information on this comment will be provided at a later date.

Comment – Prefer alignment of fire truck access lanes where grasscrete is proposed, applicant to justify design intent.

Response – More information on this comment will be provided at a later date.



Zoning

Comment – Applicant to quantify and show on plans the net land area. The report from Jones Associates states that there is approximately 236,727.92 sf (5.43 acres) of delineated wetlands on the two properties. That is part of what needs to be subtracted from the net land area, but we still need to know the square footage of the watercourse (stream) and the slopes of 25% or greater. The overall site plan (sheet C-09) under Net Land Area states that 244,738 sf has been deducted from the property area to reach the net land area of 537,251 sf.

Response – This will be clarified in the forthcoming set of plans.

Comment – Applicant to confirm density bonus under section 18.2.4.B for PRUDs. Applicant to outline minimum lot area per dwelling unit in table.

Response – This will be clarified in the forthcoming set of plans.

Comment – Applicant to confirm if seeking minimum recreation open space reduction to 200/square feet of common area.

Response – This will be clarified in the forthcoming set of plans.

Comment – Proposed 122 parking (67 off street, 55 on street). The proposed 55 on-street parking stalls would not be counted towards required parking. R3 requires 1 parking stall per unit. Planning Board may establish a parking requirement less than 1 per unit based on affordable housing development. Applicant has provided TDM to pursue Land Use Code, Article 19, Table 19-B: Categorical Exceptions to Off-Street Parking Minimums, “No off-street parking shall be required within ¼ mile of fixed route transit service. New uses or changes of use of more than 10,000 SF taking advantage of this exception shall be required to provide a Transportation Demand Management Plan if they use this provision in lieu of parking requirements.”

Response – We agree the project is within a ¼ mile of a transit facility (and features 2 new bus shelters at the middle of the site along Washington Ave) and also provides a TDM plan, therefore there is no parking requirement.

Comment – Confirm the minimum building setbacks being observed for the development, zoning requirement for PRUD is 16-foot separation between buildings. Affordable housing of more than 50% can be reduced to 10 feet.

Response – Based on previous correspondence it is our understanding that this requirement was not eligible to be reduced from 16', but if our interpretation of previous correspondence was incorrect then it is desired the building separation is reduced to 10 feet.

Inclusionary Housing

Comment – 165 Lambert Street would meet the IZ requirement of 25% of the units being workforce housing at 80% AMI and over 50% low-income housing at 100% AMI for the density allowed under section 18.2.4.B. There will be 12 two-story townhouses, 48 three-story rowhomes, and 105 three-story flats - consisting of a total of 5 studios, 64 one-bedroom, 50 two-bedroom, and 46 three-bedroom units.



Observations***Transportation & Traffic***

Comment – *The applicant has conducted a Trip Generation analysis and assuming an Affordable Housing development 83 peak hour trips will be generated by the project during the worst-case peak hour. I find the methods used to estimate trip generation to be reasonable. I would further note that this level of trip generation does not require a Traffic Movement Permit.*

Response – *Noted, thank you for the review.*

Comment – *As noted in the report acceptable sight distance will be provided from the proposed driveways assuming vehicle speeds of 25MPH. I find conditions to be acceptable.*

Response – *Noted, thank you for the review.*

Comment – *In terms of cross-section – they are proposing 11-foot lanes and 8-foot parking lanes. The exception is at the bus stop where it will be 10.5' lanes and 10-foot shoulders. This seems okay to me.*

Response – *Noted, thank you for the review.*

Transportation & Traffic

Comment – *The improvements at Auburn Street need a detailed review and approval. ADA ramps need to be revised.*

Response – *A detailed design of the Auburn Street intersection improvements will be revised and submitted at a later date.*

Comment – *The improvements at Lambert Street need a detailed review and approval. DPW observes that the curbing alignment at this intersection might have an adverse impact on plowing operations.*

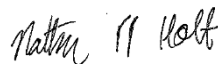
Response – *A detailed design of the Lambert Street intersection improvements will be revised and submitted at a later date.*

Please let us know if you have any additional questions or comments.

Sincerely,



Samuel J. Lebel, P.E.



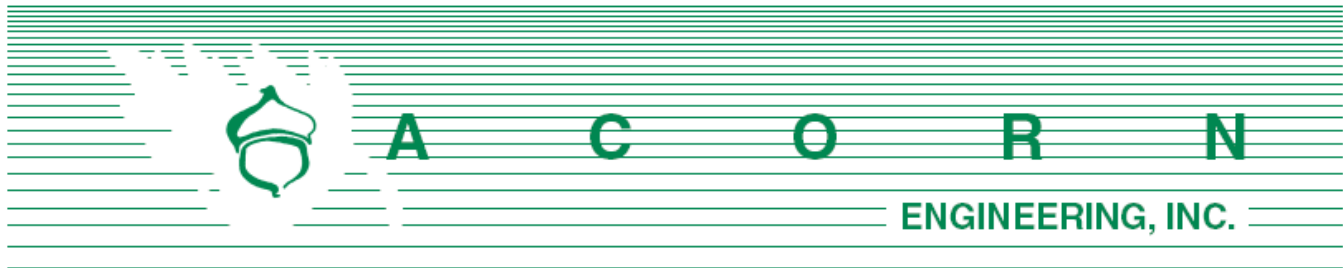
Nathan PP Holt, E.I.



Project Manager
Acorn Engineering, Inc.

Project Engineer
Acorn Engineering, Inc.





Sean King, PLA
Urban Designer
389 Congress Street
Portland, ME 04101

September 26, 2022

Subject: Comment Response Letter
165 Lambert Street – Portland, Maine

On behalf of Winchester Woods LLC and the rest of the project team, we are pleased to respond to the final round of comments received.

To facilitate the review, comments are provided below in italics followed by the project team's response.

Acorn Engineering (Sam Lebel, PE) Civil Engineer

Aceto Landscape Architecture (Nick Aceto, RLA) Landscape Architect

Kaplan Thompson Architects (Adam Wallace, RA) Architect

Maine Cooperative Development Partners (Matt Peters & Liz Trice) Developer

City Planning Staff Comments

Comment – *Document the existing conditions by boundary and ownership of the 0 Gray Street property in Falmouth, ME. Indicate the property and acreage for conservation use on a surveyed plan.*

Response – Please refer to revised Survey prepared by Owen Haskell, Inc. The property acreage in Falmouth consists of 14.74 acres. The areas slated for conservation will be determined at a later date.

Comment – *Advance design of proposed facilities for the Community Pavilion, and include the intent for use. With the majority of household services (ie. grocery, playground, community and social such as child care services) are beyond the 1-mile radius, consider community pavilion as building for access to essential goods and services within the development.*

Response – The community pavilion will provide outdoor, covered gathering space with integrated seating along with space for enclosed storage and bicycle parking. The pavilions will anchor the community commons and provide a transitional edge between parking and community space.

Comment – *Provide rationale for the proposed surface material selection, consider the addition of more concrete pavers (potentially permeable) for the mews to connect building entries and assist to delineate vehicular and pedestrian use. Maintain parking and driveways as asphalt.*

Response – The design intent is to utilize bituminous paving for all dedicated vehicular and general pedestrian circulation areas (sidewalks). Unit pavers will be utilized at dedicated pedestrian spaces, such as adjacent to building entries, landings, and terraces, as well as at community gathering areas. Grass-pave materials are intended to be utilized where emergency vehicles may require secondary access or additional maneuvering space.

Comment – *Clarify the interior circulation pathway materials, it appears asphalt is proposed at the north and concrete pavers proposed at the south. Consider a unified surface material of concrete for the interior pathways and building entries with concrete pavers.*

Response – The plan will be revised to reflect intended unified surface treatment design.

Comment – *Provide site lighting locations and photometrics. Provide street lighting locations and photometrics along Washington Ave Extension.*

Response – A photometric plan and specifications will be included.

Comment – *Indicate where storage is provided for each dwelling unit per building type.*

Response – Storage is provided within the individual units; the design team is working to develop an open-air pavilion that will include storage space for the tenants.

Comment – *Building design; Confirm Guest suite as Studio apartments in Community Flats.*

Response – There are two different ground floor plans of the Community Flats building. The first has a Studio apartment with a smaller community room space, and the second has a Guest Suite for visitors who are staying with tenants and do not require a kitchen. This allows for larger community space on the ground floor.

Comment – *Building design; Provide variation in façade character along building facades that face Common (Building B.5, B.4, B.2 & B.1) as a more activated elevation. Consider delineation of first floor (ie. window awning, secondary entry or variation in façade material) that breaks horizontal scale of buildings longer than 40 feet.*

Response – Our team is working to address the facade treatment with a variety of cladding that will help reduce the length of the visual appearance. We are also planning to utilize the undulating roof forms above the entrances to act as a horizontal break between the first and second floors.

A response letter has been prepared by the architect and has been included as an attachment to this response letter.

Comment – *Outline the organization structure of the Co-op development to acknowledge common area maintenance vs. tenant responsibilities. Applicant to describe or direct planner to documents submitted.*



Response – The tenants will be responsible for housekeeping in their unit, and the Cooperative will cover all other maintenance and property management, similar to a typical apartment complex.

Transportation & Traffic Comments

Comment – *The Traffic Assessment did not identify any High Crash Locations. Although the Washington Avenue/Lambert Street intersection is not a High Crash Location (Historically it has been a High Crash Location), I would like to understand the contributing factors for crashes. The applicant shall provide the requested information.*

Response – This information has been included within the revised Traffic Analysis Report.

Comment – *Given the level of traffic generation by the project, the applicant shall conduct a traffic analysis at the Auburn Street/Washington Avenue Extension and Lambert Street/Washington Avenue Extension intersections. This shall include conducting existing traffic counts. The counts and analysis shall be performed for the weekday AM and PM peak hours.*

Response – Please refer to the revised Traffic Analysis report for this information.

Comment – *Three driveways are proposed to the development. The applicant shall provide information in support of a waiver from the City's Technical Standards. I would note that Washington Avenue Extension is classified as a Major Collector and thus minimizing access points is preferred.*

Response – Given the project is divided by Washington Ave into two distinct sites (not contiguous because of a public right-of-way), we believe that the City's Technical Standards 1.7.2.8 has been met, as no more than two driveways are proposed for each site. Additionally, both sites have been designed so that the eastern two driveways align along Washington Ave, with the western most curb cut being located as far as possible from the eastern driveways. Although the road is a major collector, it's posted at 25mph and will be enhanced by a number of traffic calming measures.

In the event the City's interpretation of this ordinance is not in agreement with the Development team's interpretation, we would request a waiver given the need for access from several parties including the Portland Fire Department, residents, the solid waste contractor, and mail services. Given the project contains nearly 3,000 feet of legal street frontage, three curb cuts represents a modest approach in order to provide the necessary access to both sides of Washington Ave Extension while complying with the various other Site Plan and NFPA standards.

Comment – *The plans depict a shared use path from the site to Auburn Street. The minimum width for a shared use path without constraints is 10 feet, although existing constraints by drainage system shall be considered. Applicant shall provide the design intent of the proposed multi-use path on the north side of Washington Avenue Extension. Confirm if share use path provides linkage of the Portland Trails Sebago to the Sea trail head and the Presumpscot Falls portion of the trail.*

Response – After multiple conversations with DPW and the City's traffic peer reviewer, the design team is proposing two 8' wide multi-use pathways along a segment of the project's frontage on Washington Ave. Though not 10' in width due to constraints presented by adjacent wetlands and



drainage ditches, by providing two separate pathways this will help alleviate any congestion on the multi-use paths. The paths will connect to the existing sidewalk along Auburn Street which provides linkage to the Portland Trails Sebago to the Sea trail head as well as the Presumpscot Falls trail. This link will also allow children destined for the various schools an ability to safely cross in the tandem with the relocated crosswalk on the south side of the Auburn/Washington Ave intersection. This crosswalk has been designed with a curb extension and Rapid Flashing Beacon (RFB) and is outlined further in the Traffic Analysis Report and civil plans.

Comment – *The use of on-street parking spaces to meet parking demand requirements for a project has not been permitted during project reviews, zoning requires parking demand to be accommodated on site. Applicant to provide rationale behind the proposal to include the amount of on-street parking along with further justification for the amount of total parking provided for the development with the exemption for 1/4 mile from a fixed transit route.*

Response – The parking requirement is being met on site through the ¼ mile transit provision in tandem with a TDM plan. The on-street parking is generally meant for guests, traffic calming, and to ensure the project parking impacts do not encroach into the surrounding neighborhood should the parking demand be greater than the on-site supply. Overall, this project intends to follow both “smart growth” and “complete streets” principles which entails a compact site design that preserves wetlands while transforming the roadway into more of an urban condition that features multimodal transportation opportunities instead of prioritizing automobiles and tractor trailers.

Comment – *Suggest on-road bike facilities in this section of Washington Avenue Extension with the following options;*

- *Eliminate the proposed curb extensions and on-street parking to provide a dedicated 8' wide bike facility (6' width bike lane, 2' width buffer) on each side of the street.*
- *Create a shared lane bike facility as they are proposing with additional traffic calming measures such as reducing the travel lane width's down to 10.5' to provide more space between the on-street parking stalls and the travel lane by striping an outer fog lane line.*

Response – The second recommendation has been pursued by the design team, as the design now proposes a travel lane width at 10.5' with an outer fog lane line. We believe this approach to be optimal as it allows for on street parking and reduced traffic speeds while minimizing the impact on the surrounding neighborhood. Additionally, two multi-use paths will allow bicyclists the opportunity to cycle out of the main travel way if they are not comfortable sharing the roadway with vehicles. Additionally, an Alternatives Analysis for the streetscape has been prepared by the project team. Please refer to W. Alternative Street Design Analysis for more information.

Comment – *The waiver for aisle width (24' to 22') is being justified on reducing impervious surface. Any project can make this case – reducing pavement. The development is proposing to create 2.69 acres of impervious area. The threshold of a Maine DEP SLODA permit is the creation of 3 acres of impervious area. So that could be the angle here.*

Response – In a residential development where the vehicular users would be both familiar with the site, and experience low turnover, we believe a 22' wide drive aisle is appropriate to reduce impervious area while still providing a functional driving experience. Site constraints include grading concerns, abutter buffers, and natural resource protection given the wetlands and streams. By reducing the drive aisle to 22', it gives extra room to provide the desired site program while also allowing adequate buffers between natural resources and neighbors.



Public Works & Engineering

Comment – *Recommend to eliminate the easterly and westerly crossing and have one dedicated crossing at the middle location with an RRFB, it seems like westerly and easterly crossing locations are in very close proximity to driveways being proposed.*

Response – The three initially proposed crosswalks have been replaced with two raised crosswalks. The raised crosswalk is intended to reduce motorists' speeds as they enter the center of the development adjacent to the proposed bus stops. The distance between the crosswalks have been increased and are located at eastern and western edge of the center of the project where there is anticipated to be the most pedestrian activity. The crosswalk locations should help frame the portion of Washington Ave with the highest pedestrian density and serve as an additional traffic calming measure.

Comment – *DPW will not be supportive of slip form curbing to be installed on a major collector such as Washington Avenue Extension.*

Response – The project has revised the curb type to granite.

Comment – *Accommodations for on-road bike facilities in this section of Washington Avenue Extension shall be implemented as part of the design. There appear to be two outcomes to provide consistent bike facilities through this corridor:*

- *Eliminate the proposed curb extensions and on-street parking to provide an 8' wide dedicated bike lane on each side of the street.*
- *Create shared bike/motor vehicle travel lanes as currently being proposed with additional traffic calming measures such as reducing the travel lane widths down to 10'-10.5' in an effort to provide more space between on-street parking stalls and the travel lane. This could be accomplished by striping an outer fog lane line to the desired width.*
- *DPW would like further rationale for the development's proposed parking strategy before providing formal comments/acceptance of the proposed Washington Avenue Extension layout.*

Response – The second recommendation has been pursued by the design team, as the travel lane width has been reduced to 10.5' with an outer fog lane line. We believe this approach to be best as it allows for on street parking, will help slow traffic, and have the least impact on the surrounding neighborhood. With regards to the development's parking strategy, the off-street parking demand is met through the internal parking spaces proposed, a TDM has been prepared which outlines the parking rationale. The on-street parking is generally meant for guests, traffic calming, and to ensure the project parking impacts do not encroach into the surrounding neighborhood should the project's demand exceed the on-site parking supply. During City snow bans, the Co-Op will be responsible for signing the site and notifying residents the rules and regulations relating to plowing. The Developer has been in communication with Harrison Lyseth elementary school to provide a location for temporary snow ban parking and have been actively engaging other surrounding businesses and organizations. Additionally, an Alternatives Analysis for the streetscape has been prepared by the project team. Please refer to W. Alternative Street Design Analysis for more information.



Comment – *The applicant should revise the width of the proposed curb extensions to 6'-7' to provide more lane width for cyclists using the proposed shared travel lane on Washington Avenue Extension. The applicant should provide a minimum transition length of 20' at the start/end of each curb extension.*

Response – *The curb extensions have been reduced to 6' per request with a minimum 20' transition length.*

Comment – *DPW suggests eliminating the easterly and westerly mid block Washington Avenue Extension crossings and consider creating one raised crosswalk at the crossing location near station 6+80 to provide enhanced pedestrian visibility and further traffic calming in this corridor.*

Response – *The three initially proposed crosswalks have been replaced with two raised crosswalks.*

Comment – *DPW will not be supportive of the applicant's waiver request to utilize slip form concrete curbing on Washington Avenue Extension in lieu of granite curbing. The applicant should also note that the full radius of each driveway entrance shall be constructed of granite curbing per tech manual standard 1.7.2.5.*

Response – *The project has revised the proposal to include granite curb.*

Comment - *DPW is requesting that the applicant install a RRFB unit at the proposed Auburn Street at Garsoe Drive crosswalk location.*

Response – *Based on discussions with DPW, the crosswalk location has been relocated to the south on Auburn Street. This design modification was made in attempt to provide a safer crossing for children walking to the Lyman Moore school to the south of the project. An RFB has been added to this crossing in tandem with a curb extension.*

Comment - *DPW is requesting to meet with the applicant's engineer to better understand the proposed horizontal alignment and curbing changes being proposed at the Washington Avenue intersections with Lambert Street and Auburn Street*

Response – *This meeting has occurred, and we believe both the design team and DPW are in agreement with the expectations for the intersection designs.*

Comment - *Changes to the design of the Washington Avenue ADA ramps at Lambert Street should be considered to better align the ramp with the direction of egress across the proposed crosswalk.*

Response – *Please refer to the revised ADA ramps at the Lambert/Washington intersection to better direct pedestrian egress across the crosswalk.*

Comment - *DPW is requesting further information to better understand the design intent of the multi-use path being proposed on the northside of Washington Avenue Extension. If implemented, the path would ideally be a minimum of 10' wide and extend the entire length of Washington Avenue from Lambert Street to Auburn Street to help provide further connectivity for the Portland Trail network.*



Response – Given the constraints involving wetlands and the existing drainage ditch, we feel it most appropriate to provide two 8' wide multi-use paths along a portion of Washington Ave, as discussed in our meetings. Based on the wetland geometry this approach will result in less overall wetland fill while also helping to relieve congestion on the multi-use path by providing multiple routes of travel in tandem with a shared-use travel lane with bicycle sharrows and buffer area between the travel lane and on-street parking.

Comment - *The applicant should consider ways to provide a 3' minimum esplanade for the proposed sidewalks and pathways being proposed on Washington Avenue extension.*

Response – Given the site constraints regarding the existing ditch line and/or wetlands adjacent to the right-of-way, as well as request to provide alternative bicycle transportation routes through two multi-use pathways, there is limited opportunity to provide esplanades. Where feasible, we have implemented this technique such as the Auburn Street crosswalk which features an esplanade between the bike lane and travel way. We have also implemented esplanades between the transitions at the truck aprons and on-street parking/curb extensions.

Comment - *The applicant should provide further information on how proposed tree placement within the Washington Avenue Extension right of way could affect site line visibility of pedestrians at proposed crosswalk ramp locations.*

Response – Street trees proposed within the right of way are generally located outside critical sight triangles at driveway intersections. All trees proposed within the ROW and near driveway intersections will be deciduous species with crown heights above 5-6' minimum.

Comment - *The site plan refers to a driveway detail which could not be located in the plan set. The applicant should provide this driveway detail and provide information how the proposed driveway designs will meet sidewalk ADA requirements.*

Response – Please refer to Sheet C-40 which has the driveway detail meeting ADA requirements.

Comment -

- *It appears that a fire truck will have trouble circulating through the site without driving over proposed curbing based on a review*
- *DPW suggests moving the development's proposed internal sanitary sewer outside of the footprint of the proposed porous pavement system.*
- *The applicant should consider signage to discourage on-site drivers from driving down and parking along the proposed emergency access roads corridor.*

Response –

- Flush curbing is proposed on the internal curves within the mews and will not impact circulation of a fire truck.
- The internal sanitary sewer has been relocated outside of the porous pavement.
- Please refer to the revised site plan which prohibits parking along the emergency access route.



Comment – *Current configuration of Washington Ave Ext. not sufficient. Cross section needs revisions by the applicant to consider curb bump out to account for a reduced bike lane width, striping travel lane and reduce to 10', elevated crosswalks for traffic calming. On-street parking should accommodate the development and not create overflow into the adjacent neighborhood.*

Response – In coordination with DPW, please refer to the revised plans which provide multi-use pathways as an additional bicycle transportation route, reduced curb bump out widths, and a 10.5' striped travel lane.

Comment – *DPW is requesting that the applicant team look at alternative traffic calming measures at the Lambert/Washington and Auburn/Washington intersections. We are not in favor of the utilizing sloped granite truck aprons at these locations. We suggest referencing Maine DOT's guidance for the use of traffic calming devices. We also expect the previously requested traffic analysis at each intersection will further inform our opinion regarding the proposed changes to the intersections including but not limited to the turning radii at each location and the eastbound lane reduction at Auburn Street.*

Response – The project is now proposing flush reinforced concrete truck ramps at the intersection of Lambert/Washington as well as Auburn Washington. The truck ramps will be sloped up from the edge of pavement to the sidewalk ranging from 1.5% to 4" depending on distance from pavement to curbing along the sidewalk. The sidewalk is currently proposed with a 4" reveal as the concrete ramp rises 3" from pavement to curbline.

Comment – *Any curb extensions utilized should extend out a maximum of 6' from the proposed gutterline/edge of pavement.*

Response – The curb extensions have been revised to a 6' width.

Comment – *DPW is requesting that the applicant find a way to install 10' wide multi use paths on both sides of Washington Avenue extension if separated on-road bike facilities can't be provided as a result of the on-street parking being proposed. The applicant agreed to complete an alternatives analysis to see what can be fit in. 10' multi-use paths are typically required and preferred. It is possible that site constraints might warrant a reduction to 8' per DOT guidance.*

Response – Please refer to Section W Alternatives Analysis. The project team is proposing an 8' wide multi-use path on both sides of the street in conjunction with sharrows and buffer area in the roadway for bicyclists.

Comment – *DPW would be willing to support the proposed on street parking layout if the applicant can address two main concerns: 1.) Providing a safer biking alternative through the use of multi-use paths. 2.) Addressing snow ban/plowing operational concerns. The fundamental questions is: If residents are utilizing the on-street parking, where will cars be moved during a city wide snow parking ban to ensure the City can properly plow the parking stalls.*

Response – As discussed in the Alternatives Analysis, the revised treatment of Washington Ave provides a safer biking alternative through the use of multi-use paths. The owners have been in communication with Harrison Lyseth elementary school to provide a location for temporary snow ban parking and have been actively engaging other surrounding businesses and organizations.



Comment – *DPW is requesting that the applicant team look into reducing the number of mid block crossings from 3 to 2 as discussed in the meeting. DPW would support the idea of a raised speed table in this midblock zone to enhance pedestrian visibility and overall safety.*

Response – The midblock crossings have been revised from 3 to 2 along Washington Ave. These crossings will be raised to help further calm traffic and improve pedestrian safety. After consideration of the midblock speed table, it is not being pursued at this time as funding for public improvements is being prioritized towards the Auburn crosswalk and the truck aprons.

Comment – *It's DPW's position that the applicant will need to request a waiver and further justification for proposing three driveway locations. Based on the amount of traffic on this major collector road, DPW maintains that driveway locations should be minimized. It's acknowledged that the applicant team is trying to make the case that this development site should be treated differently since the site is bisected by the City's Washington Avenue Extension right of way.*

Response – Given the project is divided by Washington Ave into two distinct sites (not contiguous because of a public right-of-way), we believe that the City's Technical Standards 1.7.2.8 has been met, as no more than two driveways are proposed for each site. Additionally, both sites have been designed so that the eastern two driveways align along Washington Ave, with the western most curb cut being located as far as possible from the eastern driveways. Although the road is a major collector, it's posted at 25mph and will be enhanced by a number of traffic calming measures.

In the event the City's interpretation of this ordinance is not in agreement with the Development team's interpretation, we would request a waiver given the need for access from several parties including the Portland Fire Department, residents, the solid waste contractor, and mail services. Given the project contains nearly 3,000 feet of legal street frontage, three curb cuts represents a modest approach in order to provide the necessary access to both sides of Washington Ave Extension while complying with the various other Site Plan and NFPA standards.

Please refer to the "F. Waivers" document for the team's waiver request and justification regarding the three driveway locations.

Comment – *DPW is requesting that the applicant consider installing a crosswalk to the south of the Washington Avenue/Auburn intersection with an RRFB to provide a safer school crossing route for kids walking from the development site towards Lyseth-Lyman Moore. There was agreement in the meeting that this crossing would most likely provide more public benefit than the proposed crosswalk location at the Auburn/Garsoe intersection.*

Response – Please refer to Sheet C-35 for the proposed crosswalk design and relocation. We believe the proposed design provides the appropriate balance between plowing concerns, pedestrian safety, and bicyclist safety. To summarize, a curb extension with an RFB has been provided on Auburn Street to reduce the pedestrian crossing distance from approximately 44' to 26' of clear width pavement. The bicycle lanes have been rerouted around the crossing with a paved bike ramp. This design continues to be finessed as we reach out to various stakeholders including DPW and the Bicycle Coalition of Maine.



Comment – *DPW is willing to reconsider the bio retention cells being proposed in Washington Avenue Extension depending on the outcome of the cross section alternatives analysis we have requested.*

Response – Noted, the bioretention cells have not been affected from the alternatives analysis and will help treat stormwater runoff created by the existing roadway. These biocells are not being proposed to meet treatment requirements on site.

Comment – *DPW is requesting that the applicant conduct an evaluation of the pavement structure condition, particularly in the existing shoulder areas, to ensure adequacy for future loadings (shoulder pavement design can be different from travel lanes) as part of the project's geotechnical analysis. The scope and methodology of the test pits/borings shall be coordinated with DPW.*

Response – The future geotechnical investigations will feature test pits/borings of the existing road shoulder; the results will be forwarded to DPW. Should the shoulders lack sufficient subbase material, they will be box cut and replaced with adequate materials and depth, or an alternative method such as geogrid reinforcement may be proposed subject to review and approval by DPW.

DPW Water Resources Comments:

Comment – *DPW is seeking further clarification and rationale for the number of stormwater outfalls and the corresponding pipe sizes being proposed to tie into the City's existing ditch lines on Washington Avenue Extension. It appears that the applicant is anticipating greater stormwater flows leaving the development site than what is indicated in the stormwater management report post development POI # 1 flow rate. The existing closed storm drain system at the SW corner of Lambert and Washington is a 15" circular pipe. DPW is concerned that any additional flows may cause downstream flooding issues, especially during large events.*

Response – The stormwater report accurately depicts the anticipated peak stormwater flows based on the hydrologic analysis for not only the private development, but also considers the right of way improvements. The north side of the project features three (3) outlets into the City's existing ditch line along Washington. The eastern most outlet pipe is an 8" pipe that outlets proposed Rain Garden #1. Moving to the west, the next outlet pipe is an 18" storm drain that outlets the proposed underdrain subsurface sand filter proposed to treat and detain runoff from the northern site. The pipe diameter of this outlet pipe exceeds the diameter of the downstream 15" outlet at the Lambert/Washington intersection; however, the governing variable while sizing the pipe wasn't from a hydraulic capacity perspective, but rather to ensure minimum velocities and slopes are met. However, we have downsized the 18" pipes to 15" pipes which are more than adequate for the proposed outflow. The western most outlet is an 8" pipe that connects into the underdrain for Rain Garden #2. In summary, only one pipe conveying private runoff is proposed to daylight into the northern ditch, and it is not anticipated to create downstream flooding due to large subsurface detention facilities proposed on site.

We have removed two outlets on the southern side of the site. The only private outlet is now a 15" pipe which was sized to minimize the pipe run and slope, and is oversized from a hydraulic capacity standpoint.



Comment – *The applicant shall provide further information regarding flows anticipated within the ditch lines and shall complete an analysis to determine if further improvements to the existing ditch lines are necessary to accommodate the additional stormwater flow and to protect against potential scouring of the ditch channel and embankments.*

Response – The HydroCAD modeling features the northern and southern ditch lines as reaches to analyze the impact of the project. In accordance with Maine DOT standards, grassed ditches shall be designed with longitudinal grades between 0-6%, to withstand flow from a 10-year storm with velocities not to exceed 5 ft/sec, and the road subgrade to maintain 0.5' of freeboard above the water level within the ditch. As such, the project meets all three of the above criteria assuming a 25" road profile depth on Washington Ave. Please refer to the Stormwater Management Report for more information.

Furthermore, the project demonstrates maintenance, or reduction, of peak flows to this ditch line when compared to the existing condition. All pipe outfalls will be armored with riprap which will act as a plunge pool, dissipating energy before the water enters the grassed portion of the ditch.

Comment – *The storm water pipe discharge angles of SD 1.1, 6.1 and 8.1 into the Washington Avenue Extension ditch lines should be revised such that flow is discharged more in line with the main flow line of the ditch.*

Response – Please see the revised plans which the angle of the outlet pipe daylighting closer to the angle of the main flow line of the ditch.

Comment – *DPW has concerns that the proposed south side level spreader # 2 discharge will flow towards private property.*

Response – Please see the revised plans where the level lip spreader has been shifted to the east so that the sheet flow coming out of the level lip spreader is directed towards the stream rather than private property.

Comment – *The applicant shall provide further detail about the proposed catch basin inlet improvements at the end of the southerly and northerly Washington Ave extension ditch lines. The applicant should specify a beehive grate with proper inlet capacity to drain the proposed ditch line flows. These proposed inlets should be surrounded with a 5' riprap/geotextile fabric perimeter at least 12"-18" thick below the proposed inlet rim elevations. The applicant should provide a detail in the plan set for the proposed improvements to this inlet.*

Response – Please refer to the revised plans and detail for the catch basin located at the terminal end of the northern ditch. Additionally, a culvert with a riprap apron has been added to the end of the southern ditch such that the existing structure location can be maintained given the existing cross culverts.

Comment – *The applicant shall submit further information and design detail for the rip-rap energy dissipation pads at locations where the development's proposed storm drain systems daylight into the existing Washington Avenue ditch line.*

Response – Please refer to the revised plans which includes specifications for the plunge pools.



Comment – *The applicant should specify on the plans how the southerly and northerly ditch lines will be permanently stabilized.*

Response – Although only small portions of the ditchline are proposed to be disturbed, based on recommendations per the DEP's Erosion and Sediment Control Field Guide, it is proposed to install temporary check dams within the northern and southern ditch lines to help reduce velocity to mitigate against erosion and promote the settling of fine particles from flows. The check dams will be removed once the ditch has achieved 95% vegetive cover. The channel will be permanently stabilized with seed and an erosion control blanket.

Comment – *The applicant should update the project erosion control and construction management plans to include work in the right of way and specify measures to prevent erosion of the City's ditchline and sediment transport into the City's separated storm drain system.*

Response – Please see revised erosion control and construction management plans.

Comment – *DPW Water Resources is not supportive of the proposed rain gardens located within the Washington Avenue Extension right of way. If further treatment/flow attenuation is needed to meet regulatory requirements, it shall be provided on the development site.*

Response – Based on our correspondence with DPW, we are under the impression the rain gardens may be considered further. The treatment and flow attenuation requirements from the City and DEP are met with the BMPs proposed on private property. The proposed rain gardens in the public ROW are meant to treat existing runoff from the roadway, particularly for the "first flush", or 0.5" which features the highest concentration of pollutants. The Developer intends to fund and construct the rain gardens as a public improvement in tandem with the traffic calming implementations.

Comment – *DPW is requesting that the applicant grants the City of Portland permanent drainage easements for any proposed stormwater inlet or discharge points on private property providing drainage for the Washington Avenue Extension Street right of way. These drainage easements shall be a minimum of 30' long by 30' wide.*

Response – Noted, drainage easements will be prepared at a later date as requested.

Stormwater

Comment – *The project is required to comply with MaineDEP Chapter 500 and City of Portland Section 5 standards for stormwater management.*

- *Basic Standards – The project is providing for erosion and sedimentation controls on the site, and has provided two plans one each for the areas north and south of Washington Avenue. On Plan C-04, some of the work area extends off of the page and there is also an area where site drainage could exit the site that does not have perimeter erosion control – these areas should be updated. Work is also proposed for areas along Washington Avenue, and similar erosion control measures should be identified for those impact areas as well.*



- *General Standards – Stormwater treatment is being provided on the site using underdrained subsurface sand filters and porous pavement.*
 - *The Applicant should address the depth of groundwater. The subsurface sand filter and soil filter details include an impermeable liner, but the porous pavement detail does not.*
 - *The report does not address the design of the proposed soil filters along Washington Avenue. The City has expressed some concern with utilizing these underdrained soil filters, so further coordination will be required.*

Response –

- Please refer to the revised construction management and erosion control plan which now includes the right-of-way work as well proposed work within private property. The perimeter controls on the south site have been revised to enclose the proposed disturbed area.
- A geotechnical investigation is scheduled and the groundwater depths will be provided at a later date. A plethora of underdrains are proposed as part of this project which is anticipated to dewater any seasonal groundwater that may impede on subsurface infrastructure.
- We have been in coordination with DPW, our understanding is that they will reconsider accepting the proposed BMPs in the right-of-way as they are not used to satisfy the quantity or quality requirements for the project.

- *Flooding Standards – The Applicant has noted that the Flooding Standard has been met, primarily maintaining flows at the pre-development condition. I have reviewed the HydroCAD model and have the following comments.*
 - *The Applicant is utilizing a method of evaluating flow through porous pavement with a large time of concentration that I am not familiar with, but I am continuing to review. I am specifically interested in understanding more about how the use of the large time of concentration works with also separately modeling the porous pavement's storage and flow-through. I will continue to review and will provide additional comment as required.*
 - *The Applicant should review the time of concentration calculations for areas that are remaining as undeveloped. In some cases it appears that surface types may have been modified from the pre-development to post-development models resulting in larger TC values in the post-development condition.*
 - *The North and South grading and drainage plans both include drainage structures and stormdrain pipes. The numbering of these structures and pipes includes the same numbers on both the north and south project areas. It is suggested that the Applicant consider some kind of naming distinction as there could be some confusion when distinguishing the different project areas.*
 - *The Applicant should review the drainage structure rims with the proposed site grading that is shown on the plans – in some areas of the site the grades seem to be different than the structure rims. For example, CB6 on the southern project area appears higher than site grades; similarly CB2 on the northern project area is also slightly higher. The catch basins will provide the overflow backup for the permeable pavement, so they should be set at low points to be able to collect stormwater in higher intensity storm events or in the event that areas of the permeable pavement becomes clogged.*



Response –

- The time of concentration method used for the porous pavement is in accordance with research provided by the University of New Hampshire's Stormwater Center. Source: Ballesterio, Thomas, UNHSC. "Real Time Hydrology of Permeable Pavements" Philadelphia Low Impact Development Symposium, 2011. Part of the rationale is that the Curve Number (CN) input for porous pavement is 98 which is what traditional impervious pavement is rated at. If an alternative method of analyzing the attenuation provided from the robust porous pavement profile were determined or utilized with a lower Tc method, the CN would drop dramatically. Currently, the approach presented in the Stormwater Management Report and HydroCAD modeling is the industry standard based upon our research, experience, and past submissions, both at the local and State levels.
- The time of concentrations have been reconciled in the pre and post development condition.
- A naming convention for the north and south drainage networks has been incorporated to help avoid confusion.
- The structure rims have been revised.

Comment – *The utility plan shows the proposed locations of an electric utility pole and guywire east of the driveway and north of Washington Avenue. Please clarify what work may be necessary to install this utility infrastructure, and if this is part of the identified wetland impacts.*

Response – This is a potential utility pole location, ultimately the final location will be per CMP. Any work that is required within the wetland will be included within the Tier 1 NRPA permit.

Comment – *The potential snow storage locations that have been identified on the plans should be reviewed with proposed landscaping for conflicts. It appears that some areas may overlap with proposed trees.*

Response – Snow storage and planting areas have been coordinated to eliminate or reduce conflicts.

Comment – *The proposed landscape plans for the Washington Avenue work should be coordinated with the site plans. The landscape plans do not appear to show the entire area, they do not account for proposed stormwater features, and it appears that trees are proposed within stormwater swales, and in some cases on slopes that are identified on the site plans as rip rap. Any proposed on-street vegetation should also be coordinated with utilities.*

Response – Planting plans have been updated to reflect site plans.

Comment – *City of Portland Department of Public Works has provided a number of comments about the proposed stormwater management system, in particular for the work proposed within the Washington Avenue Right of Way. I would echo their comments, and would note that one area that needs some further clarification is the section from stations 9+00 to 13+50. Based on the grading plan, it is not completely clear where drainage will be directed, and what impacts drainage may have on off-site areas.*

Response – It is proposed to collect the runoff from Washington Ave with catch basins located along the gutter line. Near Sta 9+50, there are two catch basins proposed on opposite sides of the road. The northern structure will outlet into a riprapped plunge pool/spreader in a similar manner to the



existing condition. The southern catch basin will discharge to a 12" level lip spreader and then flow towards the wooded buffer in a similar manner to the existing condition.

Comment – *Recommends a realistic limit of work to include staging, equipment and earthwork anticipated adjacent to wetlands to accurately depict disturbance area. Riprap is not recommended as a permanent solution and promotes a robust vegetated solution and erosion matting solution at steep grades adjacent to wetland. Consider appropriate vegetated buffers at wetland edges.*

Response – Please see revised sheet C-03 that depicts erosion control measures adjacent to the wetland edge as well as revised sheet C-33 that now depicts an option for an engineered geotextile fabric proposed on a 1.5:1 slope near Sta. 9+00-13+00. Depending on the geotechnical evaluation of the project, a “green” alternative may be implemented in lieu of riprap, but both options are currently being left open. An advantage of riprap is it allows for steeper slopes which decreases the encroachment into the wetlands. The proposed riprap areas are also adjacent to the roadway which is a standard location for implementation of riprap.

Open Space & Trails

Comment – *Advocate for trails in passive wooded areas, applicant to clarify how open space requirement is being met. Coordinate with Falmouth Land Trust & Portland Trails for potential opportunities for trail connections and future recreation use.*

Response – We have been in coordination with Portland Trails; there is not a final trail design yet but a note has been added to the plans that states the future trails are to be coordinated with Portland Trails.

Comment – **TREE SAVE / Limit of Work** - *The final plan should include a 'Tree Save' / Limit of Work designation and plan to be used prior to clearing and during construction. This would include a written plan, signage and construction fencing to prevent off site storage or materials and equipment. "Tree Save" trees should be protected with signage and fencing around the drip line. To date the plan does not show either a tree save or limit of work. The proposed project clears an extensive amount of existing forest without any tree saves or forest management suggestions? The site workclearing should include nearby forest thinning improvements for sustainable landscape and safety.*

Response – A forester has been contacted for this project and has visited the site to mark out potential tree saves. The proposed tree saves have been included on the latest set of plans. A narrative will be prepared at a later date.

Comment – **Invasive plant management** - *The northern side of the project especially contains extensive Common Buckthorn shrubs, the project should identify, plan and remove all invasive plants as part of their clearing portion of site work. This has been a standard on other project sites where high numbers of invasive plants are located.*

Response – Please see the revised document titled “Q. Construction Management Plan” which includes information regarding the management of the Common Buckthorn shrub during clearing.

Comment – **Tree & Landscape treatment** - *We encourage high percentage use of native plants on wood sites like the proposed 165 Lambert Street project. Stevens Commons for example next to Baxter*



Woods successfully modified their landscape plan to a higher percentage of native species. This should be a condition of approval. The site is surrounded by natural appearing woodlands, the project should appear part of the surrounding landscape vs 'suburban'. The 'Woods at Canco' development is another successful landscape example. Thus we would ask the project not to use plants like 'Feather Reed Grass' and 'Maiden Grass' for example, and increase the native grasses like 'Little Bluestem', 'Prairie Dropseed' and other plants compatible to the New England region. The proposed tree pallet should also diversify, currently over 100 trees using only four species, recommend reducing numbers on the 'Armstrong' Red Maples from 40 to perhaps half of that and consider other tree types like the 'Beacon' and 'Regal Prince' Oak, though they are cultivars it would be nice to have a greater mix of tree types. Tree types missing: Red Oak, Swamp White Oak (use instead of the hard to establish White Oak), Tupelo, Shagbark Hickory, River Birch, Yellow Birch, White Spruce, Larch, 'Bowall', 'Red Pointe', 'Karpick' Red Maples offer a variety of other maple types depending on the desired planting space size.

Response – A revised planting plan been included indicating a broader variety of trees and mix of native shrubs and grasses. The design team has held a meeting with the city to review trees and plantings.

Comment – ***Tree planting spacing and sizes** - While regular spaced trees all in certain order adds a degree of structure to the landscape, this site might be better served by including groves of trees in a more natural arrangement. This might include a mix of plant heights like 5-6' conifers and 2" caliper trees with the larger sizes proposed. Knowing the more orderly plantings might be closer to the buildings and the natural groves of trees near the edges.*

Response – A revised planting plan has been included to incorporate a greater variety of native material, as well as revised layout indicating more naturalistic transitional plantings along site edges.

Comment – ***Street trees** - We would like to work closer with the project team to review the public 'Street tree' portion of the project. This would include species types, spacing. Applicant to include total tree count proposed.*

Response – ALA looks forward to working with the City on more detailed design and tree selection for public ROW improvements.

Comment – ***Buffering** - The proposed site contains existing residential boundaries with Auburn Street, and Falmouth properties on the North side and Auburn Street and Lambert Street residents on the South side, the landscape plan should address adequate buffer planting and treatment.*

Response – A revised planting plan will be provided to include considerations for buffering adjacent sites. The planting plan now includes a more robust mix of evergreen plantings to buffer adjacent properties as well as fencing in key locations.

Comment – ***Wetlands / drainage treatment** - the use of restored wetlands, intermittent streams, raingardens was not noticed during my review and wanted to check to see if the project is favoring natural drainage features?*



Response – A formal stormwater drainage system has been designed for this project, the stormwater water will be detained, treated, and cooled through the use of underground chambers and utilization of porous pavement. The stormwater will be released back into the surrounding environment at a controlled rate to ensure the post development peak flow rates do not exceed the predevelopment rates. The development has been designed to be tight and compact, consolidating the infrastructure such that the overall development footprint remains minimized. As a result, intermittent rain gardens and natural drainage features are difficult to incorporate into the core site design given the competing list of site elements.

However, as a way to treat the “first flush” of runoff from the road, and to provide an educational component to the project, two rain gardens have been proposed within the public right-of-way between the roadway and the development.

Comment – *Recreational / Open Space* - *It is essential to include a variety of onsite recreational and trail amenities for this project. The geographic location is out of walking distance to existing playgrounds and trails. (The future Haverty Field may in time offer somewhat close trails). Recreation features for youngsters could include playground structure, adventure play items, benches. Walking trails on or around the existing site should be a requirement and could match up with Fire Safety access.*

Response – The design team is actively working with the client to solidify program and design of the community spaces. The site design goals include creation of community amenities which provide benefits and may be accessible both for residents of this project as well as adjacent neighbors insofar as budget, spatial constraints, and project sequence allows.

Fire & Life Safety

Comment – *Fire truck access shall be well marked and visible from public street.*

Response – Please refer to sheet C-09 for the proposed signage. The fire truck access lane has been signed.

Comment – *Indicate appropriate snow storage and maintenance agreement to ensure fire access is clear at all times.*

Response – Noted, proposed snow storage has been depicted on the plans and is not proposed within the fire access lane. A maintenance agreement shall be prepared at a later date.

Comment – *Consider loop connection at the south development lot to gain access behind back of buildings to eliminate backing out onto Washington Ave Extension.*

Response – A loop connection has been considered but is not feasible given the current site design with the various grading challenges and desired programming. The site has been designed with fire access in mind by providing a loop connection through the reinforced grassed access aisle; there would also be access to the front of buildings S.3 and S.4 through the bus loading zone and paved driveway, therefore providing access to 2 sides of all buildings in tandem with 50' or less to the main door.



Comment – *Prefer alignment of fire truck access lanes where grasscrete is proposed, applicant to justify design intent.*

Response – The alignment of the fire access lanes was considered, but given the existing site constraints consisting of the southwestern property line and setback on the south parcel, the eastern wetlands on the northern parcel, and the minimum 16' building separation requirement within the R-3 PRUD standard, there is not an ideal adjustment to the site plan that would result in alignment of the fire access lanes without resulting in more wetland fill or violation of the City's zoning standards. Turning templates have been prepared which demonstrate the City's fire apparatus successfully maneuvering through the site and utilizing the access aisles based on their current alignment.

Comment – *Some of the lines in the turning templates seem to go outside of the drive isles. I want to confirm that these lines are the overhang of the truck and not the tire paths.*

Response – That is correct; the lighter lines represent the overhang and the bolder lines represent the wheel path.

Comment – *The grasscrete fire lane areas will need some definition through landscaping signage or some other means so fire apparatus operators can easily tell where the sides of the fire lane is. It will also need to be maintained as a fire lane year round so they should have a plan to plow or somehow clear the snow in those fire lane areas.*

Response – An operations and maintenance plan will be prepared for this area in tandem with additional signage proposed within the plans.

Comment – *Is the curb in the fire lane area a mountable curb?*

Response – This curb is flush and has been clarified as such on the plans.

Comment – *The project should have 2 street addresses (one for each side of Washington Ave Ext.) and the building should have separate letters (building A, building B etc.).*

Response – We will continue to coordinate addressing with Public Works and will incorporate this guidance.

Zoning

Comment – *Applicant to quantify and show on plans the net land area. The report from Jones Associates states that there is approximately 236,727.92 sf (5.43 acres) of delineated wetlands on the two properties. That is part of what needs to be subtracted from the net land area, but we still need to know the square footage of the watercourse (stream) and the slopes of 25% or greater. The overall site plan (sheet C-09) under Net Land Area states that 244,738 sf has been deducted from the property area to reach the net land area of 537,251 sf.*



Response – This has been clarified in the plan set.

Comment – Applicant to confirm density bonus under section 18.2.4.B for PRUDs. Applicant to outline minimum lot area per dwelling unit in table.

Response – This has been clarified in the plan set.

Comment – Applicant to confirm if seeking minimum recreation open space reduction to 200/square feet of common area.

Response – Yes, that is the intent although the ratio will likely be much larger. This has been clarified in the plan set.

Comment – Proposed 122 parking (67 off street, 55 on street). The proposed 55 on-street parking stalls would not be counted towards required parking. R3 requires 1 parking stall per unit. Planning Board may establish a parking requirement less than 1 per unit based on affordable housing development. Applicant has provided TDM to pursue Land Use Code, Article 19, Table 19-B: Categorical Exceptions to Off-Street Parking Minimums, “No off-street parking shall be required within ¼ mile of fixed route transit service. New uses or changes of use of more than 10,000 SF taking advantage of this exception shall be required to provide a Transportation Demand Management Plan if they use this provision in lieu of parking requirements.”

Response – We agree the project is within a ¼ mile of a transit facility (and features 2 new bus shelters at the middle of the site along Washington Ave) and also provides a TDM plan, therefore there is no parking requirement; however, some on-site parking is being provided in response the realistic expectation that many residents may still wish to utilize a vehicle.

Comment – Confirm the minimum building setbacks being observed for the development, zoning requirement for PRUD is 16-foot separation between buildings. Affordable housing of more than 50% can be reduced to 10 feet.

Response – Based on previous correspondence, it is our understanding that this requirement was not eligible to be reduced from 16’, but if our interpretation of previous correspondence was incorrect then it is desired the building separation is reduced to 10 feet. We look forward to this clarification.

Inclusionary Housing

Comment – 165 Lambert Street would meet the IZ requirement of 25% of the units being workforce housing at 80% AMI and over 50% low-income housing at 100% AMI for the density allowed under section 18.2.4.B. There will be 12 two-story townhouses, 48 three-story rowhomes, and 105 three-story flats - consisting of a total of 5 studios, 64 one-bedroom, 50 two-bedroom, and 46 three-bedroom units.

Observations

Transportation & Traffic



Comment – *The applicant has conducted a Trip Generation analysis and assuming an Affordable Housing development 83 peak hour trips will be generated by the project during the worst-case peak hour. I find the methods used to estimate trip generation to be reasonable. I would further note that this level of trip generation does not require a Traffic Movement Permit.*

Response – Noted, thank you for the review.

Comment – *As noted in the report acceptable sight distance will be provided from the proposed driveways assuming vehicle speeds of 25MPH. I find conditions to be acceptable.*

Response – Noted, thank you for the review.

Comment – *In terms of cross-section – they are proposing 11-foot lanes and 8-foot parking lanes. The exception is at the bus stop where it will be 10.5' lanes and 10-foot shoulders. This seems okay to me.*

Response – Noted, thank you for the review.

Transportation & Traffic

Comment – *The improvements at Auburn Street need a detailed review and approval. ADA ramps need to be revised. The improvements at Lambert Street need a detailed review and approval. DPW observes that the curbing alignment at this intersection might have an adverse impact on plowing operations.*

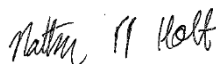
Response – We have revised the design concept for review. Once the approach to the street treatment and improvements is agreed upon, the next iteration of plans will feature detailed spot grades and construction details/sections. As proposed, the intent is to meet ADA regulations while also being responsive to DPW concerns.

Please let us know if you have any additional questions or comments.

Sincerely,



Samuel J. Lebel, P.E.
Project Manager
Acorn Engineering, Inc.



Nathan PP Holt, E.I.
Project Engineer
Acorn Engineering, Inc.



September 16, 2022

LAMBERT WOODS

Response to design review comments from Planning Board workshop #1

Additional building façade articulation shall be explored at the rear of the Rowhomes buildings that front the common open space through either additional fenestration at the ground floor, façade delineation of floors, expression of base foundation and/or similar elements appropriate to the style of the building.

Because the building contains more than 2 units with building lengths greater than forty (40) feet, the Rowhome buildings shall provide additional variation through either roof configuration at midpoint or end and/or projecting or recessed building elements to assist with dividing to a greater degree the horizontal scale.

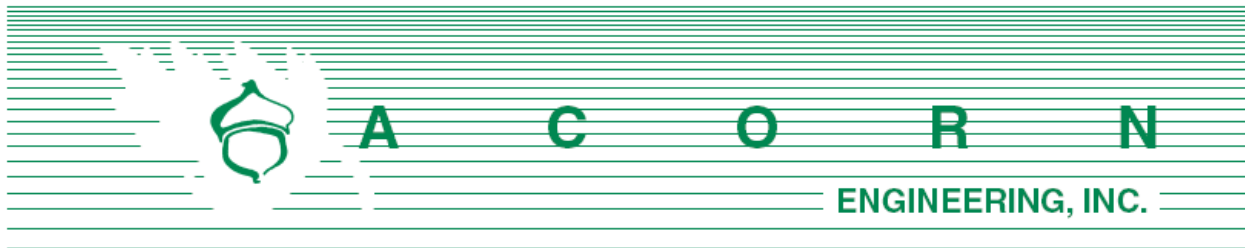
Our approach to the architectural design of the rear facade of the Rowhouse is to utilize overlapping hierarchical patterning that communicates at varied scales, to add depth and visual interest. The smallest of the patterning is the individual unit, clearly delineated by a contrasting siding color to its neighbor. We have offset the fenestration along one edge of each unit to avoid an evenly spaced patterning across the entire face of the building within this first layer of patterning. The next layer is delineated by the vertical downspouts that separate a pair of units by providing a vertical element held off the face of the building. Within the pair of units, the rhythm of the offset fenestration becomes more evident. The third layer is integrating landscape. Taller trees are placed between pairs of units offset from the downspout delineation by one unit. This establishes a new pattern across the face of the building, and a series of shorter plantings between the taller trees provide shading and a buffer from the ground floor units to the common open space.

The building is divided horizontally by a subtle change in siding exposure on each of the three levels. The exposure at the ground floor is 4" and will have a dense concentration of shadow lines that will produce a darker appearance. The exposure increases from 6" to 8" on the upper two levels. This effect will reduce the density of the shadows, thus lightening the facade as the building climbs upward. The larger reveal on the upper level will also help reduce the foreshortening effect and make the third floor appear closer than it actually is. Along the primary façade of the Rowhouses, we used a similar approach to dividing the building vertically with an additional element at the ground floor extending over the entry doors. There are a series of angular awnings that meander up and down and in and out across the face of the building. They are bisected by tall trees in front of the living room windows, which provide relief to the continuous ribbon of the awnings. Where the awnings meet at valley conditions, the valley is pulled apart to form a gap to provide water and sunlight to the planning bed below and a minor pause in the eave line when looking down the mews.



Phil Kaplan

Maine Licensed Architect, AIA
Kaplan Thompson Architects



Alternative Street Design Analysis

In collaboration with Sarah Cushman, the project's transportation consultant, the following analysis has been prepared for the 162-unit proposed residential development located at 165 Lambert Street and 622 Auburn Street in the North Deering neighborhood in Portland, Maine. The existing traffic conditions along the project's frontage on Washington Avenue Extension, as well as the intersections at Auburn and Lambert Streets will be improved through a combination of transportation strategies, including narrowing the lane widths along Washington Ave, reducing the paved turning radius at both intersections, and providing a concrete apron to facilitate larger truck traffic. The purpose of this alternatives analysis is to examine different treatments of the project's frontage, focusing on slowing traffic, and providing a safe transportation route for bicyclists and pedestrians. As requested by the City's transportation peer reviewer, we have examined several cross sections of Washington Ave. which weigh the pros and cons of the multimodal facilities, the utility and traffic calming of on-street parking, and the environmental impacts of infrastructure on the adjacent wetlands and open ditch drainage systems.

The following alternatives focus on the street section at Station 10+00, where the existing drainage sheet flows off the roadway into the surrounding wetlands. To provide a consistent comparison, this section will remain the same throughout this analysis; however, it should be noted Stations 1+00 thru 4+00 generally have existing drainage ditches that represent a fixed parameter when looking at available width. Please refer to the design plans for more information in these areas. Given the majority of the transportation will occur between Stations 4+50 and 13+00 as residents move between the Site and the State highway (Auburn Street / Rt. 26 / Rt. 100) which provides access to goods and services in Portland and Falmouth, the focus of this analysis is based upon this stretch of roadway.

Other existing conditions to note along Washington Avenue Extension:

- Posted at 25mph
- Road profile iteratively steps in grade from 5% to 2%, moving from Auburn Street to Lambert Street, respectively.
- 12' travel lanes with 8' shoulders yield 40' of existing pavement, with additional gravel shoulders off the edge of pavement before the transition to a grassed ditch line occurs
- No bicycle or pedestrian infrastructure exists along this corridor

Also of note, in addition this analysis: other site elements that will improve the human scale of the pedestrian and bicycling environment significantly along both the north and

south frontages of Washington Avenue Extension (and will consistently remain part of the design in all Alternatives include):

- Raised pedestrian crossings and signage
- Bus shelters with seating on both sides of the street at the core of the development, linked to a proposed public sidewalk network
- Additional walking and bicycling access to the site via emergency vehicle access points that feature structurally stable and uniform grass pavers
- Active building facades, lighting, street trees, and other landscaping
- Trail connections

Option 1

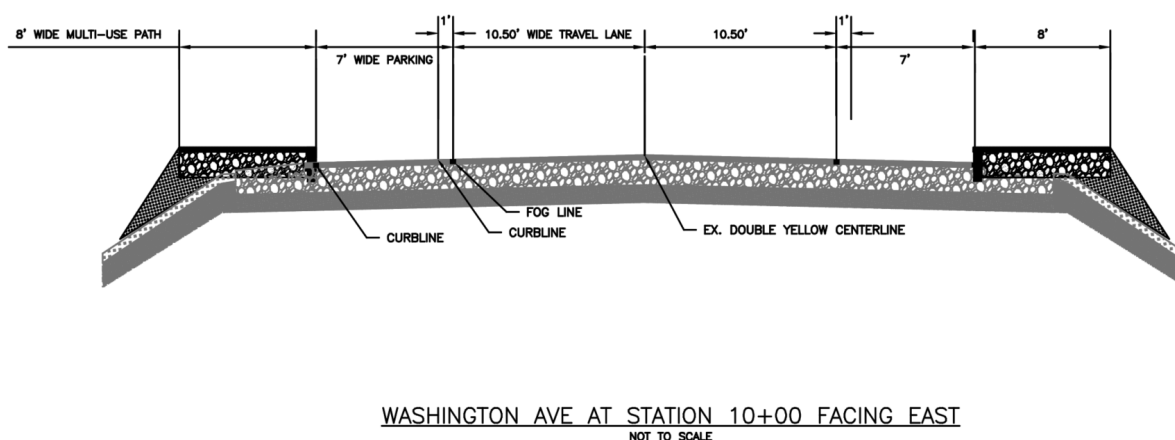


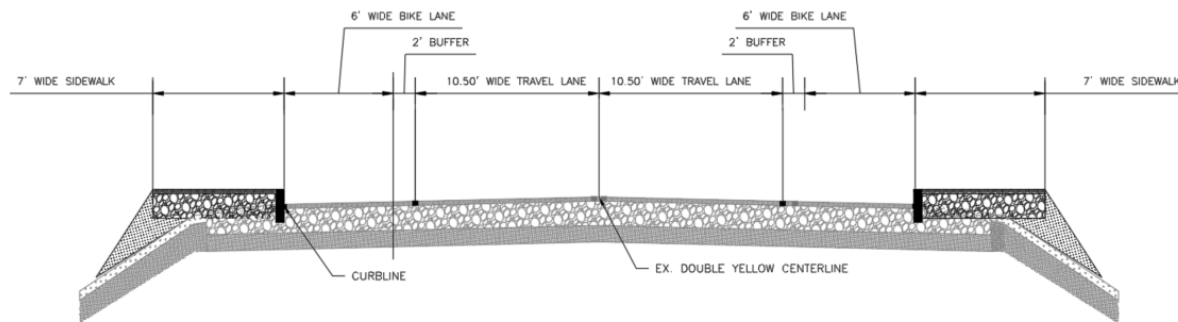
Figure 1 – Washington Ave Section Facing East (Option 1)

Option 1 features 10.5' wide travel lanes striped with a fog line, 7' wide on-street parking (6' wide curb extensions), and 8' wide multi-use pathways on both sides of the road. In addition to the 8' multi-use pathways, shared lane markings (sharrows) are proposed to be striped in the center of the roadway.

As designed, this option features three different routes of transportation for bicyclists to travel with the multi-use pathways on both sides of the street and on-street riding facilitated by sharrow markings.

It should be noted that the 8' multi-use pathways are proposed as a result of grading constraints adjacent to existing wetlands and environmental concerns. Providing 10' multi-use paths would result in additional wetland fill and environmental impacts to accommodate the design.

Option 2

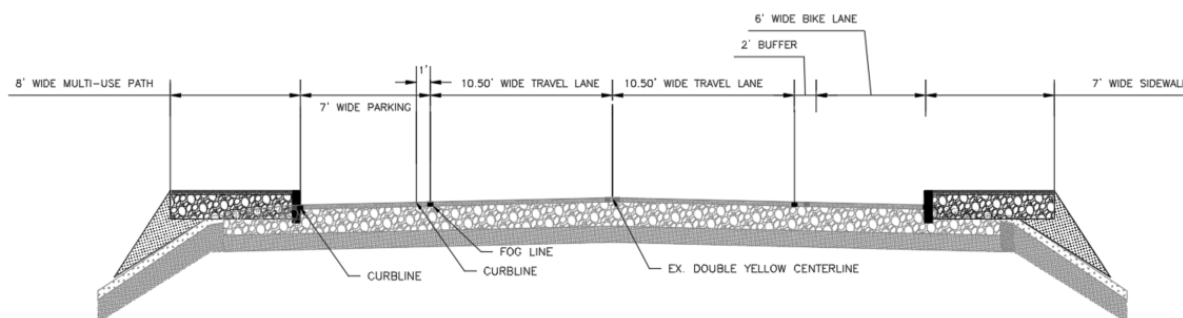


WASHINGTON AVE AT STATION 10+00 FACING EAST
NOT TO SCALE

Figure 2 – Washington Ave Section Facing East (Option 2)

Option 2 features 10.5' wide travel lanes striped with a fog line, 2' wide striped buffer between the travel lane and bicycle lane, a designated 6' wide bike lane, and a 7' wide sidewalk on both sides of the road. In this scenario, no on-street parking is proposed. Bicyclists would have their own travel lane, along with a striped buffer to help designate a clear difference between bicycle and motorist travel ways

Option 3



WASHINGTON AVE AT STATION 10+00 FACING EAST
NOT TO SCALE

Figure 3 – Washington Ave Section Facing East (Option 3)

Option 3 consists of certain elements from each of the the first two options. The northern side will feature 10.5' wide travel lane with sharrow striping, 7' wide parking (with 6' wide curb extensions), and an 8' wide multi-use path. The southern side features a 10.5' travel lane, 2' bike lane buffer, a 6' bike lane, and a 7' wide sidewalk. The northern side of the road is

proposed to feature the shared lane methodology consistent with NACTO recommendations which states that sharrow markings are best suited for downhill situations where bicyclists are able to move faster and better match the flow of vehicular traffic. The southern side features a designated bike lane or “climbing lane” as riders move uphill, resulting in slower cyclist speeds.

Conclusion

Given the relatively short distance that would be traveled by bicyclists, and accounting for previous concerns from the neighborhood, in our professional opinion Option 1 provides the best balance when comparing the three outlined options. This includes consideration of traffic calming measures, separation of routes of travel for bicyclists, and maximization of the number and use of on-street parking spaces. The other design options laid out contain some portion of reduced on street parking, which takes away from the overarching transportation design intent of the project which is to provide a more welcoming place for residents and visitors, by calming the speed of motor vehicles on this existing “rural highway” and providing a buffer from street traffic for people on the multi-use paths.

Key points are listed below that support this conclusion:

- On-street parking increases positive “friction” along a street and can narrow the effective crossing width for pedestrians, both of which encourage slower speeds (FHWA). With curb extensions interaction with on-street parking, the condition becomes more of an urban feel with the intent to engage drivers’ awareness as well as slow their speed based upon the perception of available travel width and human activity.
- Generally, one concern regarding the traffic calming efficacy of on-street parking is when it is not utilized enough. In the case of Lambert Woods, however, the reduced on-site parking encourages use of on-street parking for some residents as well as their guests, increasing the likelihood of a strong utilization rate of these spaces, and thereby more calmed traffic. This proposal is in tandem with various curb extensions that help hold the curbline and travel lane widths regardless of the on-street parking rates.
- A separate multi-use path is the most desired option to support pedestrians and bicyclists of all comfort levels, ages, and abilities (NACTO). More experienced or comfortable bicyclists will be able to utilize the travel lane with sharrows if they do not wish to use the multi-use paths.
- The multi-use paths are not anticipated to be heavily traveled such as Portland’s Back Cove, or South Portland’s Greenbelt. Therefore, for the bicyclists who are not comfortable sharing the travel lane with motorists, it’s not anticipated there will be heavy usage or conflicts with pedestrians and other bicyclists, such as a more central, public space such as the Back Cove trail. Thus, the 8’ width is anticipated to be appropriate.

Washington Avenue Extension has been proposed to contain minimum treatment as a future “on road bikeway” on the City of Portland’s Bikeway & Pedestrian Network

Map. Option 1 goes the furthest to support pedestrians and cyclists by creating separated bicycle and pedestrian accommodations and facilities on both sides of the roadway.

- Option 1 is the most effective option at reducing the effective pavement width and crossing distance. Options 2 and 3 would have larger effective pavement widths and are not anticipated to have as effective traffic calming effects because of this.
- Option 1 maximizes the total number of on street parking spaces and traffic calming potential of this strategy. It would also minimize any on-street parking impacts on the surrounding neighborhood. The concern of overflow parking spilling into the surrounding neighborhood has been expressed as a concern from residents relating to the project and Option 1 is the most effective at addressing this issue.

Lastly, our team has summarized several supporting conclusions pertaining to on-street bicycle riding and the shared lane markings/ sharrows proposed in Option 1:

- Shared lane markings are helpful to alert road users to the presence of bicyclists who want to use the street and who have the right to do so. For example, motor vehicle drivers are sometimes confused by the existence of an adjacent off-road multi-use path and believe bicyclists are only permitted to use the path.
- Shared lane markings also have been shown to encourage cyclists to position themselves safely in the travel lane (NACTO *Urban Bikeway Design Guide*) (Anderson & Bernbaum, Smart Design, 2020). For example, cyclists who ride too far to the right unintentionally encourage motor vehicles to pass too close within a travel lane that cannot accommodate both road users side by side. That is, a travel lane must be at least 13 feet wide to accommodate a 6 foot-wide vehicle, the 3 feet of passing distance required by state law, and at least 4 feet of operating space needed by a bicyclist. In addition, research has also demonstrated that well-placed sharrows nudge bicyclists away from the door zone of parked vehicles, reducing the risk of bike crashes precipitated by motorists opening their doors into the travel lane.
- NACTO states a desirable shared lane marking application existing where the speed differential between bicyclists and motorist travel speed is low. (NACTO *Urban Bikeway Design Guide*)

Based upon the above analysis, it is our professional opinion that Option 1 results in the most balanced street cross section when evaluated from a multimodal transportation perspective.

Comments on PL-002078-2022

1 message

Ed Eggleston <eeggleston@gmail.com>

Thu, Jul 28, 2022 at 9:51 AM

To: Sean King <sking@portlandmaine.gov>, planningboard@portlandmaine.gov, planning@portlandmaine.gov

Sean,

I just received the postcard about the project going before the planning board and my neighbor (at 640 Auburn) and I (at 660 Auburn) have some concerns.

We are both directly on one side of the north development and within 500 feet.

After reading the document listed below, there are several items that we are concerned about.

Reference: "Lambert Woods Cooperative Housing Transportation Demand Management Plan June 15, 2022"

While the discussion of parking in the document is accurate, there is mention of "Eddies", Hannafords and Shaws being "close".

Eddies - It is fairly close, but if you want something other than wine / beer / pizza, your choices will be very limited.

Shaws - This is a "reasonable" store but is about 2 miles down the road. For grocery shopping, walking and biking will be a challenge in any type of weather or in the winter.

Hannafords - This is a nice store and is about 1/2 mile away. However Auburn (which gets renamed as Grey in Falmouth), is very busy and there are no sidewalks. And again, walking and biking may not be a viable choice in weather or winter. NOTE: There are NO sidewalks between the development and store.

There is also a mention of two child care centers. These are not close but for both of them, there are NO sidewalks.

Reference: Traffic Study

We have also read the traffic study but feel that putting 60(?) or so parking spaces on the road is a concern. The concern is parallel parking and people walking across the street in traffic. There is a "Traffic Report" on the web site that discusses sight lines. However, if there are cars parked on the sides of Washington Ave Ext, the results of the report for sight lines will not be valid.

The report seems to say that most of the future residents will take the bus but during one of the developers zoom meetings, they said that only 5% of Portland people can / will take the bus to work.

Reference: Cover Letter

In one of the documents, (Cover Letter) there is a comment about narrowing the traffic lanes on Washington Ave Ext. It is my understanding that this road was installed to provide a path for truck traffic to / from the Riverside industrial area to the Maine turnpike. Based on homeowner observations of the truck traffic, this would seem to be the case.

The idea of making this busy road narrower does not seem like a good idea as there does not seem to be any other convenient ways to get to / from the Riverside area to / from the Maine turnpike. In fact one of my neighbors said that the extension was added specifically to remove truck traffic from going through the neighborhoods.

Reference: "Lambert Woods Cooperative Housing Transportation Demand Management Plan June 15, 2022"

In the document ("Lambert Woods Cooperative Housing Transportation Demand Management Plan June 15, 2022") there is a note about making the drive within the development 22 feet wide versus 24 feet wide. While this might seem like a nice concept, is the developer sure that none of the residents will have large pickup trucks or mid-sized work vans.

In the document ("Lambert Woods Cooperative Housing Transportation Demand Management Plan June 15, 2022") there is a mention of an 8-foot multi-use path. As documented in a previously posted Wetlands survey, there are wetlands on both sites of Washington Ave Ext on the Auburn end. To avoid damage to the wetlands (and possible neighborhood basement flooding), this should be discussed further.

In the document ("Lambert Woods Cooperative Housing Transportation Demand Management Plan June 15, 2022") there is a mention of "pathways and trail connections". Previous zoom and personal discussions with Portland Trails covered two items. The first was that a trailhead starting on Auburn Street was not viable due to a lack of parking. At that time, there was some discussion with the developer about having a trailhead on Washington Ave Ext with parking being provided by the developer. There is no mention of this in the documents that I have searched.

Reference: Site Plan _ North

Document "Site Plan - North" appears to show setback lines. During all of the developer zoom meetings and in discussions with city staff, it was our understanding that there would be a 25 foot setback. In addition, the developer stated that there would be a 75 foot setback from the creek that runs on the north end of the property. This is not shown on the site plan.

The site plan drawing of setback lines looks more like a 10 foot setback versus 25 feet. The property was surveyed a few months ago and the lines marked with plastic tape.

Furthermore, if the requirement is for a 25 foot setback from the homeowners, it would appear that the "solid waste location" and "snow storage" are shown as being within a 25 foot setback.

In addition, from a "good neighbor point of view", it would be nice to have the "solid waste" and "snow storage" locations switched so that the "solid waste" would be further from the neighbors back yard.

Reference: Site Plan _ North

At a recent developer zoom meeting, the site plan had been updated to move the parking to the east side of the site. My neighbor (at 640 Auburn) and I (at 660 Auburn) became concerned about headlights shining into our back windows. We both contacted Liz Trice (developer) to state our concern. Liz said she understood the concern and would update the site plans to include a 5-6 foot wall along the back of the parking lot to block headlight issues. There is no indication of such a headlight blocking wall shown on this site plan.

Ed Eggleston
660 Auburn St.

--

Ed Eggleston

PL-002078-2022 - Overflow parking on Lambert Street

Ed Eggleston <eeggleston@gmail.com>

Thu, Aug 4, 2022 at 10:53 AM

To: Planning <planningboard@portlandmaine.gov>, Sean King <sking@portlandmaine.gov>

With limited onsite parking for the planned 165 units, is there going to be an issue if the development people try to park on Lambert.

One of the proposed site plans includes a path along the creek between the development and Lambert street.

Lambert is a fairly busy street and is not very wide. Based on personal observations when I am walking, I don't remember seeing many or any cars parked on the street.

Ed Eggleston
660

--

Ed Eggleston

FW: Lambert st

jrather@portlandmaine.gov <jrather@portlandmaine.gov>
To: Sean King <sking@portlandmaine.gov>

Wed, Aug 3, 2022 at 8:17 PM

From: planning@portlandmaine.gov <planning@portlandmaine.gov> **On Behalf Of** jt2 portland me
Sent: Tuesday, August 2, 2022 10:19 AM
To: planning@portlandmaine.gov
Subject: Lambert st

Disgusted with this Lambert st project! You will kill the last of beautiful tree lined streets in my neighborhood! Yes I know we need housing but I am crying over the lost "forest" deer go there, all sorts of animals. I am so so sad! Why why why? You have sold out to development! Stop this!!!

Good morning,

I would like to keep this observation of the proposed residential project named above simple and to the point. After discussion with my neighbors, we have compiled the following list of our concerns and questions.

1) Effect on traffic in the following areas: Auburn St., Washington Avenue extension, Lambert Street, Riverside Street and Summit Street. These are currently heavily traveled roads, especially during the morning and evening commutes. The large addition of vehicles from this proposed development trying to access these roadways will potentially cause back ups and traffic jams.

2) Effect on public schools. The elementary, middle and high schools which serve the families in this area are already filled to capacity. Does the developer have a plan to expand the existing buildings, build new buildings or hope that the possibility of adding perhaps 100 to 200 new students will fit into the "as is" school buildings? Also, a number of new buses will have to be put into service to meet the transportation of new neighborhood children. What is the city's plan to cover these needs?

3) City services such as police, fire departments and road maintenance, etc. will realize an increase in need. This could create a problem as most services are already understaffed and strained. What is the city's plan to cover these needs?

4) Will property taxes increase to cover the added services that will be needed to service this new development?

5) The DEP will have to take a very active position to identify and protect wetlands, vernal pools, wildlife and setbacks on this site.

As we see it this property is much too large to comfortably fit into the projected areas without affecting all of our above mentioned concerns.

Best regards,

Phil Requia
110 Lester Dr.
Portland, Maine 04103
207-807-2586

Lauren Manera <laurenmanera54@gmail.com>
to planning@portlandmaine.gov

Jul 27, 2022, 12:06:49 PM (5 days ago)

Dear Sir/Madam:

While I agree the City of Portland needs housing, I disagree it needs such a large development on the far side of the City.

The neighborhood ALREADY needs pedestrian improvements. Currently, it is not walkable from this site to a grocery, pharmacy or bank -- unless you consider walking 1.2+ miles reasonable. This would be especially true for older persons, disabled persons, children or anyone in bad weather.

Bus service would need to be improved, and bus shelters would need to be installed.

There are few connected sidewalks in this area, and people are forced to walk or run primarily in the road, or traipse over lawns. This is just not safe.

Speeding goes unenforced, and this creates a dangerous situation for pedestrians and bikers. The speed limit should also be reduced in this area by 5 mph.

A study needs to be done determining the amount of traffic in this area. The 4-way stop sign and blinking red light at the corner of Lambert will probably need to be converted to a stop light. There should be a stop sign at Lambert and Summit (by the church).

There is also a sign indicating "no trucks" entering Lambert Street from Auburn. Is this a suggestion or something that might actually be enforced some day?

Please feel free to contact me via email or by phone (207-279-9017) should you have any questions or need clarification on the above.

Lauren Manera
77 Lambert St., Unit A2
Portland 04103

Lauren Manera <laurenmanera54@gmail.com>
to planning@portlandmaine.gov

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Lauren Manera
77 Lambert St., Unit A2
Portland 04103

PL002078-2022 0 views

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Ruth Bettinger <bettinger.ruth@gmail.com> Aug 6, 2022, 12:06:19 PM (yesterday)

to planningboard@portlandmaine.gov

Please find attached comments for the public hearing relating to 165 Lambert and 655 Auburn development plan - PL-002078-2022. Comments are directed toward traffic and safety. At a recent neighborhood meeting with Maine Cooperative Development Partners, I would personally add concern and question relating to the proposed changes at the Washington Ave Ext and Auburn intersection. My hope is that you will review this carefully and ensure that traffic will safely move through this intersection. I support the narrowing of the road, but am concerned about movement at the intersection especially without a light.

There are many more concerns and productive ideas than one letter can express. Our neighborhood looks forward to the opportunity to engage in a conversation that results in some positive changes for this neighborhood and Portland.

Thank you for your time,
Ruth Bettinger
501 Summit St, Portland, ME 04103

Marpheen Chann
Brandon Mazer
David Silk
Austin Smith
Justin Baker
Maggie Stanley
Sean Murphy

August 1, 2022

Dear Planning Board members,

This letter is written to express the neighborhood concern regarding the expected increase in traffic due to the Lambert Woods housing proposal submitted by Maine Cooperative Development Partners and located at 165 Lambert and 622 Auburn. With the proposed 165 housing units, the number of vehicles added on the neighborhood roads could increase by two hundred or more vehicles. While we are not in opposition of the development, we are extremely concerned about the increased traffic and the hazards this will bring to our neighborhood.

We ask that there be immediate consideration to the intersection of Lambert and Summit. It is our request that there be a four-way stop at this intersection, traffic calming measures, a cross walk and narrowing of the road to prevent cars from passing turning traffic. This intersection is awkward, wide and with blind spots, especially with a rising or setting sun. The church parking lot adds two additional traffic entrances into the four-way intersection adding additional hazards to bicyclists, pedestrians, and vehicles. The four-way stop would slow traffic on Lambert, which currently has no stop signs. Slowing traffic will make safer passage as well as lower traffic noise in the neighborhood. Traffic on Lambert St is often exceeding the speed limit, which increases the vehicle noise to the surrounding homes.

When there are conversations with Maine DOT, we would support an effort to add a traffic light at the intersection of Washington Ave Extension and Auburn St.

The neighborhood asks that as infrastructure conversations happen during city meetings, the conversations include this North Deering neighborhood. With the new and existing neighbors, it will be extremely important to improve or add sidewalks, bicycle lanes, crosswalks, and increased schedules for public transit. With more traffic and residents coming to this neighborhood, it will be imperative to offer safe pedestrian passage as well as improve the traffic pattern for the safety of our neighbors.

As you consider approving the plans for Lambert Woods, please consider the necessary safety measures of the Summit and Lambert neighborhood as well as the surrounding neighborhoods that will also be affected by the increase in traffic.

We would be happy to meet with city officials to discuss our concerns further.

Sincerely,

Ruth Bettinger	Ruth M Bettinger	501 Summit St
Lara Austill	Lara Austill	450 Summit St
Anthony Gabovey	Anthony Gabovey	450 Summit St.
Marilyn Kirby	Marilyn Kirby	517 Summit St.
Jason Baeris	Jason Baeris	125 Lambert
Mary Cafazzo	Mary Cafazzo	544 Summit St.
John Spizzuolo	John Spizzuolo	552 Summit St
Michelle Leavitt	Michelle Leavitt	2005 Washington Ave
Brina Kelly	Brina Kelly	539 Summit St.
John Walsh	John Walsh	525 Summit St
Brittney Walsh	Brittney Walsh	525 Summit St.
Matthew Lucey	Matthew Lucey	520 Summit St
Victoria Lucey	Victoria Lucey	520 Summit St
Ann M Courtney	Ann M Courtney	517 Summit St
Merriv V. Allen	Merriv V. Allen	517 Summit St.
Jess Casseese	Jess Casseese	7 Morningstar Ln.
SABATO CASSESE	SABATO CASSESE	7. Morningstar Cn
DENISE TADDEO	DENISE TADDEO	34 Morningstar Ln
Dianne Watters	Dianne Watters	15 Morningstar Ln.
Matt Watters	Matt Watters	15 Morningstar Lane
BYRON REBURN	BYRON REBURN	513 SUMMIT STREET
Colleen Shula	Colleen Shula	513 Summit St
ED EGGISTON	ED EGGISTON	660 AUBURN ST
MARK MORAN	MARK MORAN	56 Morningstar Ln
Janet Christopher	Janet S. Christopher	7 Stonecrest Dr.
JEFF SMITHA	Jeff Smitha	33 Morningstar Ln
Joan Smitha	Joan Smitha	33 Morningstar Ln
Peter Christopher	Peter Christopher	7 Stonecrest Dr
James Cimpri	James Cimpri	198 Lambert St.

Madeline Bates
Janie Stone

Madeline J. Bates
Janie Stone

157 Lambert St.
70 Stonecrest Drive

PL-002078-2022 - walking / biking 0 views

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Ed Eggleston <eeggleston@gmail.com>
to planning@portlandmaine.gov, Sean King

5:58 AM (6 hours ago)

Background:

The developer has talked about being able to walk / bike to various places in the existing neighborhood in various documents.

The section of Washington Ave Ext between Lambert St and Auburn St currently:

Has walking / bike lanes on both sides

Has NO sidewalks

Has drainage culverts on both sides

Has wetlands on both sides between the development sites and Auburn St.

Concern:

With the proposed parking of 60(?) cars in the existing bike lanes, and no sidewalks, it seems that it would be unsafe to try to walk or bike in or out of the development.

There has been problems with basement water in the neighborhood in the past and building a sidewalk across the wetlands OR filling in the drainage culverts seems like a very bad idea.

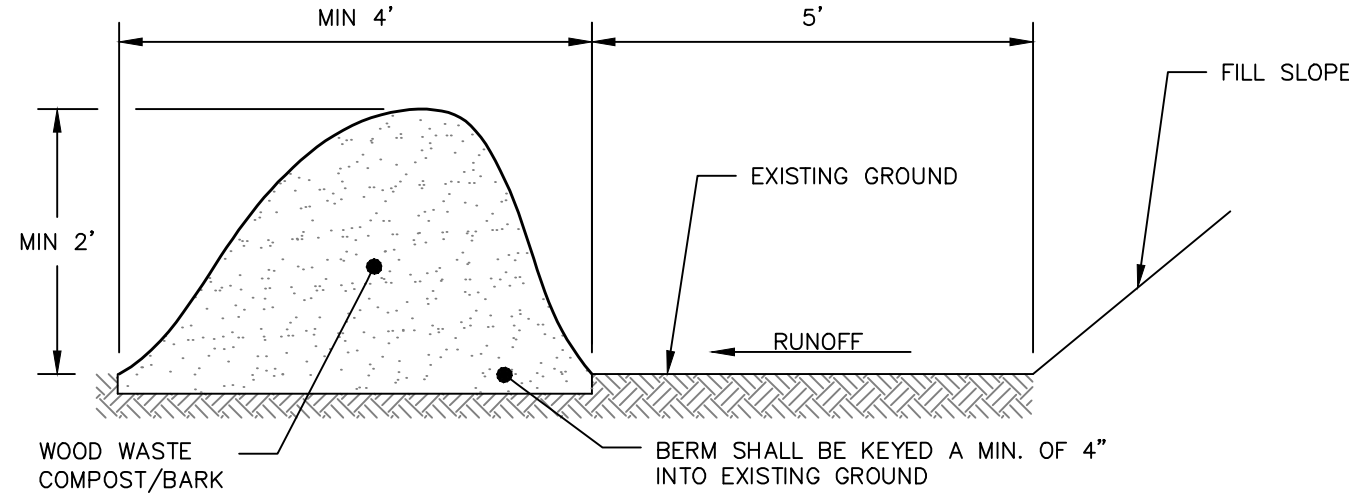
**Ed Eggleston
660 Auburn St**

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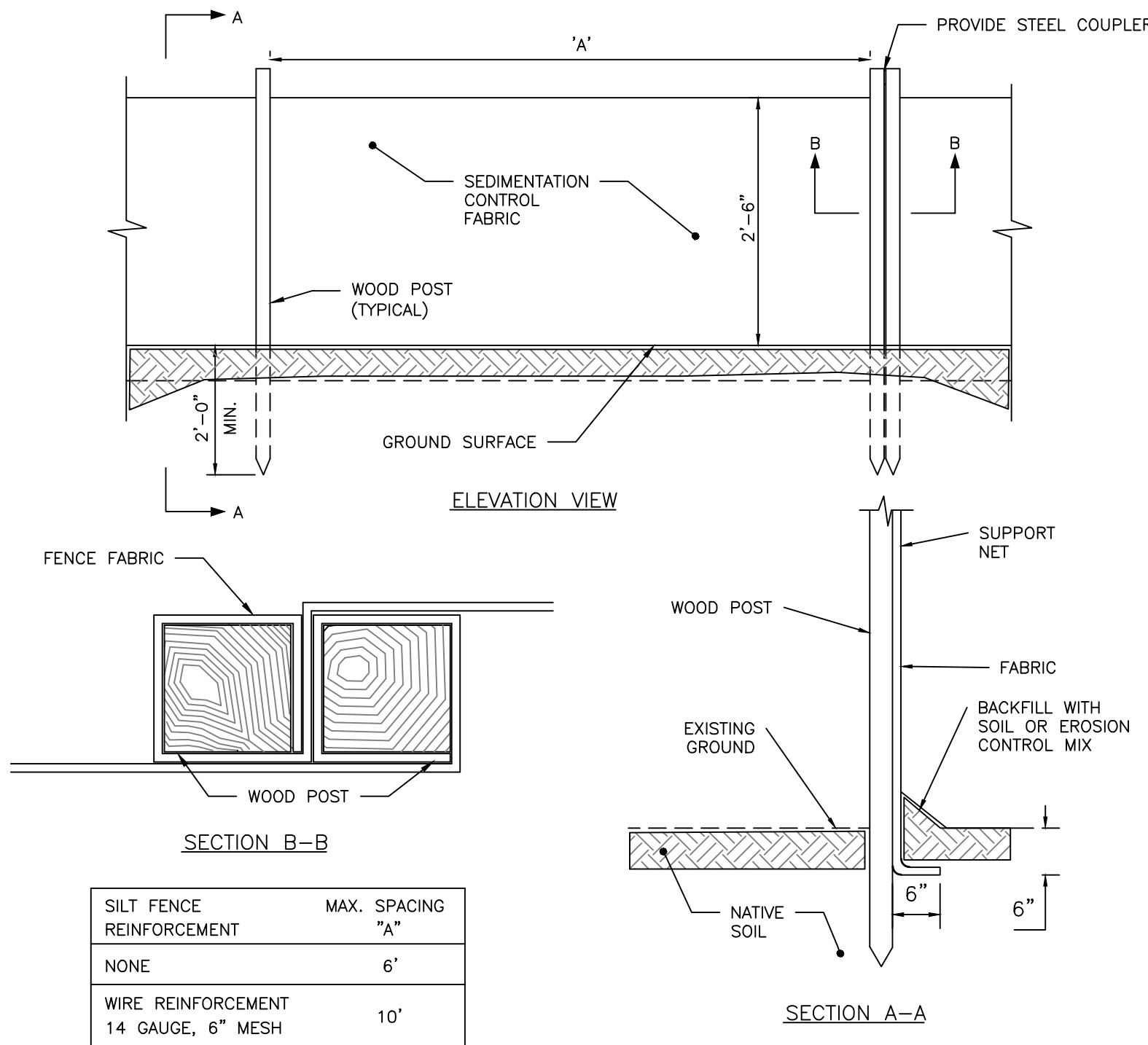
Ed Eggleston

NOTES:

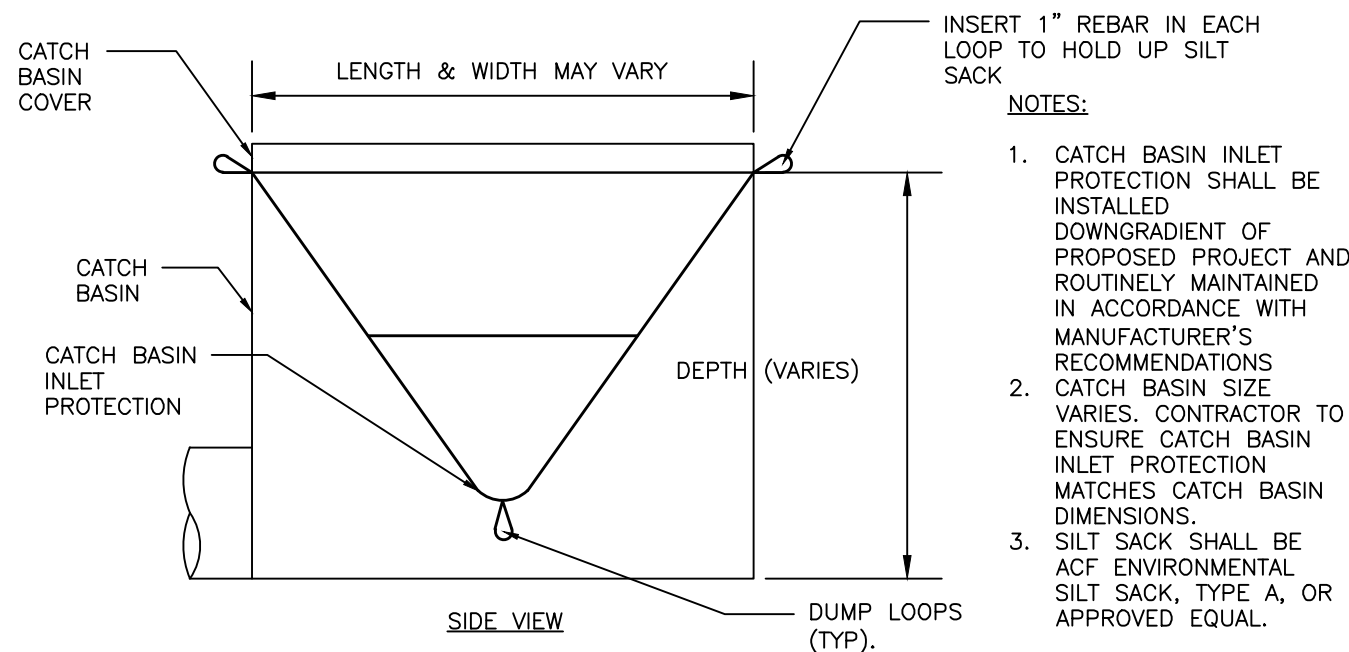
1. THE EROSION CONTROL MIX SHALL CONFORM TO THE FOLLOWING STANDARDS AND IN ACCORDANCE WITH THE MAINE DOT CHAPTER 700, SECTION 717.04(D):
 - 1.1. pH BETWEEN 5.0 - 8.0
 - 1.2. PARTICLE SIZE (BY WEIGHT):
 - 1.2.1. 100% PASSING A 150 MM (6 IN) SCREEN
 - 1.2.2. 75 TO 85% PASSING A 19 MM (0.75 IN) SCREEN
 - 1.3. SOLUBLE SALTS CONTENT < 4.0 MMHOS/CM
 - 1.4. ORGANIC MATTER 20 TO 100% , DRY WEIGHT BASIS
2. THE BERM SHOULD BE PLACED, UNCOMPACTED, ALONG A RELATIVELY LEVEL CONTOUR, WHEN NECESSARY THE BERM MAY BE PLACED PERPENDICULAR TO THE SLOPE ALONG THE PROPERTY LINE TO CONTAIN THE SEDIMENT PROVIDED A BERM IS LOCATED AT THE BASE OF THE SLOPE.
3. BERMS SHALL REMAIN IN PLACE UNTIL UPSTREAM AREA IS STABILIZED OR 90% CATCH OF VEGETATION IS ATTAINED. BERMS SHALL BE REMOVED OFFSITE OR BY SPREADING SUCH THAT NATIVE EARTH CAN BE SEEN BELOW.
4. DURING PERIODS OF WINTER CONSTRUCTION (NOV. 15 THROUGH APRIL 15), THE CONTRACTOR SHALL INSTALL EROSION CONTROL MIX BERMS IN LIEU OF SILT FENCE.



EROSION CONTROL MIX BERM DETAIL
NOT TO SCALE



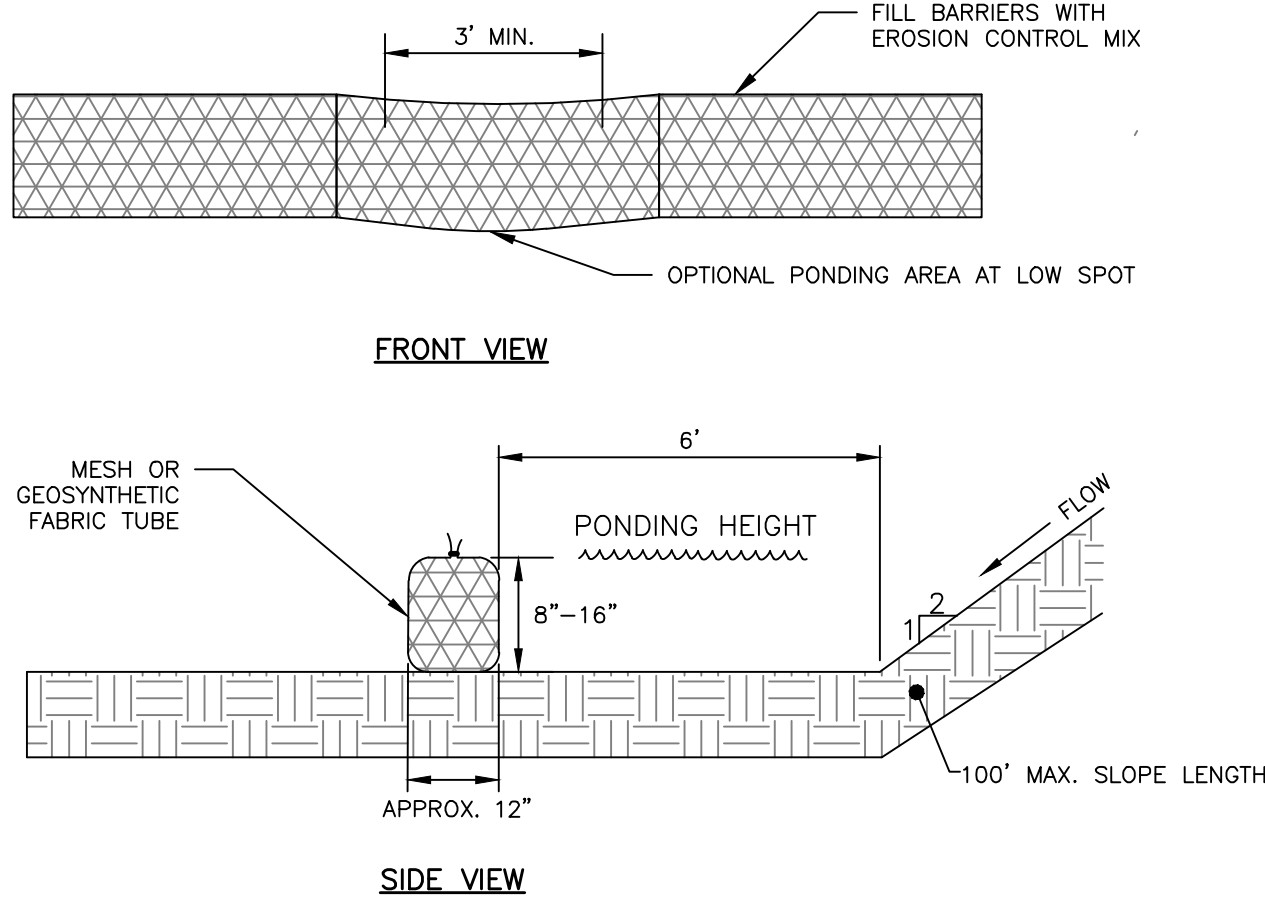
SILTATION FENCE DETAIL
NOT TO SCALE



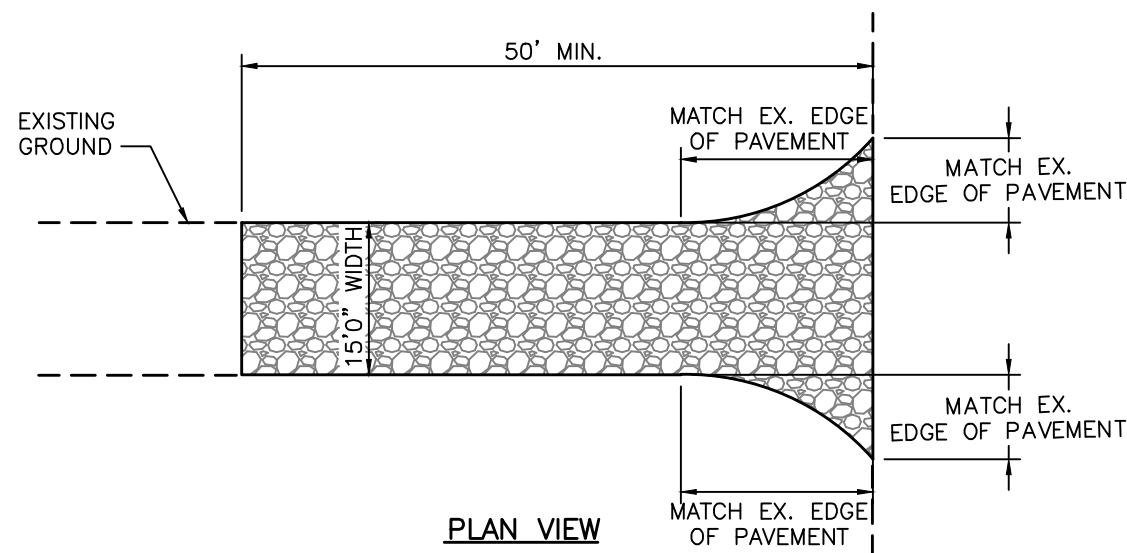
CATCH BASIN INLET PROTECTION
NOT TO SCALE

NOTES:

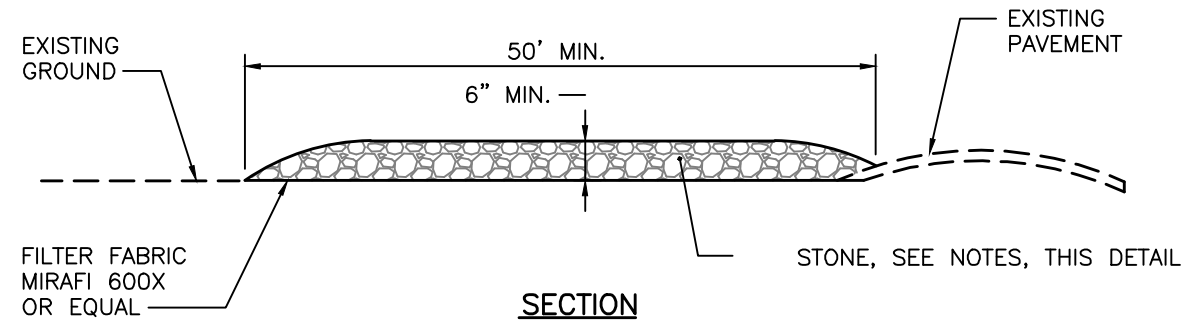
1. FULL CONTACT WITH THE GROUND IS CRITICAL TO PREVENT SHORT CIRCUITING UNDER THE TUBE - THE GROUND SURFACE SHOULD BE SMOOTH AND LEVEL. IN WOODED AREAS, PROTRUDING ROOTS AND DEBRIS MAY NEED TO BE REMOVED. IN GRASSED AREAS, THE GRASS NEEDS TO BE EITHER MOWED OR COMPRESSED DOWN.
2. STAKING MAY BE NECESSARY ON STEEP SLOPES.
3. UPON FINAL STABILIZATION, THE TUBE CAN BE CUT OPEN AND THE MATERIAL SPREAD OUT ONTO THE GROUND. THE MESH MATERIAL SHOULD BE REMOVE.
4. LOOSE COMPOST MAY BE BACKFILLED ALONG THE UPSLOPE SIDE OF THE COMPOST FILTER SOCK, FILLING THE SEAM BETWEEN THE SOIL SURFACE AND THE DEVICE, IMPROVING FILTRATION AND SEDIMENT RETENTION.



FILTER SOCK DETAIL
NOT TO SCALE

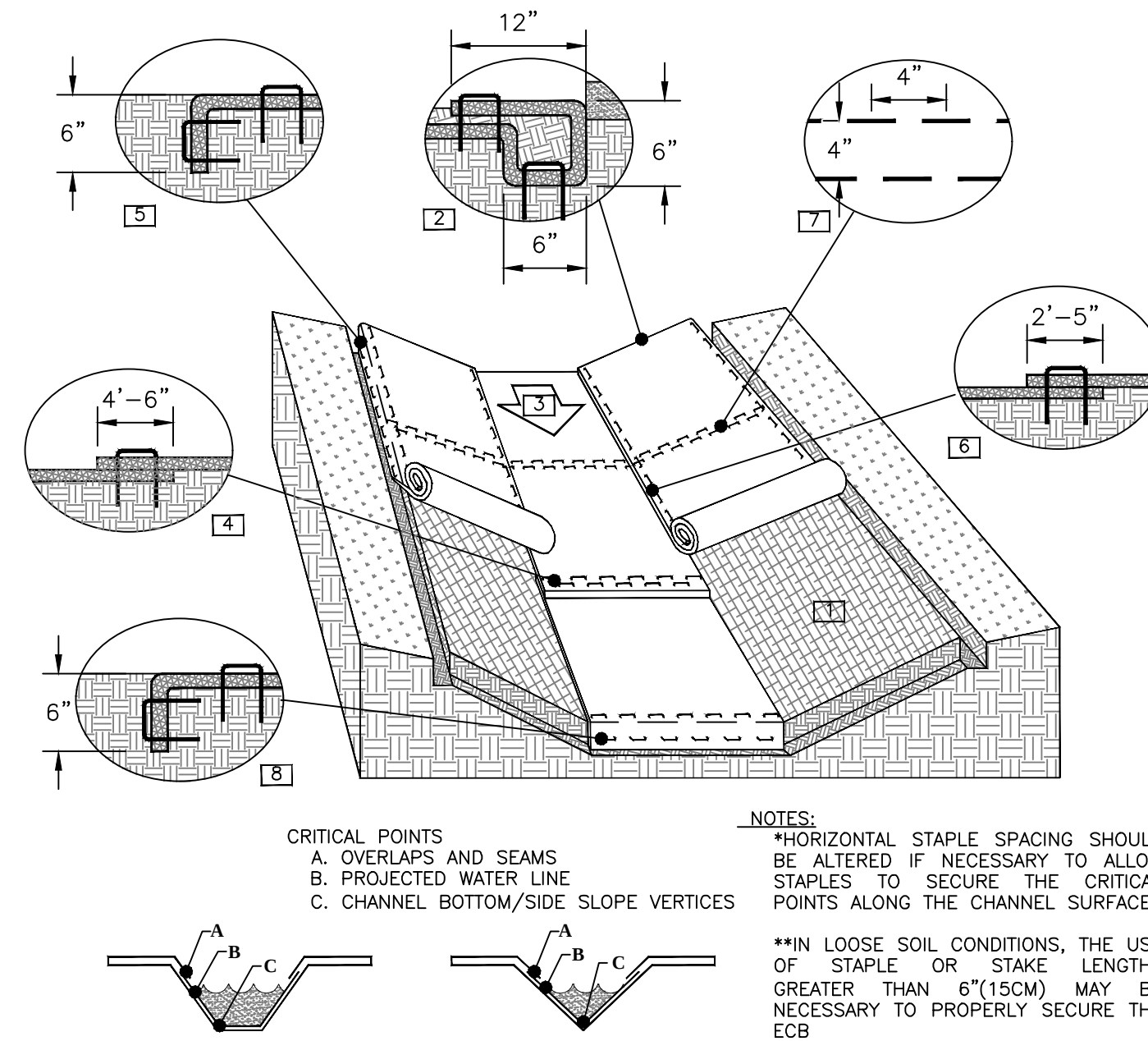


STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE



NOTES:

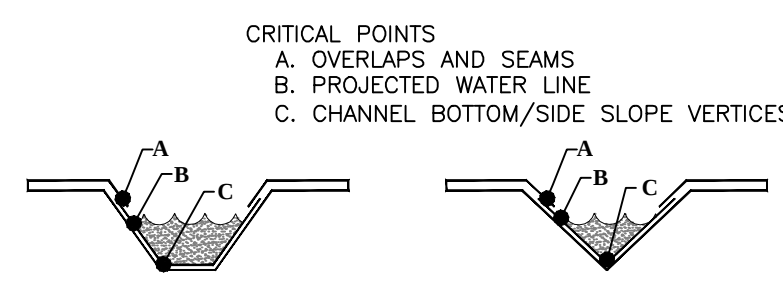
1. CONTRACTOR SHALL ADD STONE TO ENTRANCE AS MUD/SILT MATERIAL ACCUMULATES
2. STONE SHALL BE 2"-3" COARSE AGGREGATE
3. CONSTRUCTION ENTRANCE SHALL BE GRADED TO NOT ALLOW ANY STORMWATER TO BE CONVEYED OFF SITE. IN SITUATIONS WHERE THIS IS NOT POSSIBLE, ANY STORMWATER CONVEYED OFFSITE SHALL BE TREATED OR RETAINED IN A MANNER APPROVED BY ENGINEER.
4. WHEN NECESSARY, ON-SITE VEHICLES SHALL HAVE THEIR WHEELS CLEANED PRIOR TO LEAVING SITE.
5. CONSTRUCTION ENTRANCE SHALL BE GRADED IN A MANNER THAT PREVENTS TRACKING OF SEDIMENTS ONTO PUBLIC RIGHT-OF-WAY



EROSION CONTROL BLANKET CHANNEL INSTALLATION
NOT TO SCALE

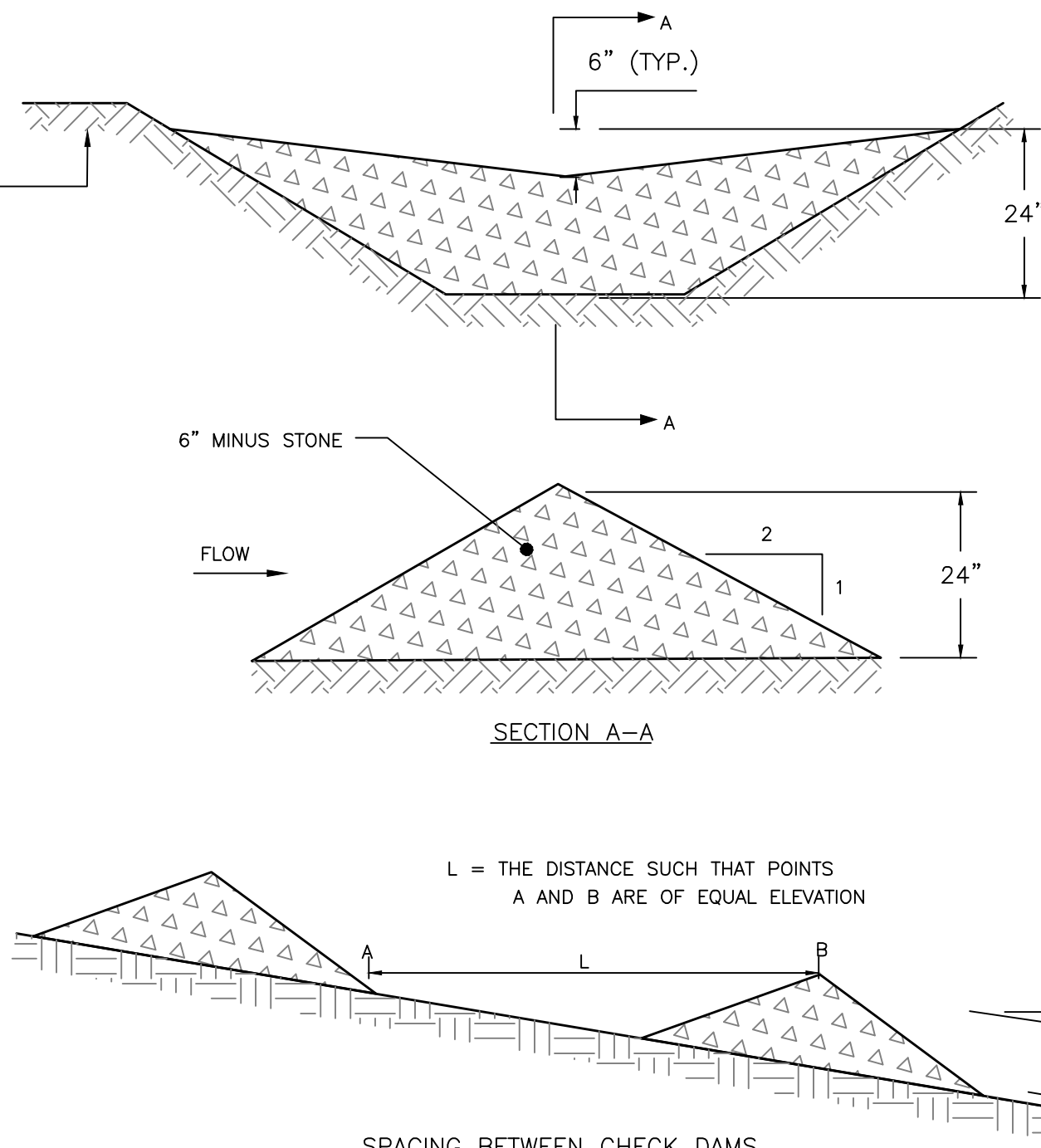
CHANNEL
INSTALLATION DETAIL

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL BLANKET (ECB), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE ECB IN A 6"(15CM) DEEP X 6"(15CM) WIDE TRENCH WITH APPROXIMATELY 12"(30CM) OF ECB EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. USE SHOREMAX MAT AT THE CHANNEL/CULVERT OUTLET AS SUPPLEMENTAL SCOUR PROTECTION AS NEEDED. ANCHOR THE ECB WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12"(30CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO THE COMPACTED SOIL AND FOLD THE REMAINING 12"(30CM) PORTION OF ECB BACK OVER THE SEED AND COMPACTED SOIL. SECURE ECB OVER THE TRENCH WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE ECB.
3. ROLL CENTER ECB IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. ECB WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL ECB MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.
4. PLACE CONSECUTIVE ECB END-OVER-END (SHINGLE STYLE) WITH A 4"-6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE ECB. THE TOP LAYER SHALL GO OVER THE DOWNSTREAM LAYER.
5. FULL LENGTH EDGE OF ECB AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12"(30CM) APART IN A 6"(15CM) DEEP X 6"(15CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT ECB MUST BE OVERLAPPED APPROXIMATELY 2"-5" (5-12.5CM) (DEPENDING ON ECB TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 -12M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4"(10CM) APART AND 4"(10CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE ECB MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30CM) APART IN A 6"(15CM) DEEP X 6"(15CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.



EROSION CONTROL BLANKET CHANNEL INSTALLATION
NOT TO SCALE

KEY CHECK DAM INTO BANKS
AND EXTEND 18" MIN. TO
PREVENT BYPASS



SPACING BETWEEN CHECK DAMS

S ₀ (FT./FT.)	L (FT.)
0.020	75
0.030	50
0.040	40
0.050	30
0.080	20
0.100	10

STONE CHECK DAM
NOT TO SCALE

ISSUED FOR	BY
SITE/SUB	DATE
COMMENT RESPONSE	SJL
	6/17/22
	9/28/22

EROSION & SEDIMENTATION CONTROL DETAILS

165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

ENGINEERING, INC.
ACORN ENGINEERING, INC. 16506
PO BOX 3372, PORTLAND MAINE 04101
(207) 775-2885

FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS



DRAWING NO.

C-49

PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION



DRAWING INDEX		
GENERAL		
COVER SHEET		
ARCHITECTURAL		
	A-0.1	WALL TYPES
	A-0.2	FLOOR TYPES / ROOF TYPES
	A-1.1	PLANS: COMMUNITY FLATS
	A-1.2	PLANS: TOWNHOMES
	A-1.3	PLANS: ROWHOMES
	A-1.4	ENLARGED GROUND FLOOR PLAN: COMMUNITY FLATS
	A-1.5	ENLARGED UPPER LEVELS FLOOR PLAN: COMMUNITY FLATS
	A-1.6	ENLARGED GROUND FLOOR PLAN: TOWNHOMES
	A-1.7	ENLARGED UPPER LEVEL FLOOR PLAN: TOWNHOMES
	A-1.8	ENLARGED GROUND FLOOR PLAN: ROWHOMES
	A-1.9	ENLARGED 2ND FLOOR PLAN: ROWHOMES
	A-1.10	ENLARGED 3RD FLOOR PLAN: ROWHOMES
	A-2.1	ELEVATIONS: COMMUNITY FLATS
	A-2.2	ELEVATIONS: TOWNHOMES
	A-2.3	ELEVATIONS: ROWHOMES
	A-3.1	BUILDING SECTIONS
	A-4.1	WALL SECTIONS
STRUCTURAL		
	S-1.1	FRAMING PLAN COMM. FLATS
	S-1.2	FRAMING PLAN ROWHOUSE
	S-1.3	FRAMING PLAN TOWNHOUSE

Base Building Design

Project Information

CLIENTS	Maine Community Development Partners
ARCHITECT	Kaplan Thompson Architects
CONTRACTOR	Penobscot General Contractors

Proposed Structure

PROPOSED OCCUPANCY:	Multi-Family
PROPOSED STRUCTURES:	2-Story Townhome 3-Story Rowhome 3-Story Community Flats

Kaplan
Thompson
Architects

102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Base Building Design

Portland, ME

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

Aceto Landscape Architects
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 397-0872

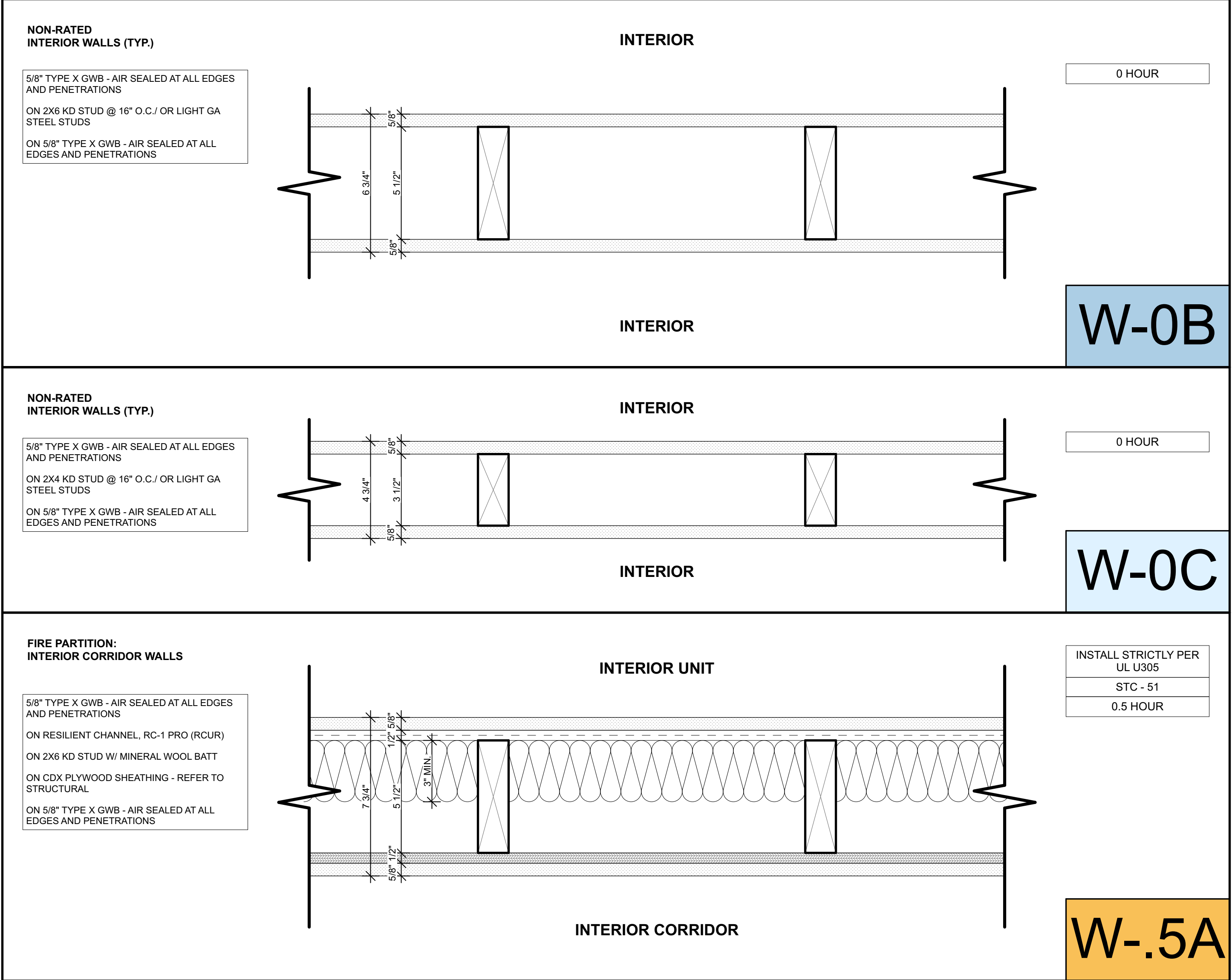
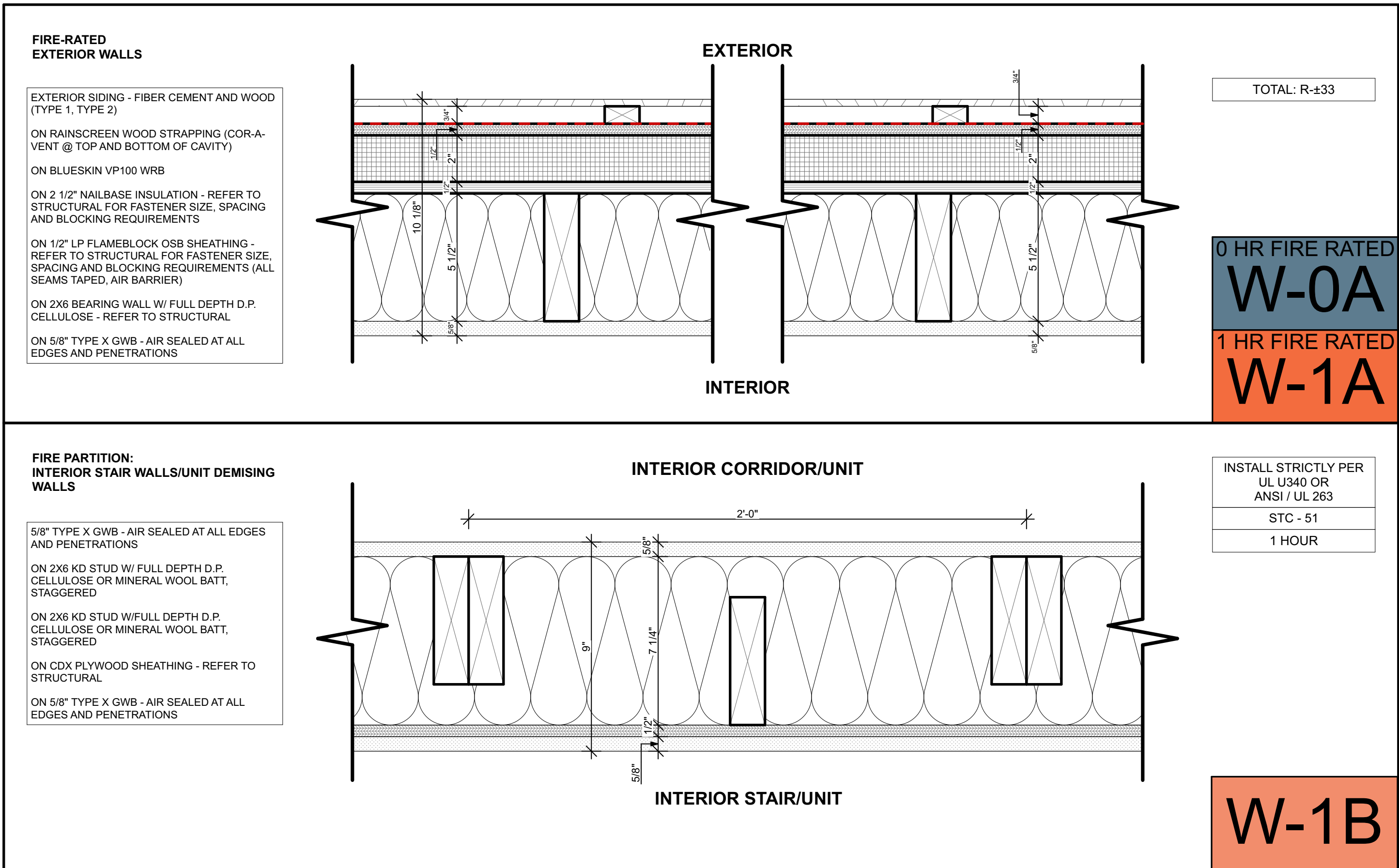
ELECTRICAL

MEGA Engineering
p: 207 749-4514

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PROJECT	MCP
DATE	6/13/22
REVISED 1	
REVISED 2	
DRAWN BY	AW, SS, CB
PHASE	Schematic Design

COVER SHEET



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Acorn Engineering, Inc.

500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

Aceto Landscape

Architects

565 Congress Street
Rochester, NY 14609

Portland, ME 04101
P: 207.331-2200

STRUCTURAL

Trillium Engineering

189 Main Street, Suite 200

Yarmouth, ME

ELECTRICAL

MEGA Engineering

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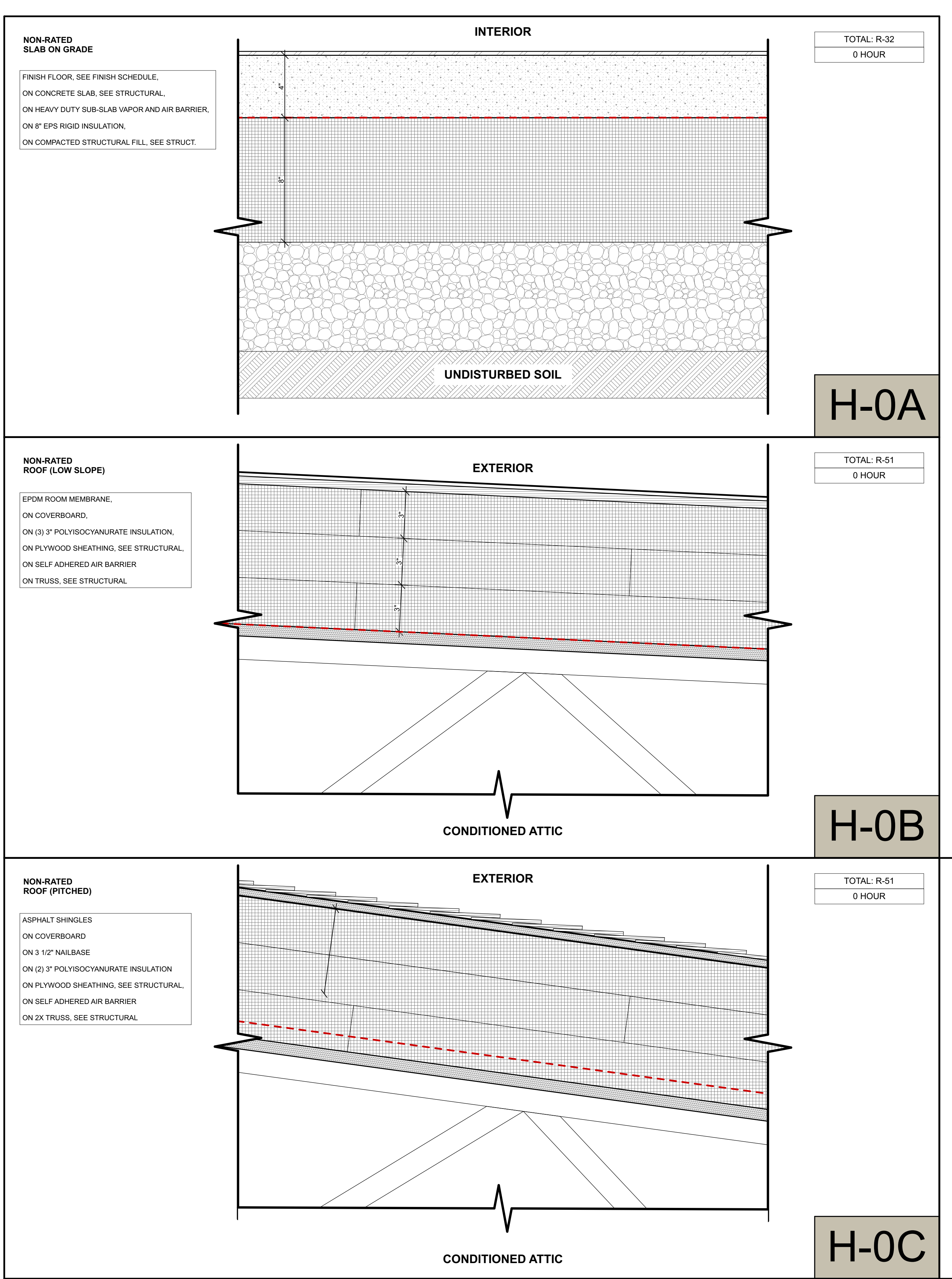
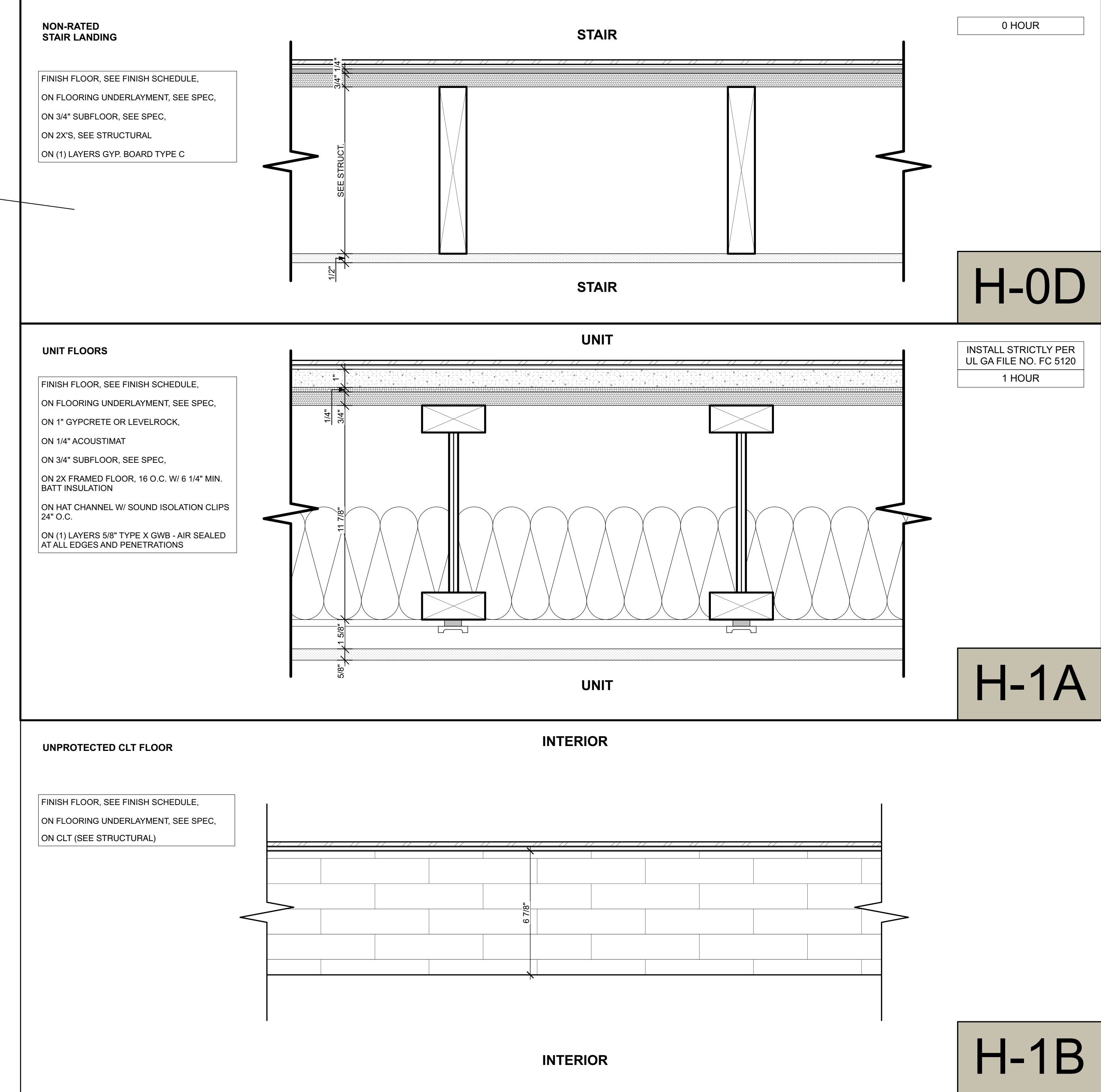
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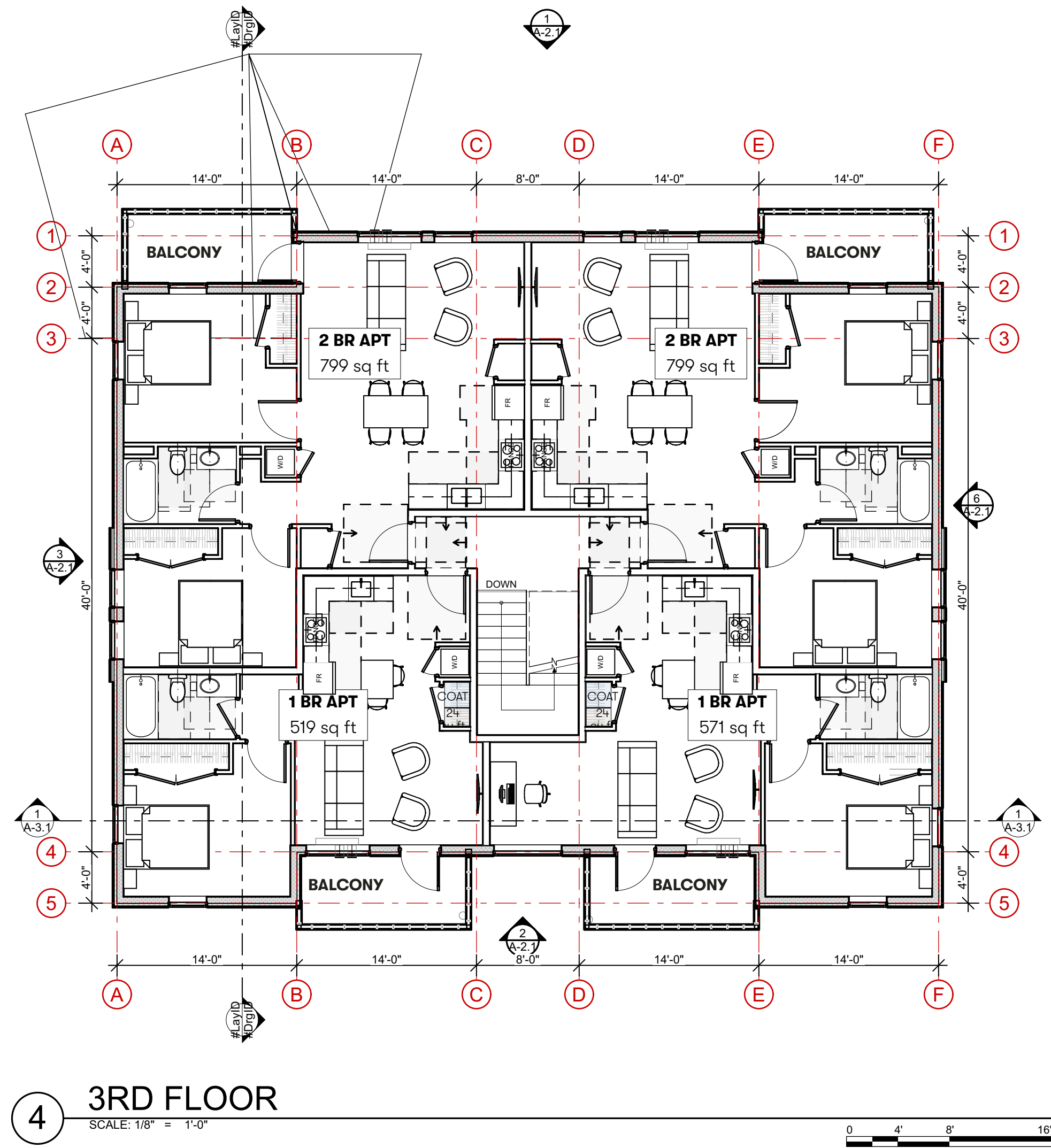
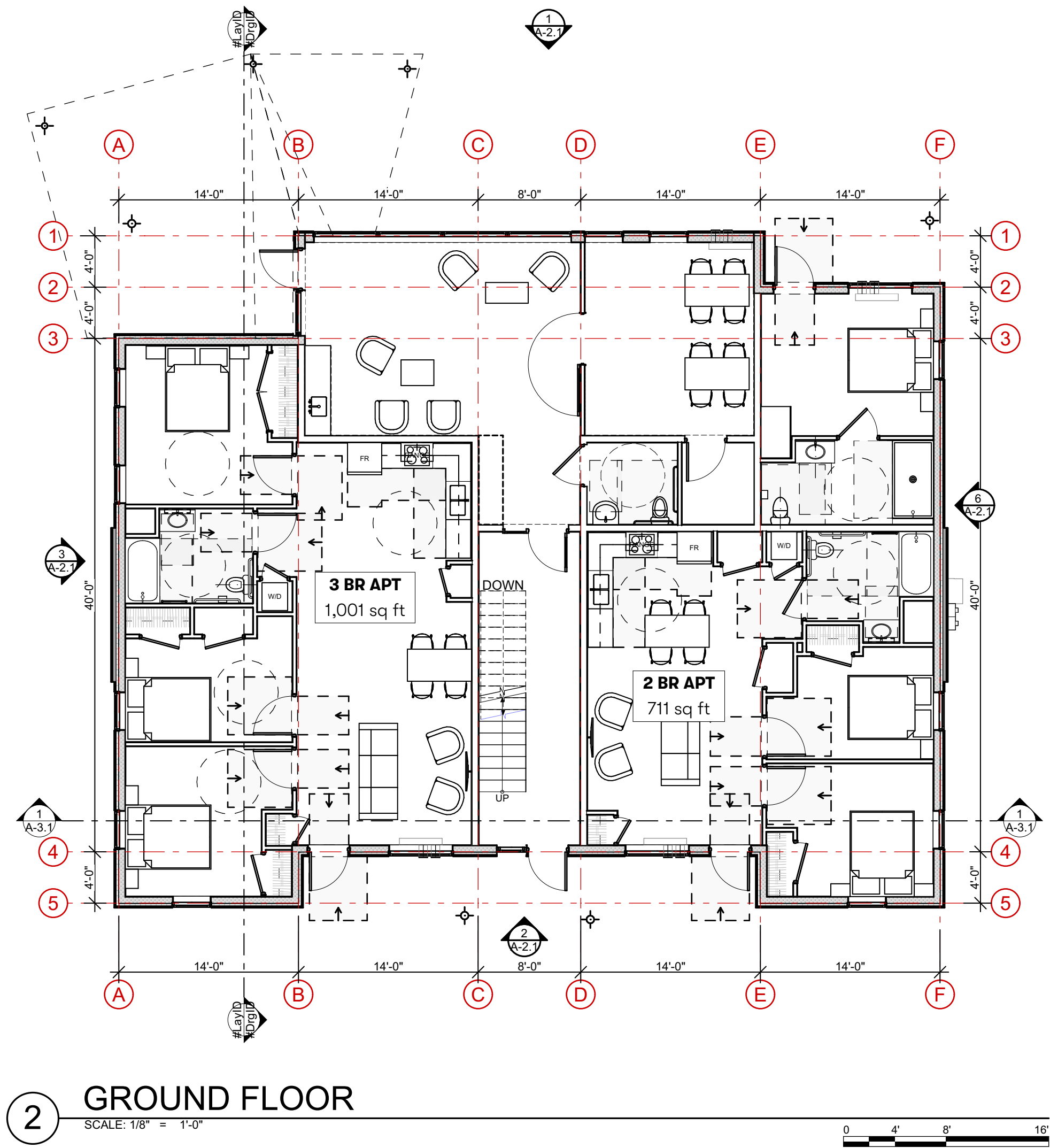
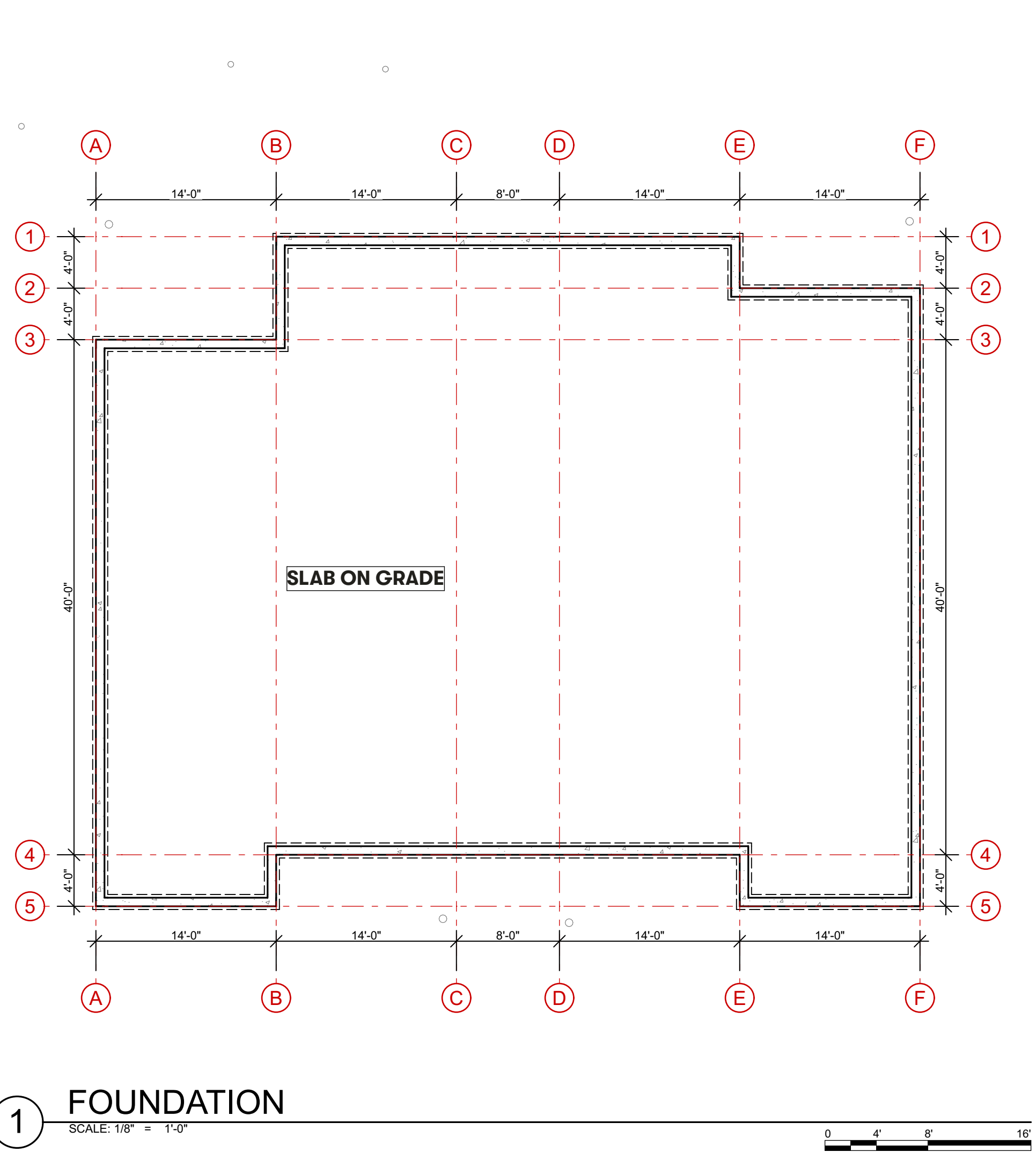
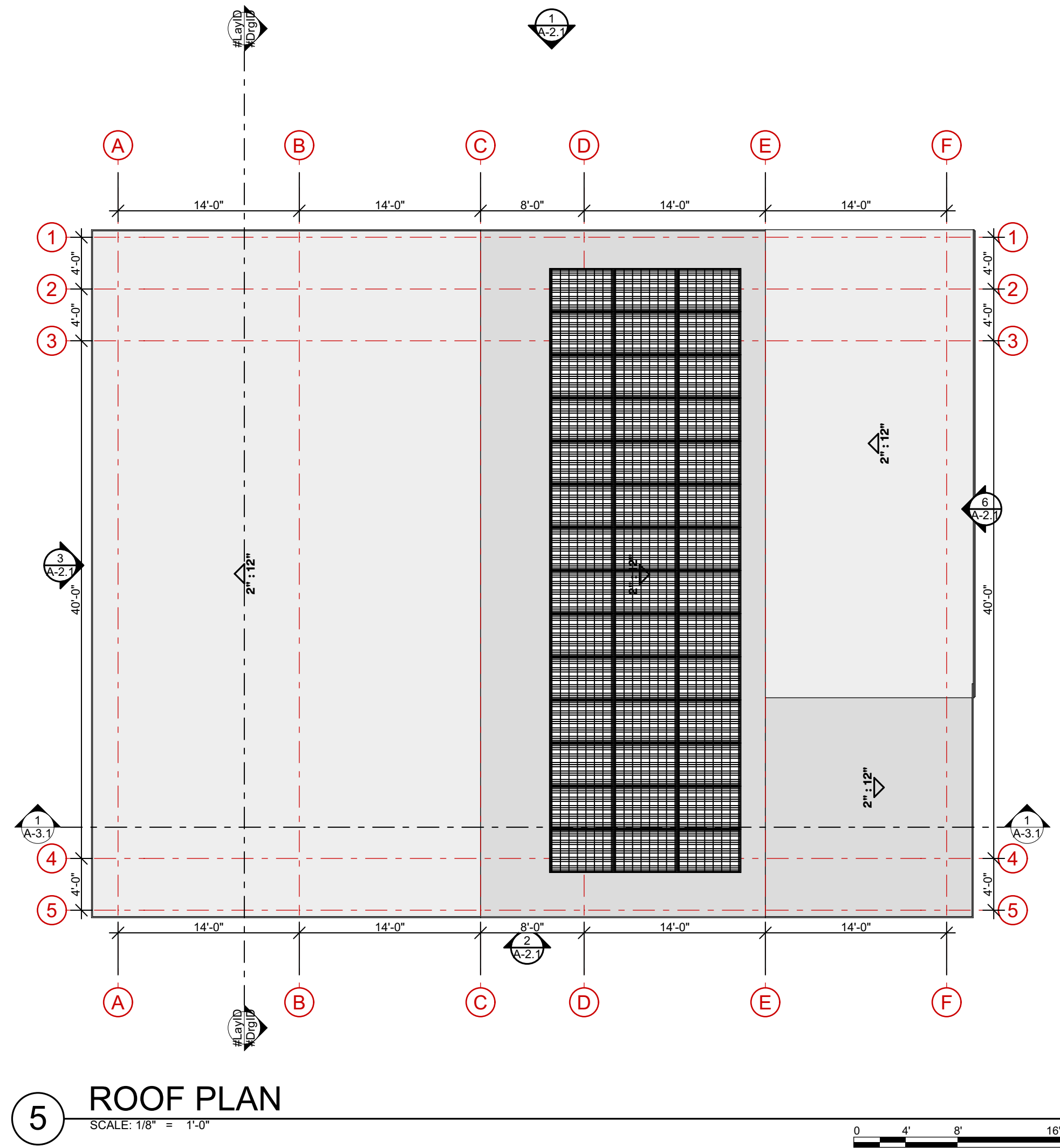
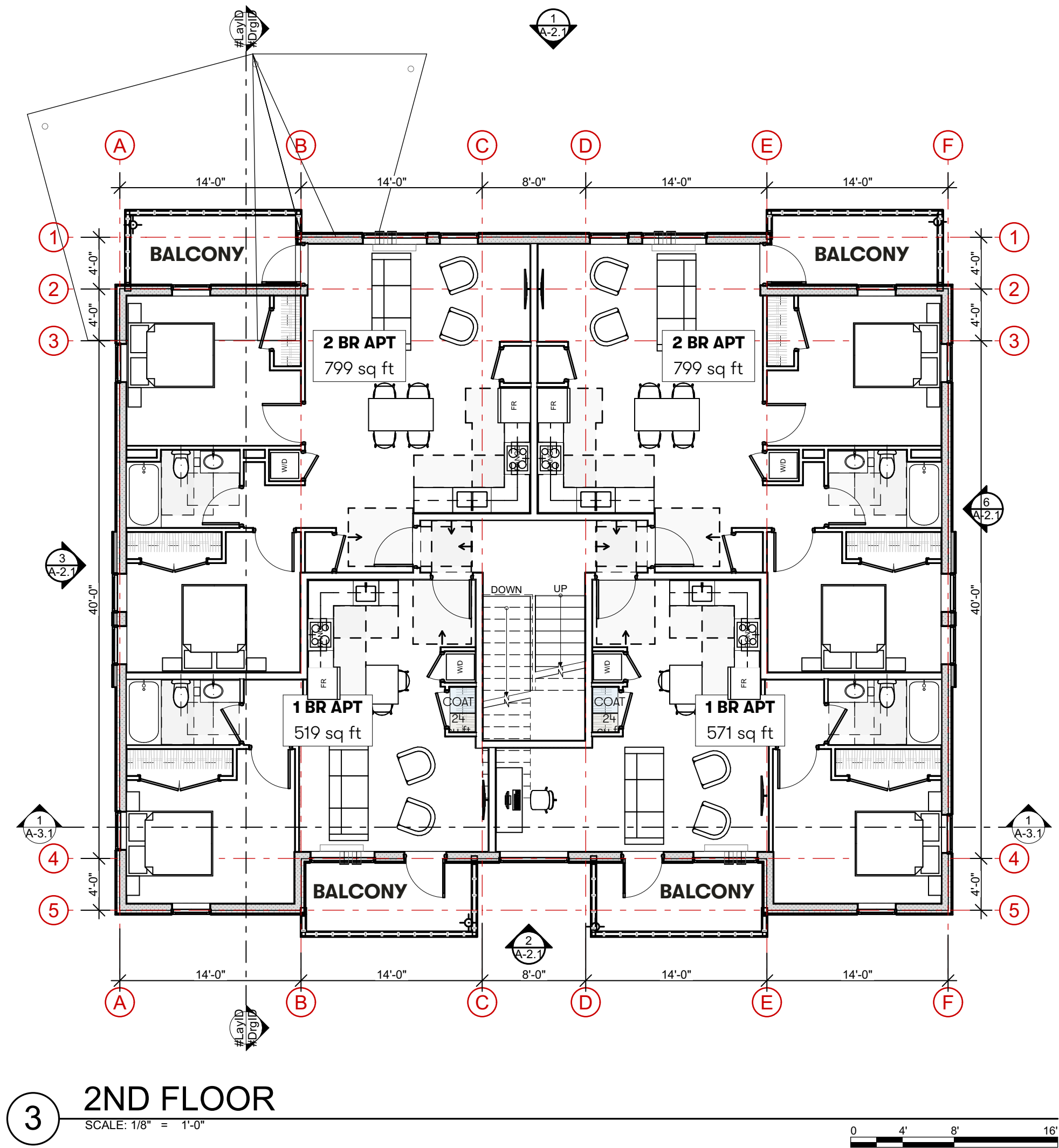
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PHASE	Schematic Design

WALL TYPES

A-0.1





Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

Aceto Landscape Architects
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 397-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

DATE	6/8/22
CHG	CHANGE NAME
ISSUE NO.	DESCRIPTION
A	Schematic Design

NOT FOR CONSTRUCTION

PROJECT	MCP
DATE	6/13/22
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DRAWN BY	AW, SS, CB
PHASE	Schematic Design

PLANS: COMMUNITY FLATS

A-1.1

PROJECT

Base Building Design

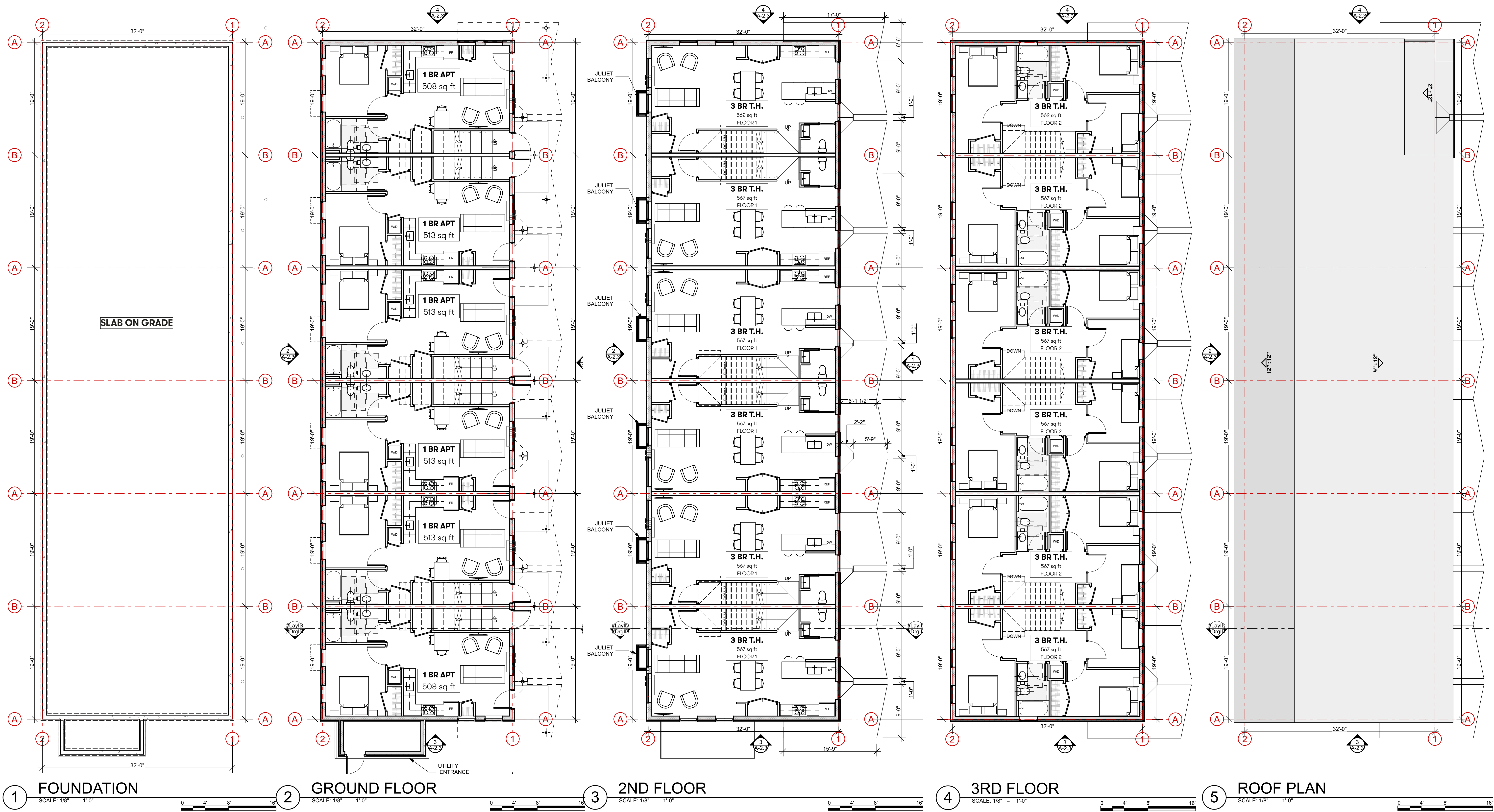
Portland, ME 04101

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500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE
**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL
Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL
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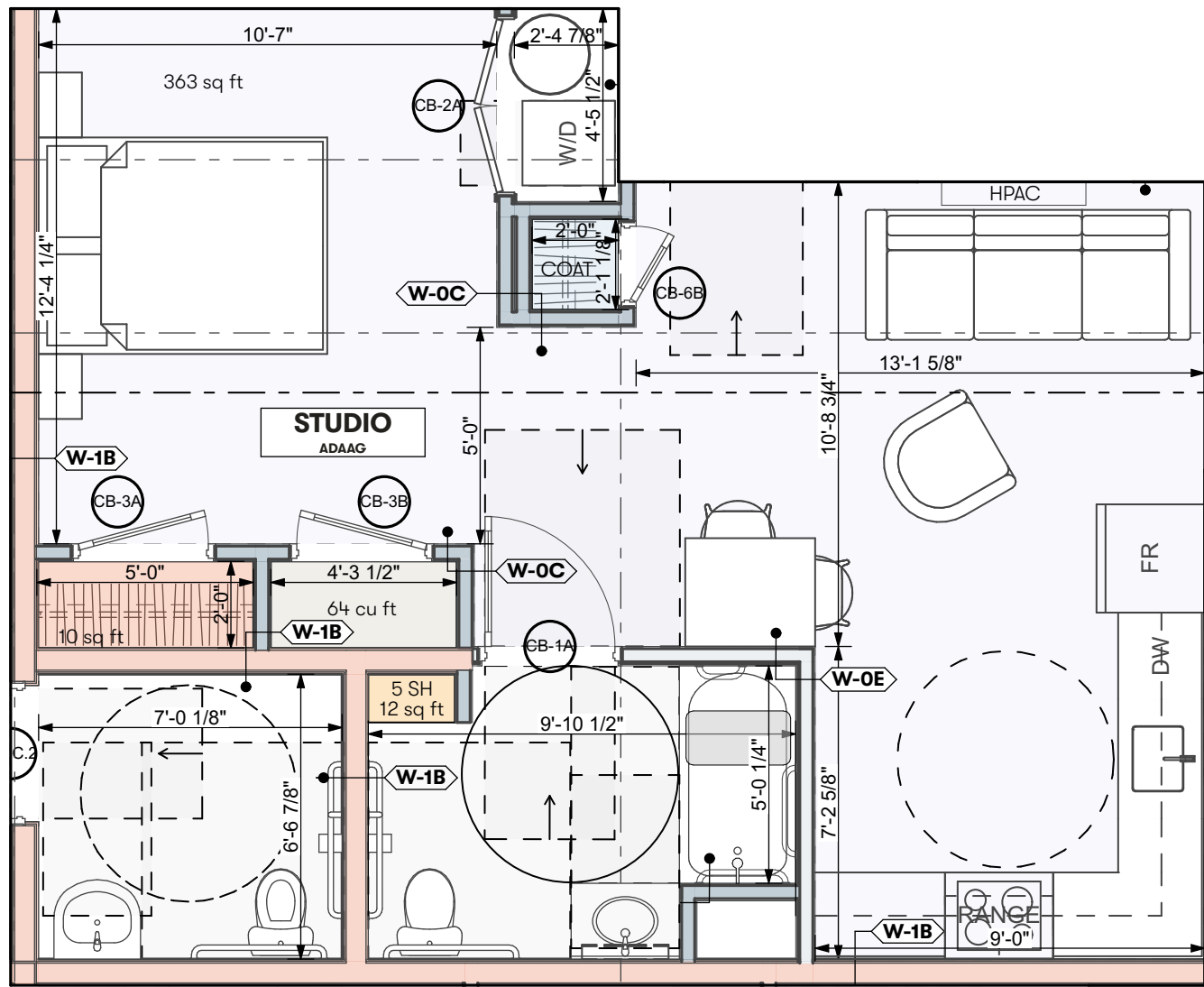
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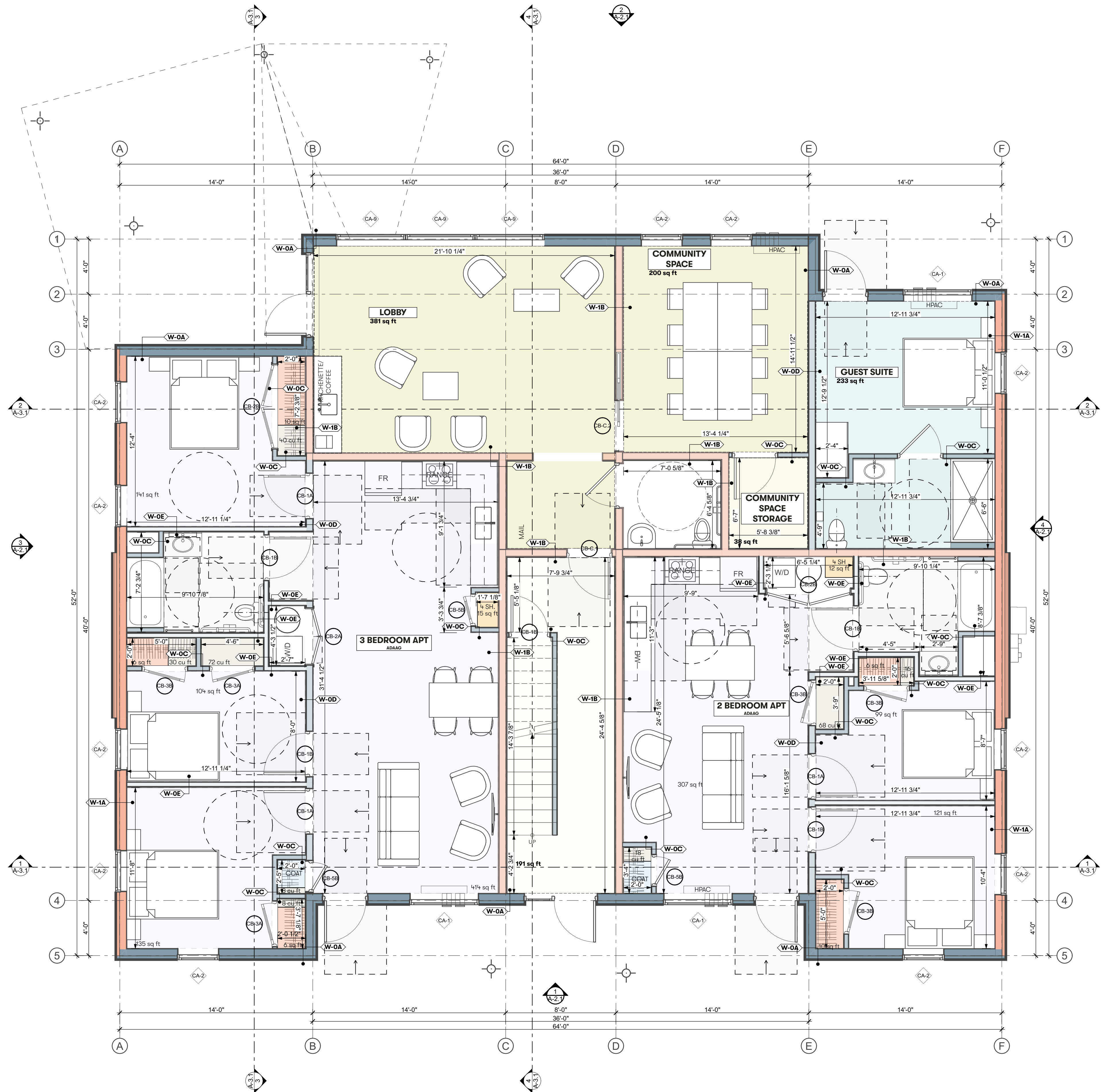
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PHASE	Schematic Design

PLANS: ROWHOMES

A-1.3



2 ALTERNATE GROUND FLOOR PLAN
SCALE: 1/4" = 1'-0"



1 GROUND FLOOR
SCALE: 1/4" = 1'-0"

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Portland, ME 04101
(207) 842-2888
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Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

MECHANICAL & PLUMBING

Fuss & O'Neill, Inc.
5 Fletcher Street, Suite 1
Kennebunk, ME 04043
p: 617 282-4675

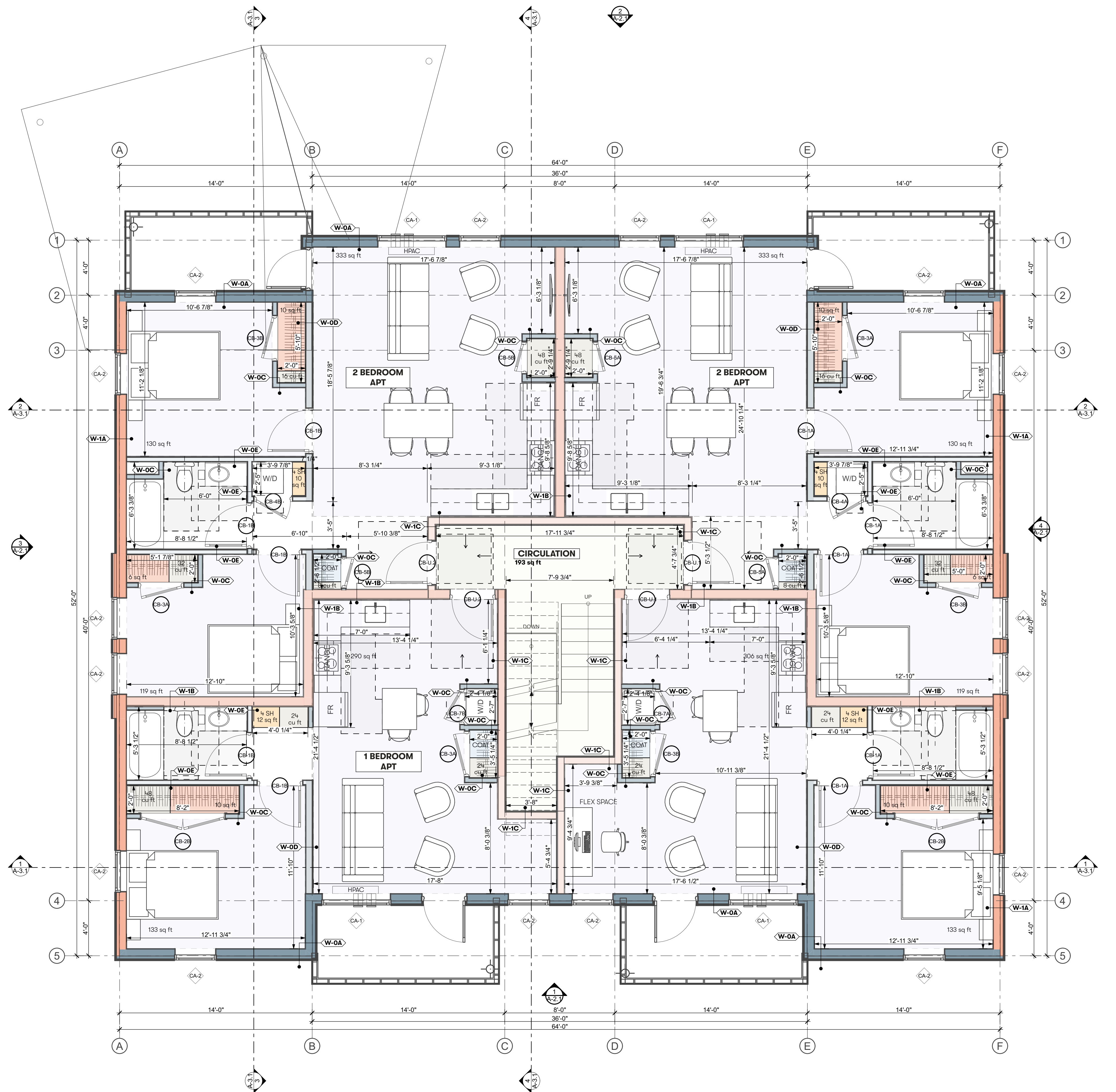
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ISSUE NO.	A

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PROJECT	MCP
DATE	9/16/22
REVISED 1	
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DRAWN BY	AW, SS, CB, SN
PHASE	Design Development

ENLARGED GROUND
FLOOR PLAN:
COMMUNITY FLATS,
10-UNIT

A-1.2



1 2ND FLOOR
SCALE: 1/4" = 1'-0"



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102 Exchange Street
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(207) 842-2888
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PROJECT

Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 397-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

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Kennebunk, ME 04043
p: 617 282-4675

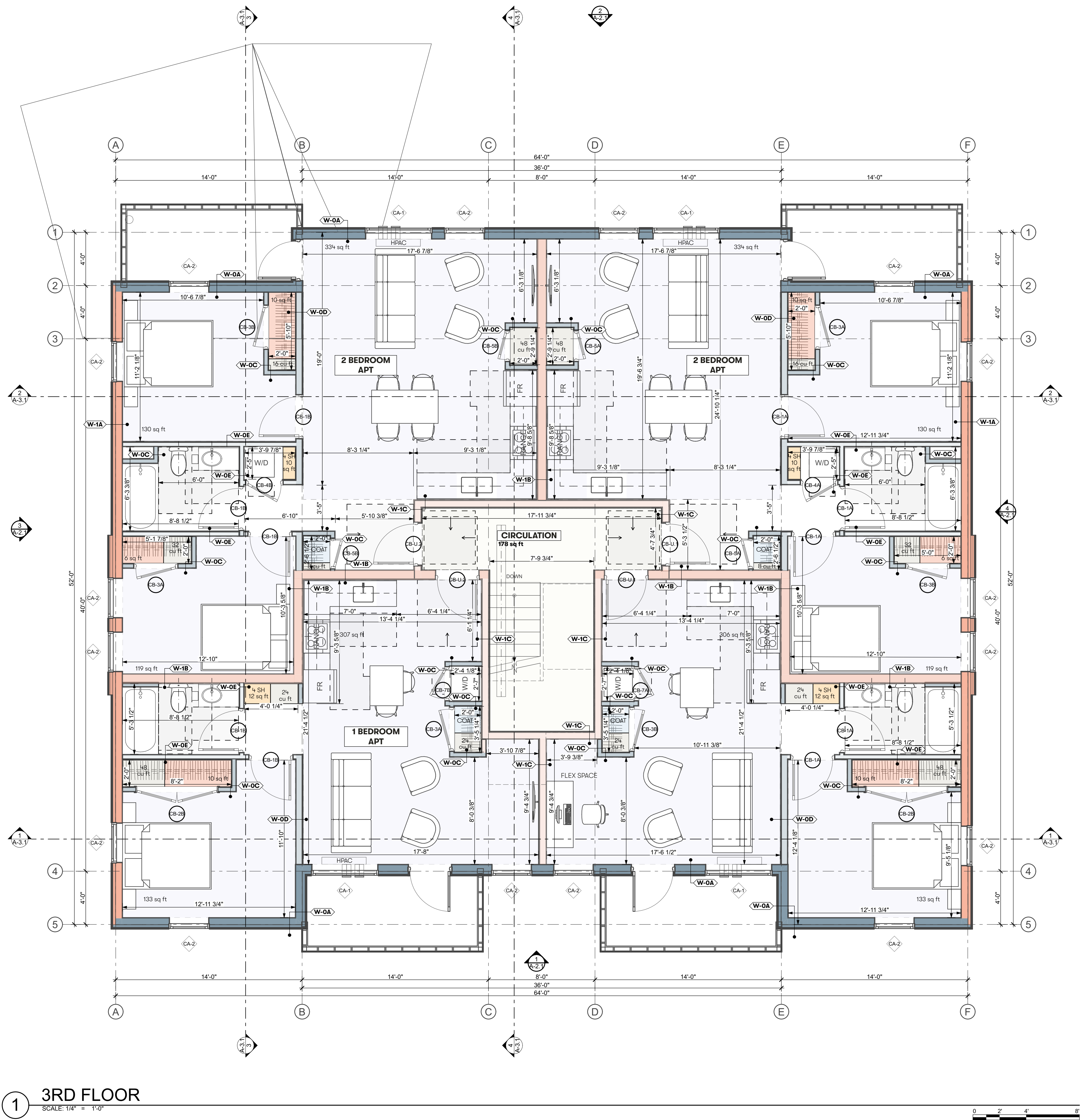
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ISSUE NO.	A

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PROJECT	MCP
DATE	9/16/22
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PHASE	Design Development

ENLARGED 2ND
FLOOR PLAN:
COMMUNITY FLATS,
10-UNIT

A-1.3



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102 Exchange Street
Portland, ME 04101
(207) 842-2888
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Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 397-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

MECHANICAL & PLUMBING

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Kennebunk, ME 04043
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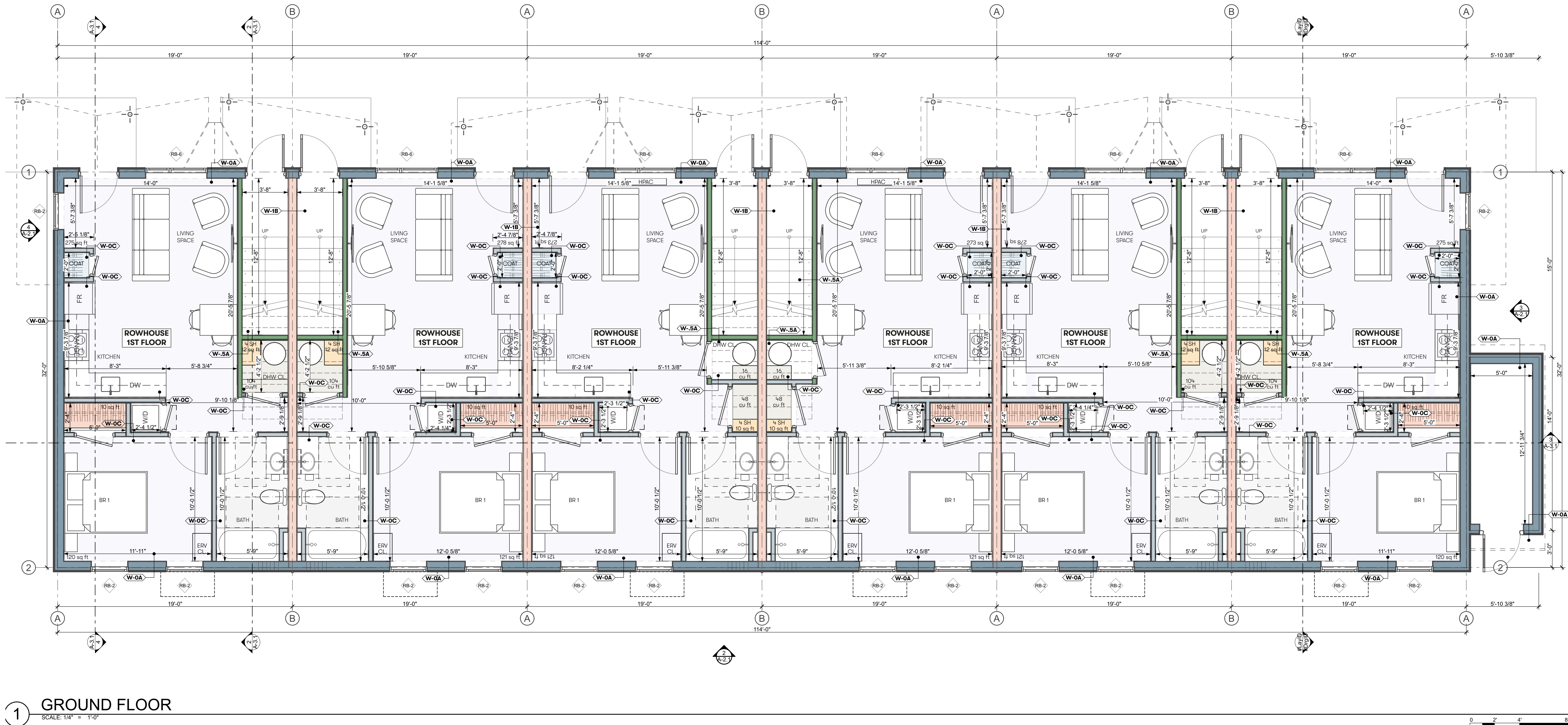
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ISSUE NO.	B

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PROJECT	MCP
DATE	9/16/22
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PHASE	Design Development

ENLARGED 3RD
FLOOR PLAN:
COMMUNITY FLATS,
10-UNIT

A-1.4



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Architects

102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

MECHANICAL & PLUMBING

Fuss & O'Neill, Inc.
5 Fletcher Street, Suite 1
Kennebunk, ME 04043
p: 617 282-4675

DATE

CHANGE NAME

DESCRIPTION

ISSUE NO.

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PROJECT	MCP
DATE	9/16/22
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PHASE	Design Development

ENLARGED GROUND
FLOOR PLAN:
ROWHOUSES, 12-UNIT

A-1.2

Base Building Design

CIVIL
Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE
**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL
Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL
MEGA Engineering
p: 207 749-4514

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5 Fletcher Street, Suite 1
Kennebunk, ME 04043
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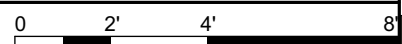
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DATE	9/16/22
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REVISED 2	
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PHASE	Design Development

ENLARGED 2ND
FLOOR PLAN:
ROWHOMES, 12-UNIT

A-1.3



SCALE: 1/4" = 1'-0"



PROJECT

Base Building Design

Portland, ME 04101

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Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

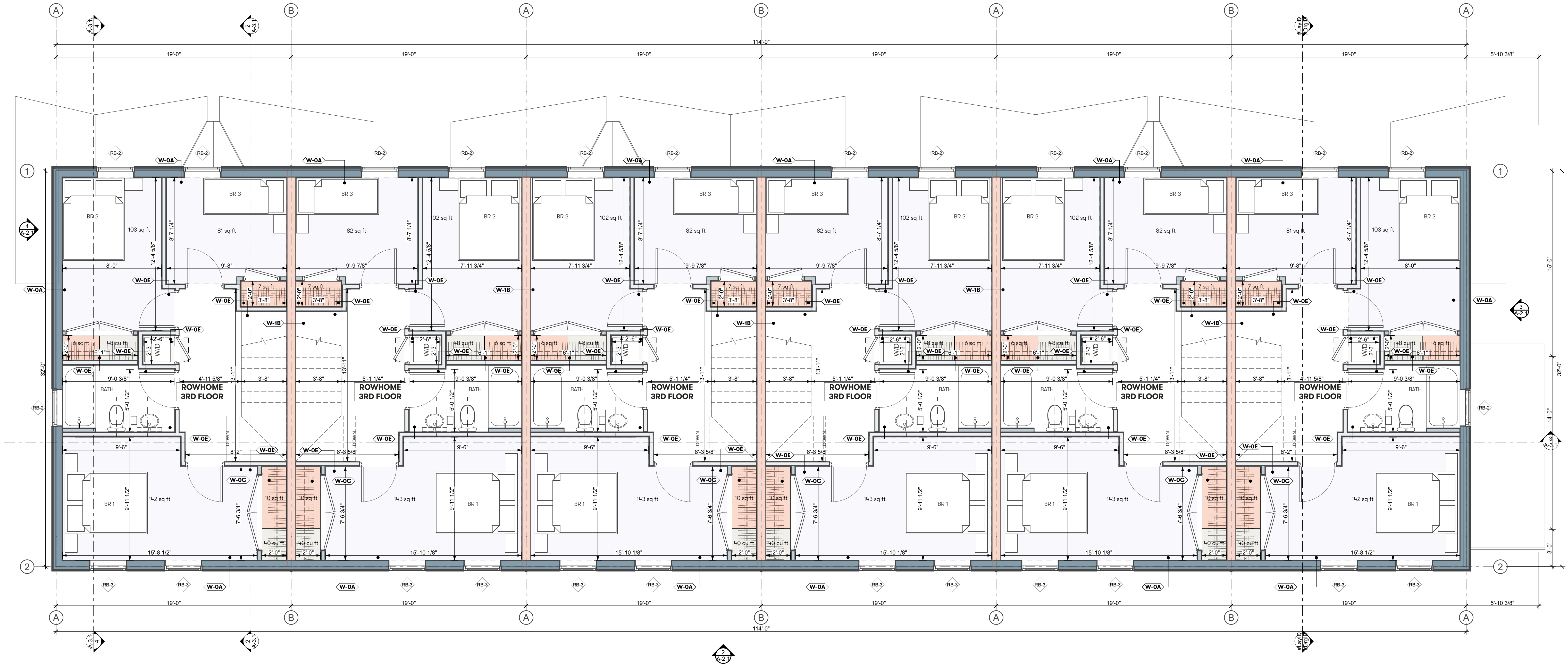
Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

MECHANICAL & PLUMBING

Fuss & O'Neill, Inc.
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Kennebunk, ME 04043
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1 3RD FLOOR

SCALE: 1/4" = 1'-0"

DATE	9/16/22
CHANGE NAME	
CHG	
DESCRIPTION	Planning Board Workshop #2
ISSUE NO.	B

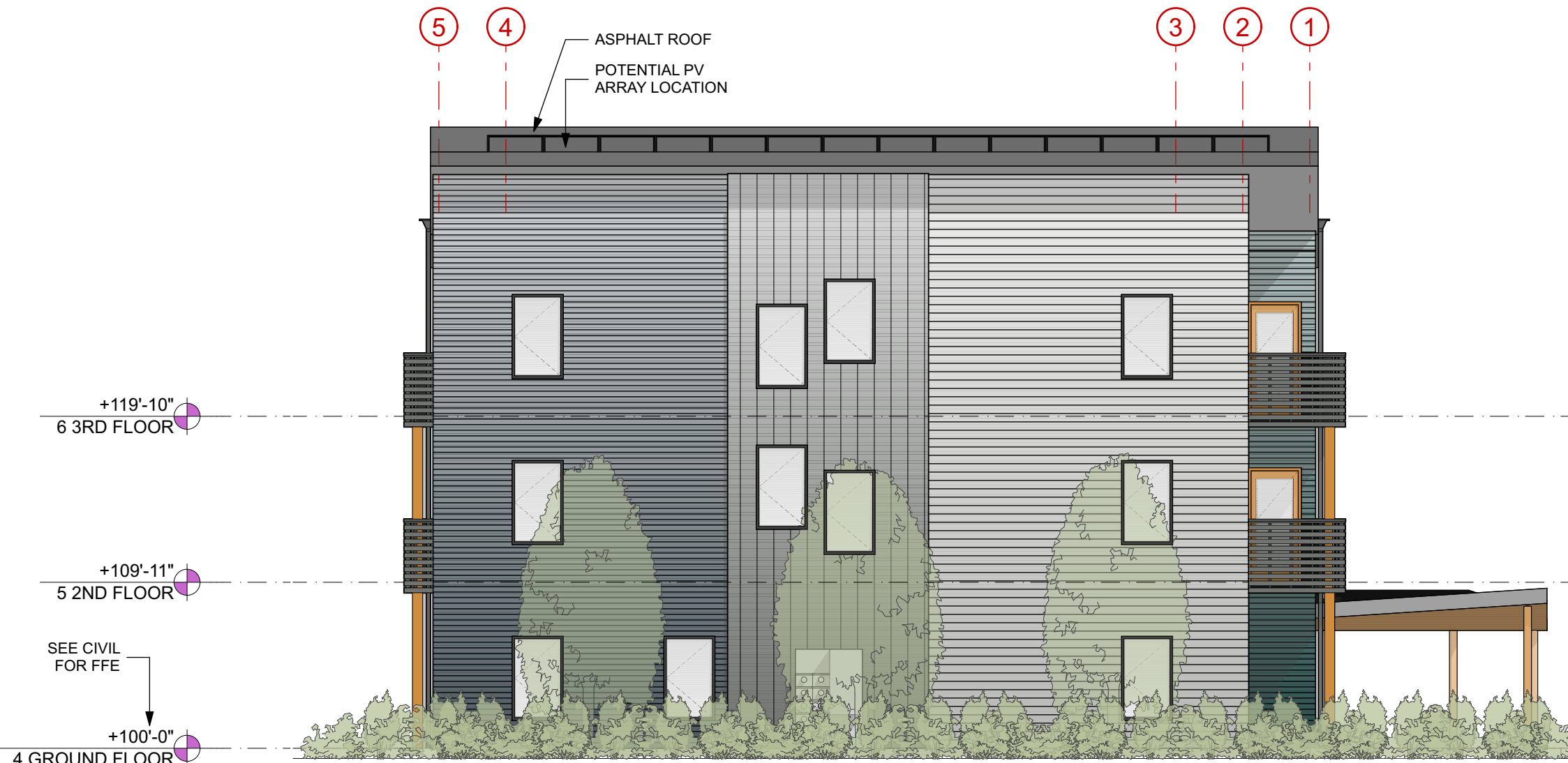
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PHASE	Design Development

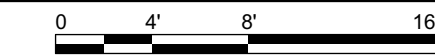
ENLARGED 3RD
FLOOR PLAN:
ROWHOMES, 12-UNIT

A-1.4

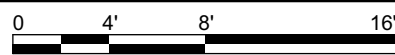
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S2	REVERSE BOARD AND BATTEN SIDING	S4C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR B)
S3A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR A)	S5A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR C)
S3B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR A)	S5B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR C)
S3C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR A)	S5C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR C)
S4A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR B)		



4 COMMUNITY FLATS, SIDE ELEVATION
SCALE: 1/8" = 1'-0"



2 COMMUNITY FLATS, ENTRY ELEVATION
SCALE: 1/8" = 1'-0"



3 COMMUNITY FLATS, SIDE ELEVATION
SCALE: 1/8" = 1'-0"



1 COMMUNITY FLATS, PATIO ELEVATION
SCALE: 1/8" = 1'-0"



Kaplan
Thompson
Architects

102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

MECHANICAL & PLUMBING

Fuss & O'Neill, Inc.
5 Fletcher Street, Suite 1
Kennebunk, ME 04043
p: 617 282-4675

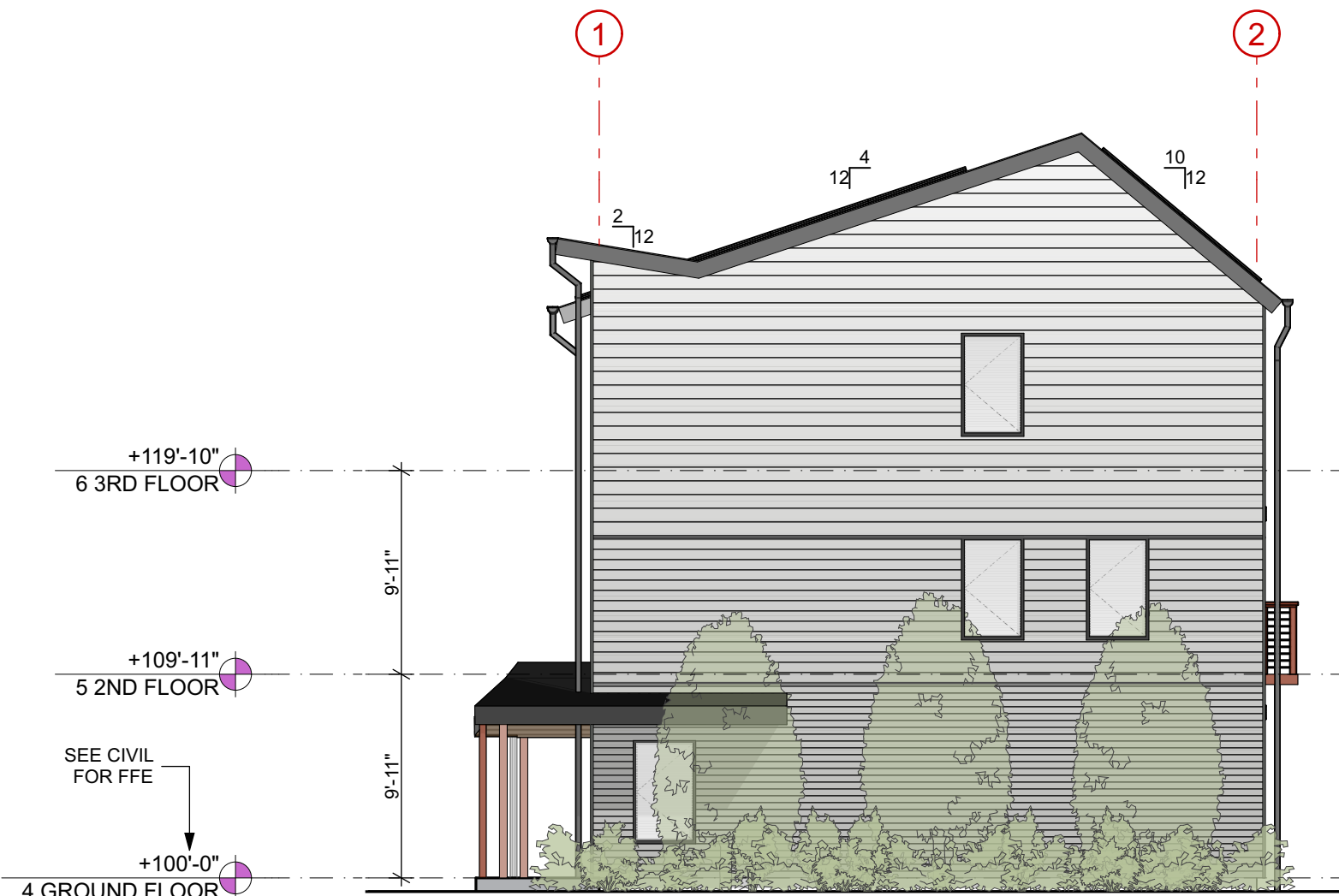
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A	Schematic Design

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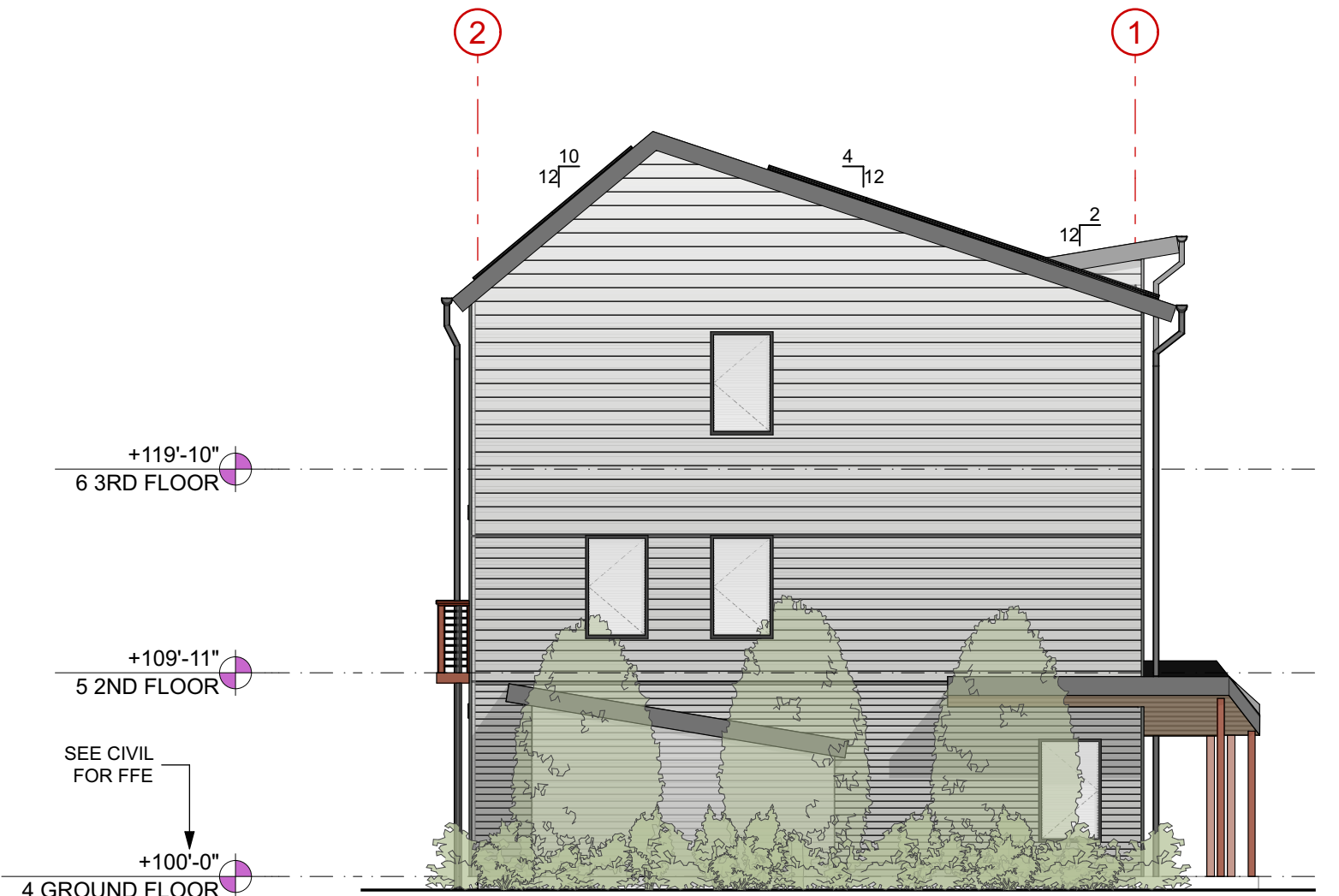
PROJECT	MCP
DATE	9/16/22
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REVISED 2	
DRAWN BY	AW, SS, CB, SN
PHASE	Design Development

ELEVATIONS:
COMMUNITY FLATS,
10-UNIT

A-2.1



4 ROWHOME, SIDE ELEVATION
SCALE: 1/8" = 1'-0"



3 ROWHOME, SIDE ELEVATION
SCALE: 1/8" = 1'-0"

SIDING KEY			
S1	CEDAR SHIPLAP SIDING	S4B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR B)
S2	REVERSE BOARD AND BATTEN SIDING	S4C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR B)
S3A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR A)	S5A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR C)
S3B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR A)	S5B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR C)
S3C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR A)	S5C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR C)
S4A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR B)		



2 ROWHOME, BACK ELEVATION
SCALE: 1/8" = 1'-0"



1 ROWHOME, ENTRY ELEVATION
SCALE: 1/8" = 1'-0"

Kaplan
Thompson
Architects

102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Base Building Design

Portland, ME 04101

CIVIL

Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

**Aceto Landscape
Architects**
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL

Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL

MEGA Engineering
p: 207 749-4514

MECHANICAL & PLUMBING

Fuss & O'Neill, Inc.
5 Fletcher Street, Suite 1
Kennebunk, ME 04043
p: 617 282-4675

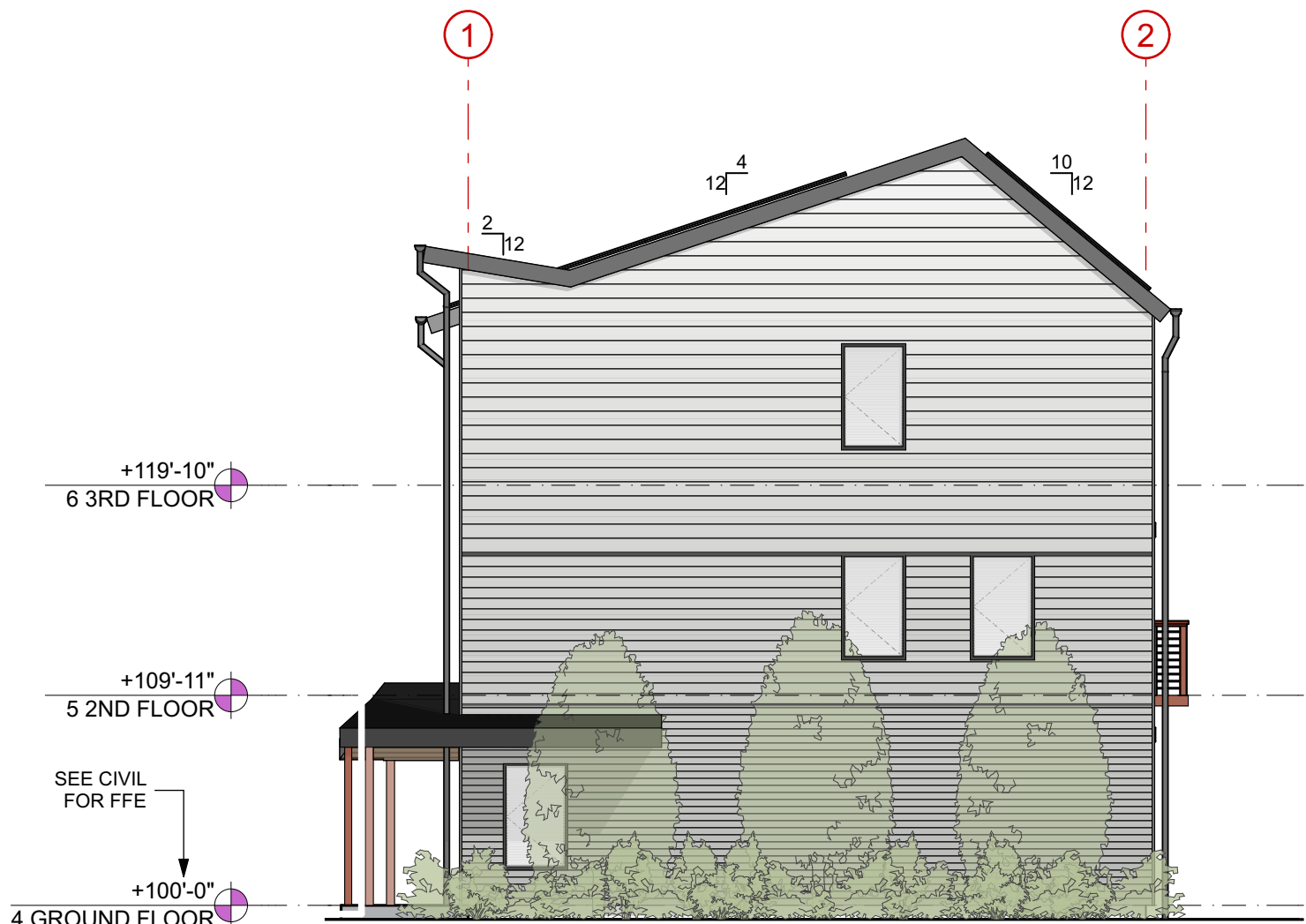
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CHANGE NAME	
DESCRIPTION	Planning Board Workshop #2
ISSUE NO.	B

NOT FOR CONSTRUCTION

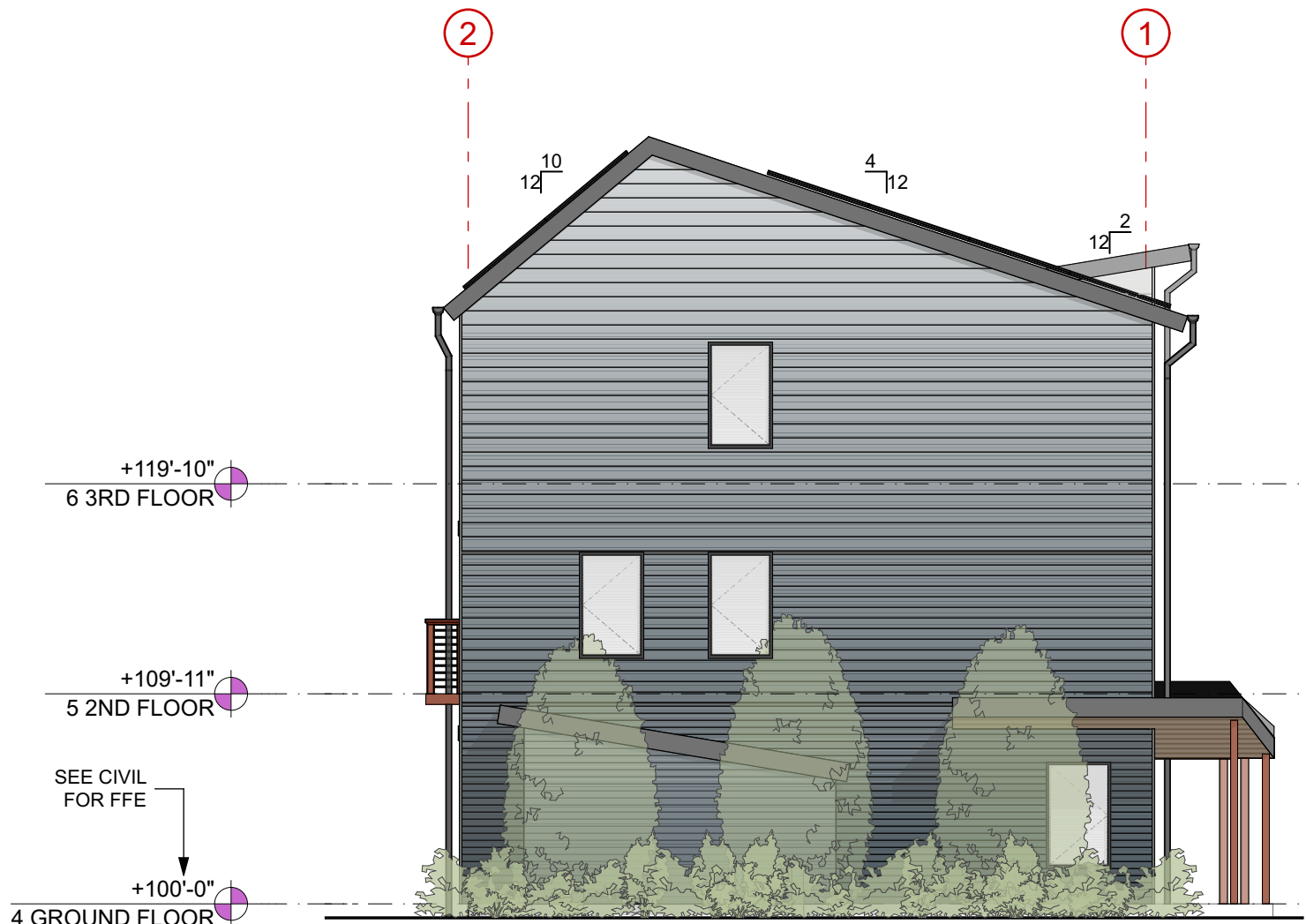
PROJECT	MCP
DATE	9/16/22
REVISED 1	
REVISED 2	
DRAWN BY	AW, SS, CB, SN
PHASE	Design Development

ELEVATIONS:
ROWHOMES, 8-UNIT

A-2.1



4 ROWHOME, SIDE ELEVATION
SCALE: 1/8" = 1'-0"
0 4' 8' 16'



3 ROWHOME, SIDE ELEVATION
SCALE: 1/8" = 1'-0"
0 4' 8' 16'



2 ROWHOME, BACK ELEVATION
SCALE: 1/8" = 1'-0"
0 4' 8' 16'



1 ROWHOME, ENTRY ELEVATION
SCALE: 1/8" = 1'-0"
0 4' 8' 16'

SIDING KEY			
S1	CEDAR SHIPLAP SIDING	S4B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR B)
S2	REVERSE BOARD AND BATTEN SIDING	S4C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR B)
S3A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR A)	S5A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR C)
S3B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR A)	S5B	TRADITIONAL LAP SIDING 6" REVEAL (COLOR C)
S3C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR A)	S5C	TRADITIONAL LAP SIDING 8" REVEAL (COLOR C)
S4A	TRADITIONAL LAP SIDING 4" REVEAL (COLOR B)		

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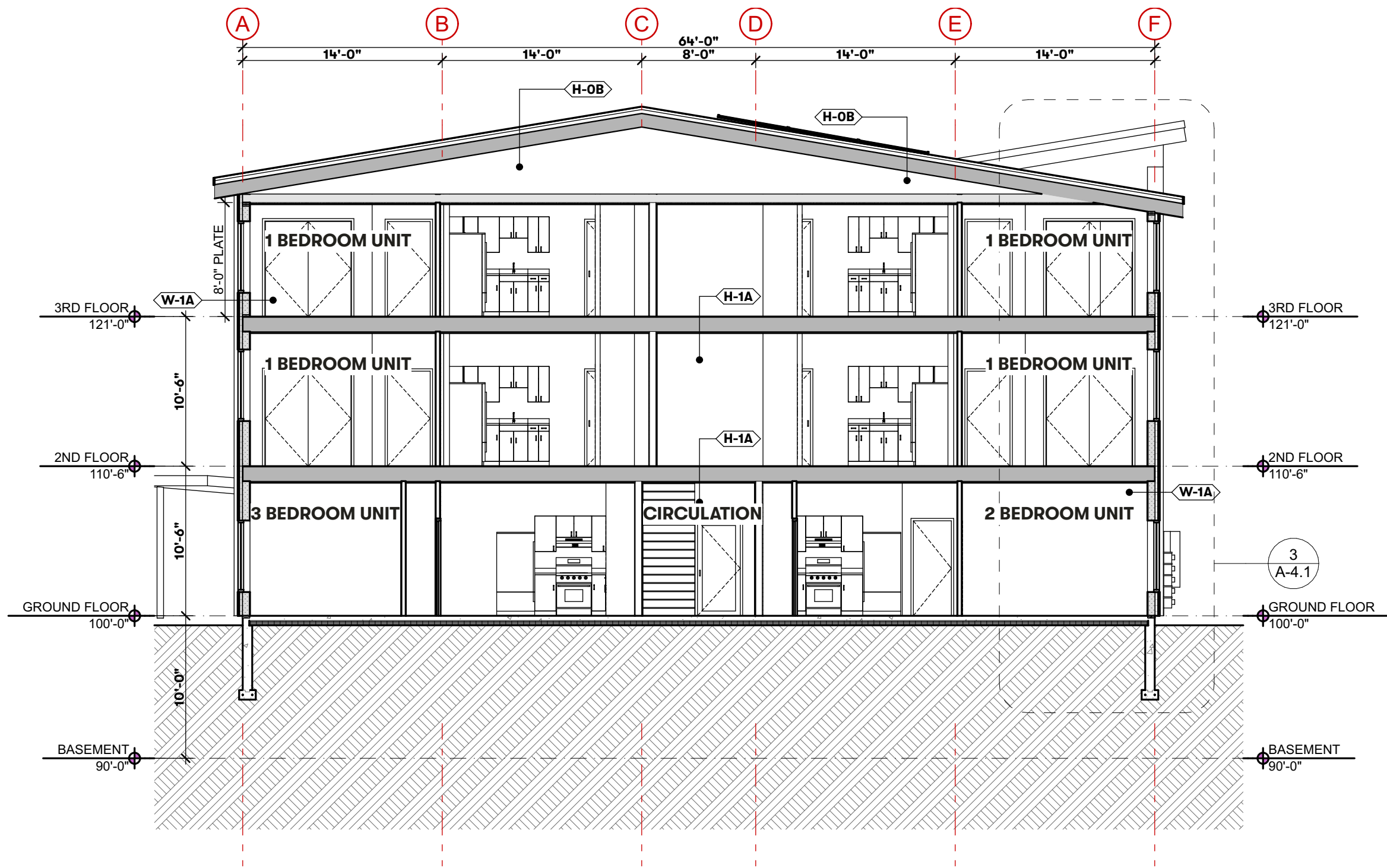
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CHG	CHANGE NAME
ISSUE NO.	DESCRIPTION
B	Planning Board Workshop #2

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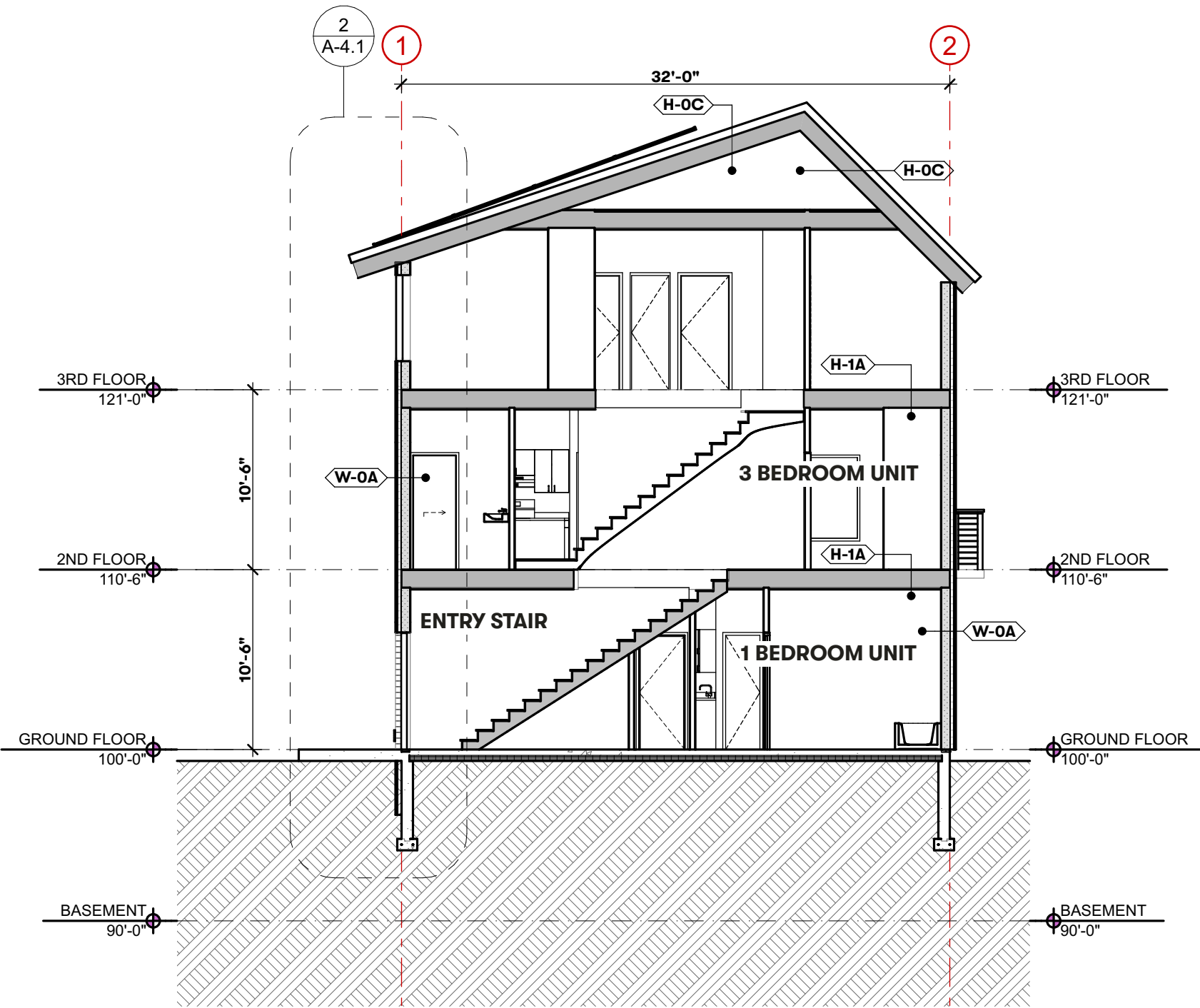
PROJECT	MCP
DATE	9/16/22
REVISED 1	
REVISED 2	
DRAWN BY	AW, SS, CB, SN
PHASE	Design Development

ELEVATIONS:
ROWHOMES, 16-
UNIT

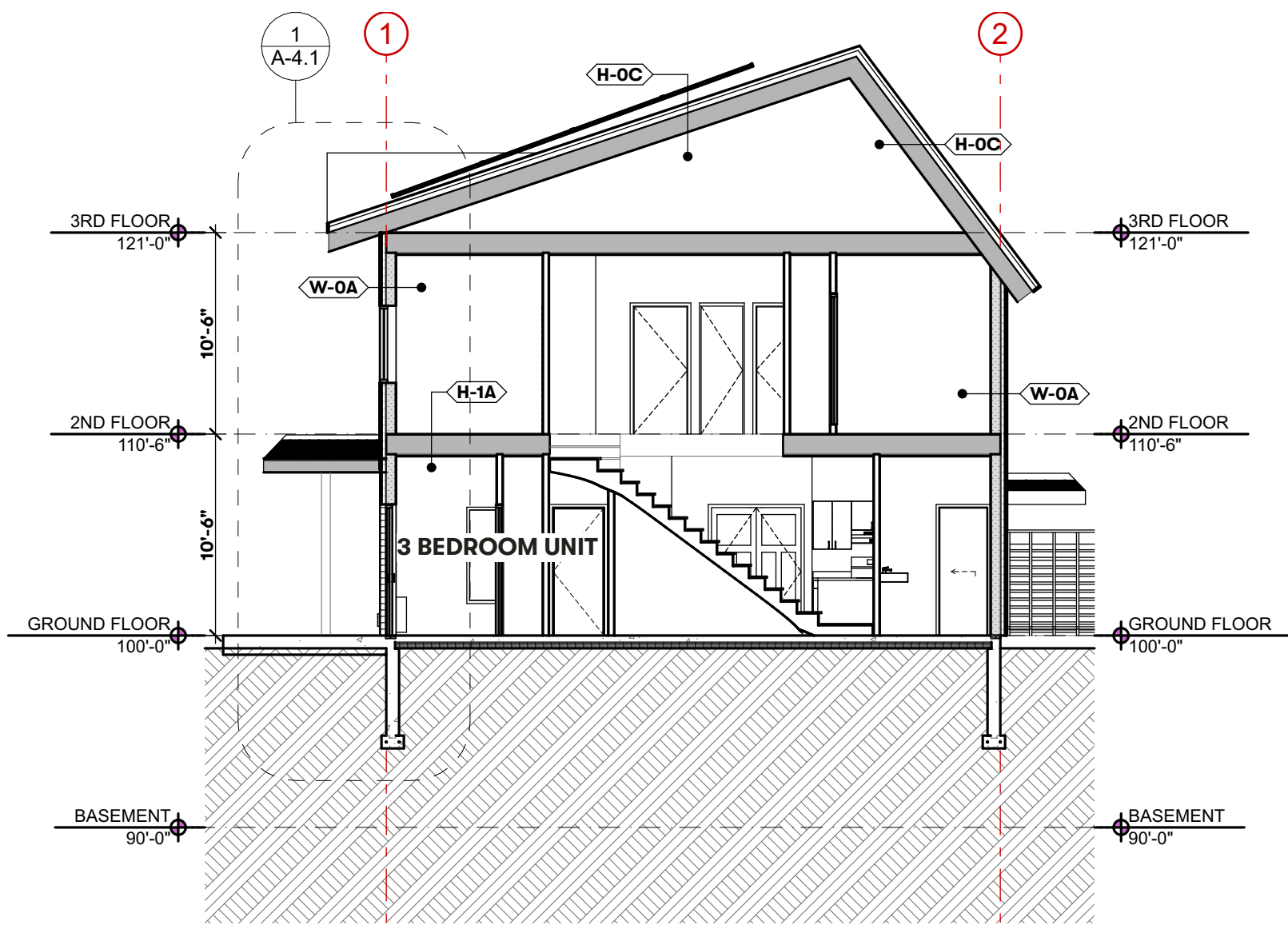
A-2.1



1 SECTION: COMMUNITY FLATS
SCALE: 1/8" = 1'-0"



3 SECTION: ROWHOME
SCALE: 1/8" = 1'-0"



2 SECTION: TOWNHOME
SCALE: 1/8" = 1'-0"

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kaplanthompson.com

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500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE

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565 Congress Street
Portland, ME 04101
p: 207 221-3390

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Yarmouth, ME 04096
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ELECTRICAL

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p: 207 749-4514

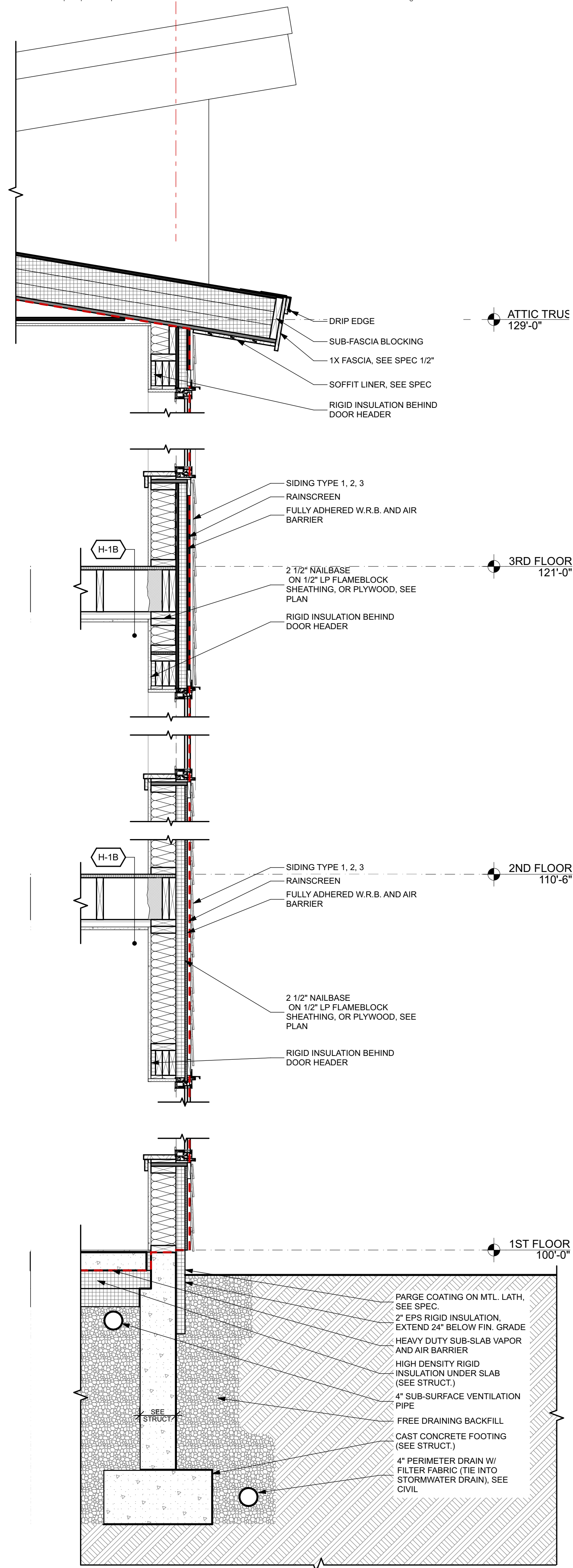
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CHANGE NAME	
CHG	
DESCRIPTION	Schematic Design
ISSUE NO.	A

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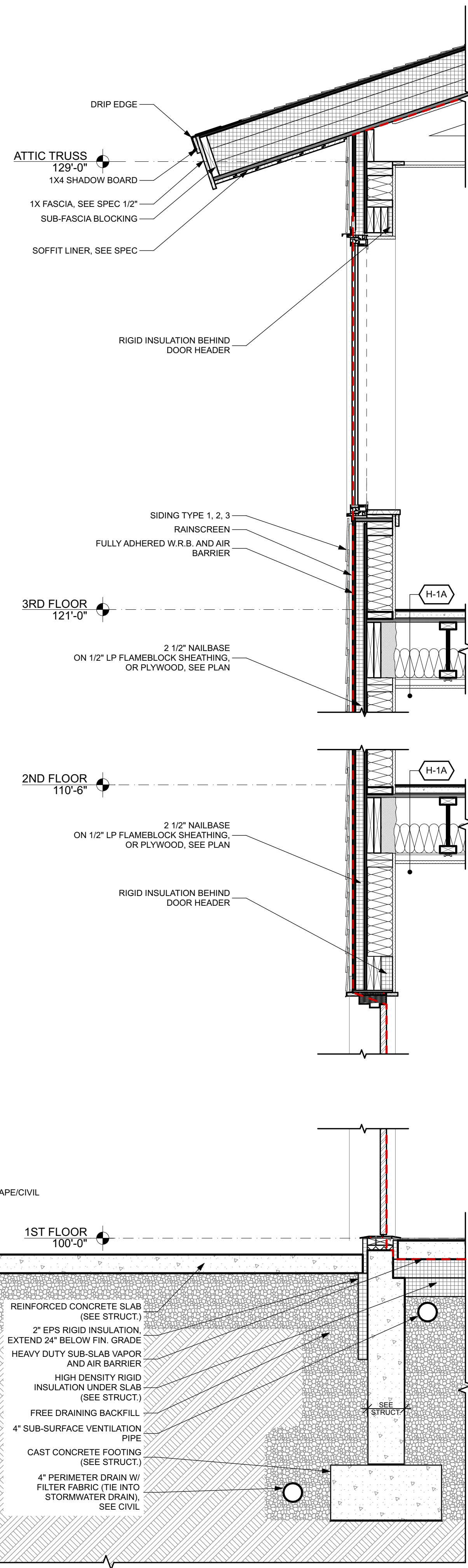
PROJECT	MCP
DATE	6/13/22
REVISED 1	
REVISED 2	
DRAWN BY	AW, SS, CB
PHASE	Schematic Design

BUILDING SECTIONS

A-3.1



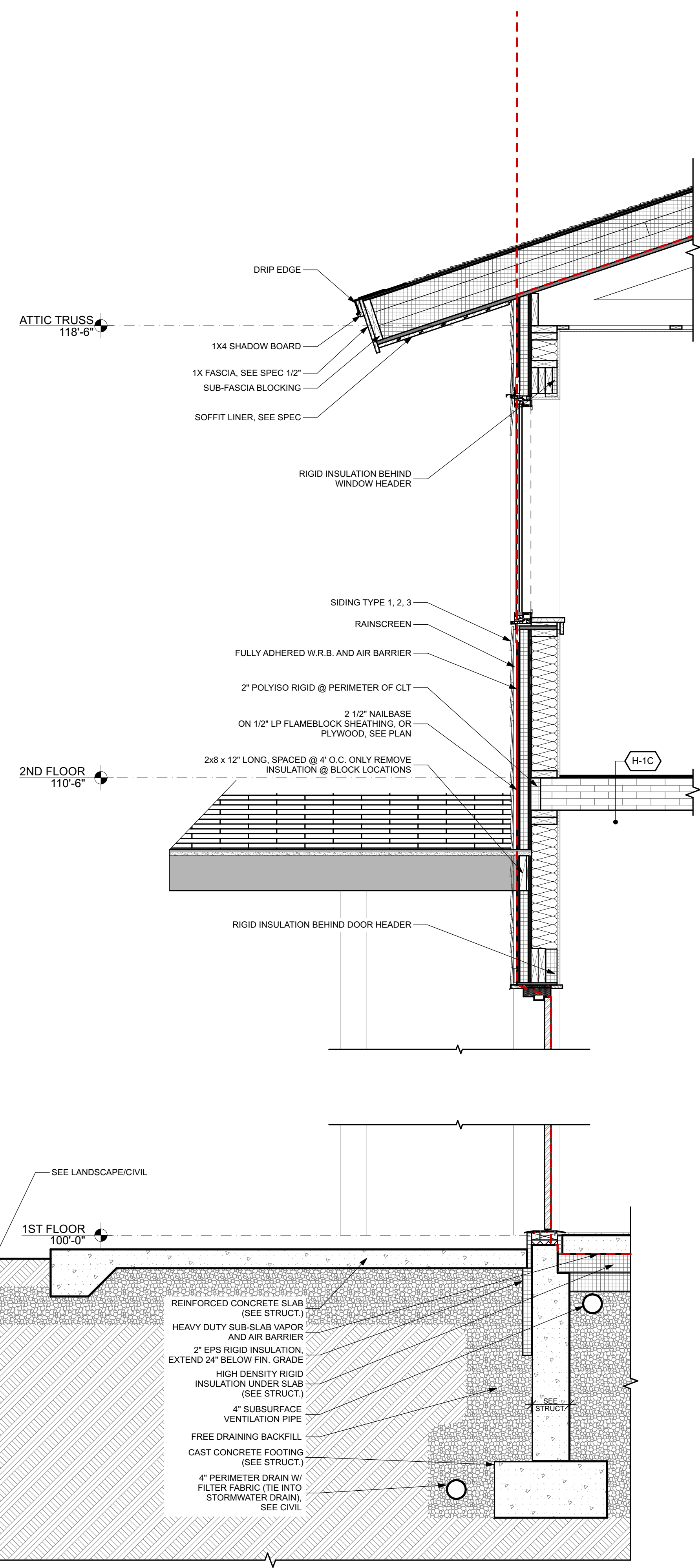
3 WALL SECTION: TYPICAL COMMUNITY FLAT
SCALE: 3/4" = 1'-0"



2 WALL SECTION: TYPICAL ROWHOME

SCALE: 3/4" = 1'-0"

0 1' 2' 3'



1 WALL SECTION: TYPICAL TOWNHOME
SCALE: 3/4" = 1'-0"

PROJECT

Base Building Design

Portland, ME 04101

CIVIL
Acorn Engineering, Inc.
500 Washington Ave., Suite 202
Portland, ME 04103
p: 207 775-2655

LANDSCAPE ARCHITECTURE
Aceto Landscape Architects
565 Congress Street
Portland, ME 04101
p: 207 221-3390

STRUCTURAL
Trillium Engineering
189 Main Street, Suite 200
Yarmouth, ME 04096
p: 207 307-0872

ELECTRICAL
MEGA Engineering
p: 207 749-4514

[illegible]

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PROJECT	MCP
DATE	6/13/22
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REVISED 2	
DRAWN BY	AW, SS, CB
PHASE	Schematic Design

WALL SECTIONS

A-4.1

LAMBERT WOODS
MAJOR SITE PLAN



CONCEPTUAL RENDERING OF WASHINGTON AVE

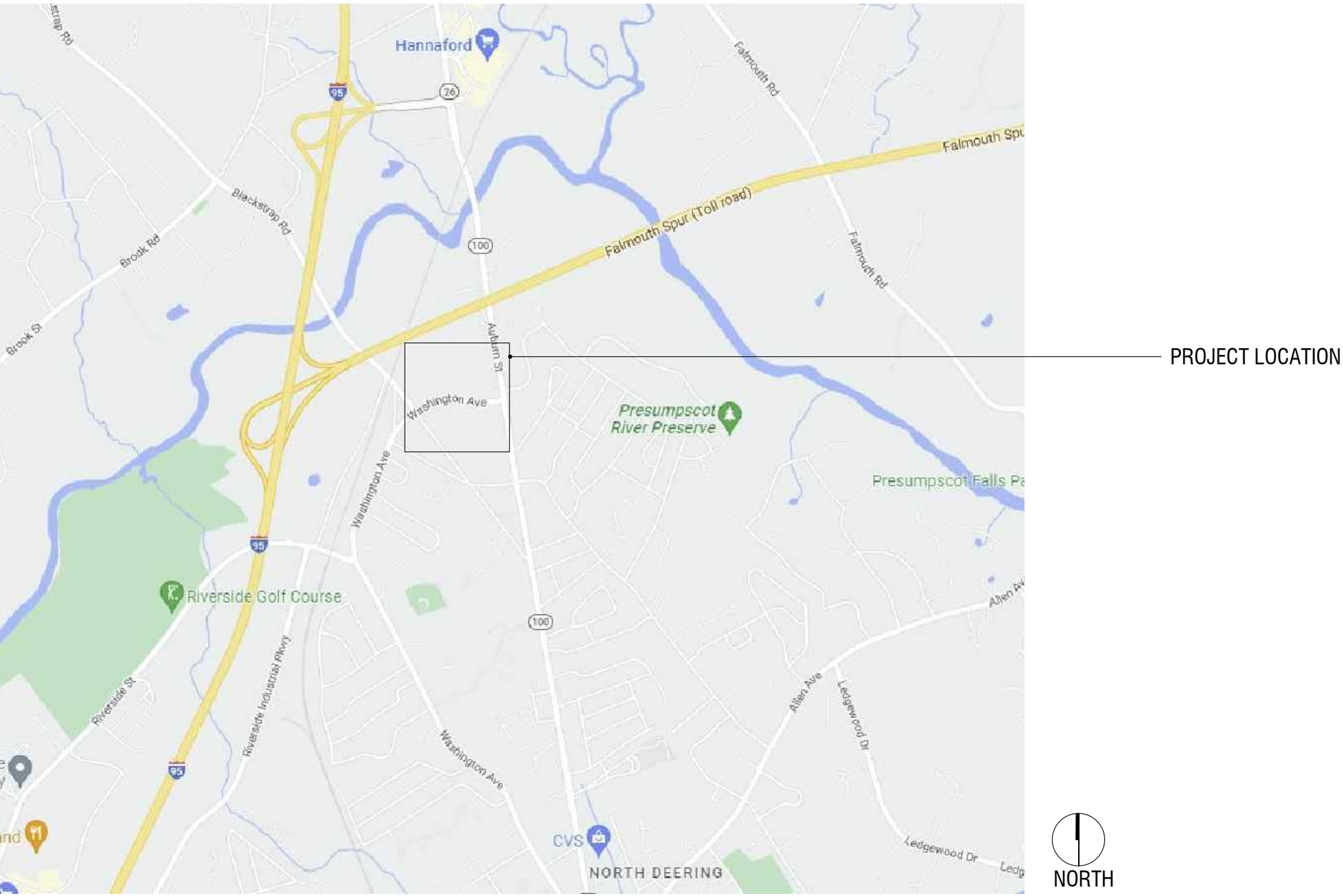


CONCEPTUAL RENDERING OF THE MEWS

09.20.2022 MAJOR SITE PLAN SUBMITTAL
06.17.2022 MAJOR SITE PLAN SUBMITTAL

SHEET INDEX	
LANDSCAPE DRAWINGS	
■ L0-00	COVER SHEET
■ L0-01	NOTES
■ L1-00	OVERALL MATERIALS PLAN
■ L2-00	OVERALL PLANTING PLAN
■ L2-01	ENLARGED NORTH PLANTING PLAN
■ L2-02	ENLARGED SOUTH PLANTING PLAN
■ L2-03	ENLARGED ROW PLANTING PLANS
■ L3-00	DETAILS
■ L3-01	DETAILS

VICINITY MAP:



LANDSCAPE ARCHITECT	ARCHITECT	CIVIL ENGINEER
ACETO LANDSCAPE ARCHITECTS CAITLIN ACETO 207.221.3390 ca@acetola.com	KAPLAN THOMPSON ARCHITECTS PHIL KAPLAN 207.842.2888 phil@kaplanthompson.com	ACORN ENGINEERING SAM LEBEL 207.478.4327 slebel@acorn-engineering.com

ALA
ACETO LANDSCAPE ARCHITECTS
207.221.3390 | ACETOLA.COM

SEAL

PROJECT TITLE

LAMBERT WOODS
PORTLAND, ME

PREPARED FOR

MAINE COOPERATIVE
DEVELOPMENT PARTNERS

REVISIONS

DATE

MAJOR SITE PLAN

09/20/2022

ISSUE DATE

MAJOR SITE PLAN

JUNE 17, 2022

SHEET TITLE

COVER

SHEET INFORMATION

L 0-00

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LAYOUT AND MATERIALS NOTES

1. REVIEW CONTRACT DOCUMENTS AND FIELD CONDITIONS BEFORE COMMENCING WORK. REPORT ERRORS, OMISSIONS, OR INCONSISTENCIES PROMPTLY TO THE LANDSCAPE ARCHITECT.
2. CONTACT UTILITY COMPANIES AS REQUIRED BY STATE AND LOCAL REGULATIONS BEFORE DIGGING. LOCATE AND MARK EXISTING UTILITIES.
3. THE CONTRACTOR SHALL OBTAIN ALL PERMITS WHICH ARE NECESSARY TO PERFORM THE PROPOSED WORK.
4. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
5. DIMENSIONS REFERRED TO AS "EQUAL" INDICATE SPACING WHICH IS EQUIDISTANT MEASURED TO THE CENTERLINES.
6. MEASUREMENTS ARE TO THE FINISHED FACE OF BUILDINGS, WALLS, OR OTHER FIXED SITE IMPROVEMENTS. DIMENSIONS TO CENTERLINES ARE IDENTIFIED.
7. INSTALL INTERSECTING ELEMENTS AT 90-DEGREE ANGLES, UNLESS OTHERWISE NOTED.
8. PROVIDE EXPANSION JOINTS WHERE FLATWORK MEETS VERTICAL STRUCTURES, SUCH AS WALLS, CURBS, STEPS, AND OTHER HARDSCAPE.
9. CONTROL JOINTS SHOULD BE SPACED NO GREATER THAN TEN (10) LINEAR FEET MAXIMUM, UNLESS OTHERWISE SPECIFIED.
10. CONTROL JOINT RECOMMENDATIONS TO MINIMIZE CRACKING SHALL BE SUBMITTED TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL.
11. ALL TOP OF WALLS AND FENCES ARE TO BE HELD LEVEL, UNLESS OTHERWISE SPECIFIED.
12. SAMPLES OF SPECIFIED MATERIALS SHALL BE SUBMITTED TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO ORDERING.
13. THE CONTRACTOR SHALL PROVIDE A FULL-SCALE MOCKUP AND RECEIVE APPROVAL FROM THE LANDSCAPE ARCHITECT BEFORE BEGINNING CONSTRUCTION OF PAVEMENT.
14. ALL SITE FURNITURE LOCATIONS ARE TO BE STAKED BY CONTRACTOR AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

PLANTING NOTES

1. CONTACT UTILITY COMPANIES AS REQUIRED BY STATE AND LOCAL REGULATIONS BEFORE DIGGING. LOCATE AND MARK EXISTING UTILITIES.
2. REFER TO CIVIL ENGINEER'S GRADING PLANS FOR FINAL GRADING AND UTILITY LOCATIONS.
3. THE CONTRACTOR SHALL OBTAIN ALL PERMITS WHICH ARE NECESSARY TO PERFORM THE PROPOSED WORK.
4. LANDSCAPE ARCHITECT TO REVIEW PLANT MATERIALS AT SOURCE OR BY PHOTOGRAPHS PRIOR TO DIGGING OR SHIPPING OF PLANT MATERIAL.
5. CONTRACTOR IS TO VERIFY ALL QUANTITIES. IF QUANTITIES ON PLANT LIST DIFFER FROM GRAPHIC INDICATIONS, GRAPHICS SHALL PREVAIL.
6. EXACT LOCATIONS OF TREES AND B&B SHRUBS ARE TO BE STAKED BY THE CONTRACTOR FOR LANDSCAPE ARCHITECT REVIEW AND APPROVAL PRIOR TO INSTALLATION. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO ADJUST PLANTS TO EXACT LOCATION IN THE FIELD.
7. PLANT MATERIAL NOT MEETING THE STANDARDS CONTAINED WITHIN CONTRACT DOCUMENTS SHALL BE REPLACED AT NO COST TO THE OWNER.
8. PROVIDE MATCHING SIZES AND FORMS FOR EACH PLANT OF THE SAME SPECIES DESIGNATED ON THE DRAWINGS UNLESS OTHERWISE INDICATED.
9. ALL PLANT MATERIAL IS TO BE INSTALLED PLUMB/PER THE SPECIFICATIONS CONTAINED WITHIN THE CONTRACT DOCUMENTS.
10. PRUNE EXISTING AND/OR NEWLY PLANTED TREES ONLY AS DIRECTED BY THE LANDSCAPE ARCHITECT.
11. PLANT MATERIAL SHALL HAVE ALL WIRE, TWINE, BASKETS, BURLAP, AND ALL OTHER NON-BIODEGRADABLE CONTAINMENT MATERIAL REMOVED FROM THE TRUNK AND/OR ROOT BALL OF THE PLANT PRIOR TO PLANTING. ROOT BALLS SHALL BE FREE OF WEEDS.
12. FINISH GRADE OF PLANTING BEDS SHALL BE ONE (1) INCH BELOW ADJACENT PAVER OR HEADER, UNLESS OTHERWISE SPECIFIED.
13. MULCH OR PLANTING BED DRESSING SHALL BE PLACED IN ALL PLANTING AREAS AS SPECIFIED. MULCH OR PLANTING BED DRESSING SHALL NOT BE PLACED WITHIN SIX (6) INCHES OF TREE TRUNKS. MULCHING SHOULD BE REPEATED ANNUALLY DURING THE AUTUMN TO A 3" DEPTH. SOIL PEP MULCH SHALL BE USED UNLESS OTHERWISE SPECIFIED..
14. ALL PLANT MATERIAL SHOULD RECEIVE AN ORGANIC FERTILIZER IN LIMITED APPLICATION FOLLOWING INSTALLATION. TYPE AND APPLICATION RATE AND METHOD OF APPLICATION TO BE SPECIFIED BY THE CONTRACTOR & APPROVED BY THE LANDSCAPE ARCHITECT.
15. STOCKPILED PLANT MATERIAL TO BE PLACED IN THE SHADE AND PROPERLY HAND-WATERED UNTIL PLANTED.
16. PRESERVE & PROTECT ALL EXISTING VEGETATION INDICATED TO REMAIN AT ALL TIMES.
17. TO THE GREATEST EXTENT POSSIBLE, TOPSOIL THAT IS REMOVED DURING CONSTRUCTION SHALL BE STOCKPILED FOR LATER USE IN AREAS REQUIRING REVEGETATION/PLANTING.
18. ALL MATERIALS USED SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE CURRENT AMERICAN STANDARDS FOR NURSERY STOCK, PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
19. ALL DISTURBED AREAS ARE TO BE REVEGETATED

SEEDING NOTES

1. REVEGETATED AREAS ARE TO BE HYRO-SEEDED, FOLLOWED BY THE APPLICATION OF STRAW MULCH.
2. APPLY STRAW MULCH AT A MINIMUM RATE OF 1.5 TONS PER ACRE OF AIR DRY MATERIAL. SPREAD STRAW MULCH UNIFORMLY OVER THE AREA WITH MECHANICAL MULCH SPREADER/CRIMPER. DO NOT MULCH WHEN WIND VELOCITY EXCEEDS 10 MPH.
3. IMMEDIATELY UPON COMPLETION OF THE MULCHING AND BINDING OPERATION, THE SEEDED AREAS SHALL BE IRRIGATED, KEEPING THE TOP 2 INCHES OF SOIL EVENLY MOIST UNTIL SEED HAS UNIFORMLY GERMINATED AND GROWN TO A HEIGHT OF 2 INCHES.
4. WATERING APPLICATION SHALL BE DONE IN A MANNER WHICH WILL PROVIDE UNIFORM COVERAGE BUT WHICH WILL NOT CAUSE EROSION, MOVEMENT, OR DAMAGE TO THE FINISHED SURFACE.

GRADING AND DRAINAGE NOTES

1. MATERIALS/WASTE CREATED BY REMOVAL PROCEDURES SHALL BE LEGALLY DISPOSED OF AWAY FROM THE JOB SITE.
2. NOTIFY LOCAL UNDERGROUND SERVICE COMPANIES FOR UTILITY FINDS 48 HOURS PRIOR TO ANY EXCAVATION.
3. THE CONTRACTOR IS TO REVIEW ARCHITECTURAL DRAWINGS FOR THE VERIFICATION OF CONNECTIONS TO DRAINS OVER STRUCTURE.
4. THE CONTRACTOR IS TO REVIEW ARCHITECTURAL DRAWINGS FOR THE VERIFICATION OF WATERPROOFING OF SLAB PENETRATIONS.
5. THE CONTRACTOR IS TO REVIEW CIVIL ENGINEER'S DRAWINGS FOR THE VERIFICATION OF CONNECTIONS TO DRAINS.
6. GRADING AND EXCAVATION WORK SHALL BE COMPLETED DURING DRY AND NON-FREEZING CONDITIONS.
7. POSITIVE DRAINAGE SHALL BE PROVIDED AWAY FROM ALL STRUCTURES.
8. SOIL COMPACTION SHALL BE 95% PROCTOR DENSITY MINIMUM BENEATH PAVEMENTS, STEPS, WALLS AND LIGHT FOUNDATIONS, UNLESS OTHERWISE SPECIFIED.

ABBREVIATIONS TABLE

APPROX	APPROXIMATE	MH	MANHOLE
ARCH	ARCHITECT	MIN	MINIMUM
AVG	AVERAGE	MISC	MISCELLANEOUS
B+B	BALED AND BURLAPPED	N	NORTH
BF	BOTTOM OF FOOTING	NIC	NOT IN CONTRACT
BLDG	BUILDING	NO	NUMBER
BM	BENCHMARK	NOM	NOMINAL
BOC	BACK OF CURB	NTS	NOT TO SCALE
BR	BOTTOM OF RAMP	OC	ON CENTER
BS	BOTTOM OF STEP	OD	OUTSIDE DIAMETER
BW	BOTTOM OF WAL	OPP	OPPOSITE
CAL	CALIPER	PAR	PARALLEL
CAP	CAPACITY	PC	POINT OF CURVATURE
CF	CUBIC FEET	PE	POLYURETHANE
CHAM	CHAMFER	PERF	PERFORATED
CIP	CAST IN PLACE	PED	PEDESTRIAN
CJ	CONTROL JOINT	PI	POINT OF INTERSECTION
CL	CENTER LINE	PL	PROPERTY LINE
CLR	CLEARANCE	PT	POINT, POINT OF TANGENCY
CM	CENTIMETER	PVC	POLYVINYL CHLORIDE
CO	CLEAN OUT	PVMT	PAVEMENT
COMP	COMPACTED	PVR	PAVER
CONC	CONCRETE	QTY	QUANTITY
CONST	CONSTRUCTION	R	RADIUS
CONT	CONTINUOUS	REF	REFERENCE
CONTR	CONTRACTOR	REINF	REINFORCE(D)
CU	CUBIC	REQ'D	REQUIRED
CY	CUBIC YARD	REV	REVISION, REVISED
DEMO	DEMOLISH, DEMOLITION	ROW	RIGHT OF WAY
DIA	DIAMETER	RT	RIGHT
DIM	DIMENSION	S	SOUTH
DTL	DETAIL	SS	SANITARY SEWER
DWG	DRAWING	SCH	SCHEDULE
E	EAST	SD	STORM DRAIN
EA	EACH	SEC	SECTION
EJ	EXPANSION JOINT	SF	SQUARE FOOT (FEET)
EL	ELEVATION	SHT	SHEET
ELEC	ELECTRICAL	SIM	SIMILAR
ENG	ENGINEER	SNT	SEALANT
EQ	EQUAL	SPECS	SPECIFICATIONS
EQUIP	EQUIPMENT	SQ	SQUARE
EST	ESTIMATE	ST	STORM SEWER
E.W.	EACH WAY	SY	SQUARE YARD
EXIST	EXISTING	STA	STATION
EXP	EXPANSION, EXPOSED	STD	STANDARD
FFE	FINISHED FLOOR ELEVATION	STL	STEEL
FG	FINISHED GRADE	STRL	STRUCTURAL
FIN	FINISH	SYM	SYMMETRICAL
FL	FLOW LINE	T&B	TOP AND BOTTOM
FOW	FACE OF WAL	TBC	TOP OF BACK CURB
FT	FOOT (FEET)	TC	TOP OF CURB
FTG	FOOTING	TF	TOP OF FOOTING
GA	GAUGE	TRANS	ELECTRIC TRANSFORMER
GAL	GALVANIZED	TOC	TOP OF CONCRETE
GEN	GENERAL	TOPO	TOPOGRAPHY
HORIZ	HORIZONTAL	TSL	TOP OF SLAB
HP	HIGH POINT	TR	TOP OF RAMP
HT	HEIGHT	TS	TOP OF STEP
ID	INSIDE DIAMETER	TW	TOP OF WAL
INV	INVERT ELEVATION	TYP	TYPICAL
IN	INCH(ES)	VAR	VARIES
INCL	INCLUDE(D)	VERT	VERTICAL
IRR	IRRIGATION	VEH	VEHICLE
JT	JOINT	VOL	VOLUME
LIN	LINEAR	W/	WITH
LF	LINEAR FEET	W/O	WITHOUT
LP	LOW POINT	WT	WEIGHT
LT	LIGHT	WWF	WELDED WIRE FABRIC
MATL	MATERIAL	YD	YARD
MAX	MAXIMUM	@	AT
MEMB	MEMBRANE		
MD	MAIN DISCONNECT SWITCH		



SEAL

PROJECT TITLE

LAMBERT WOODS
PORTLAND, ME

PREPARED FOR

MAINE COOPERATIVE
DEVELOPMENT PARTNERS

REVISIONS

DATE

MAJOR SITE PLAN

09/20/2022

ISSUE DATE

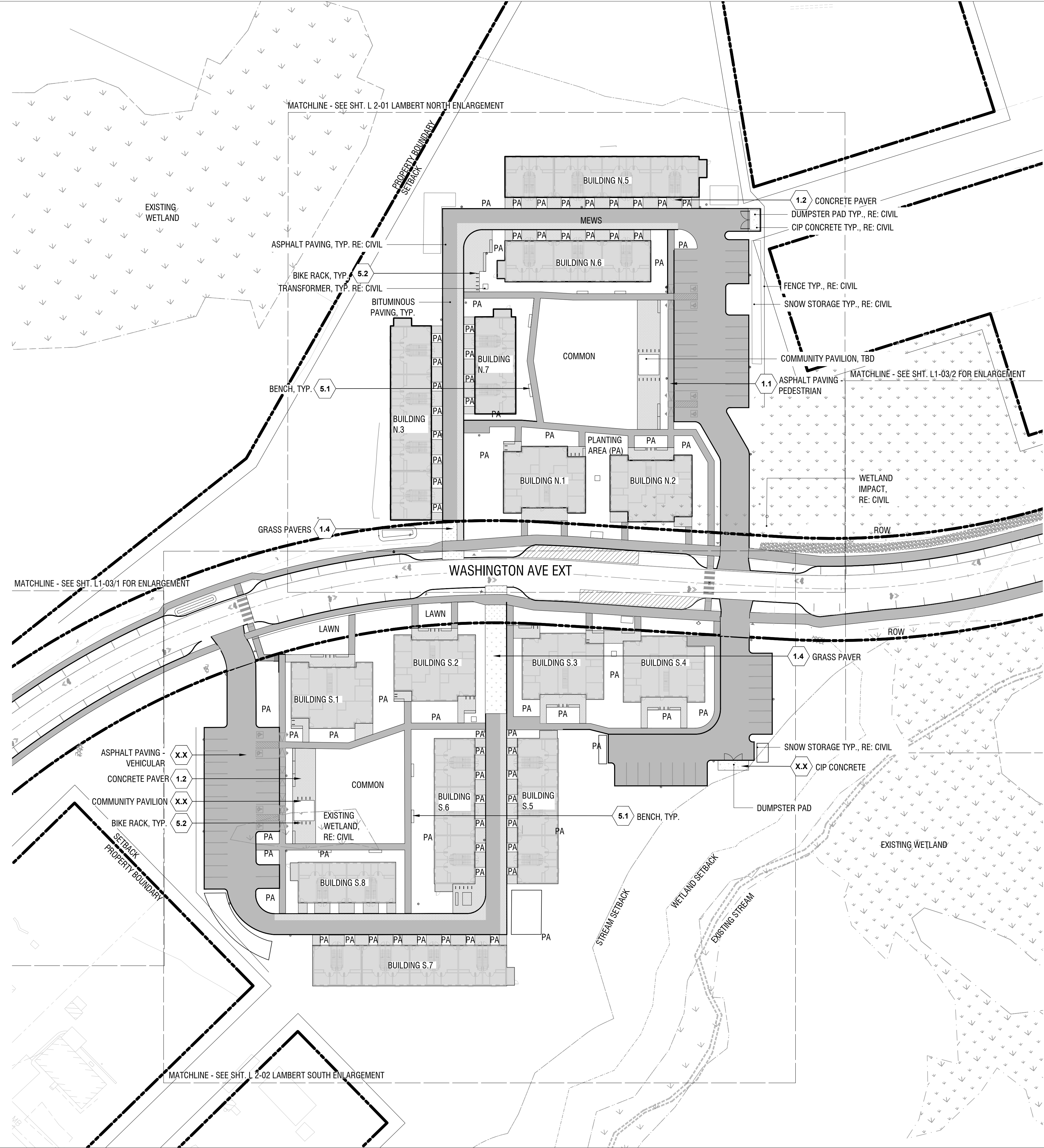
MAJOR SITE PLAN
JUNE 17, 2022

SHEET TITLE

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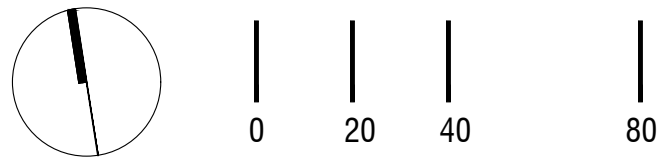
SHEET INFORMATION

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MATERIALS PALETTE		
SYMBOL	TYPE	QTY
	CAST IN PLACE CONCRETE	320 SF
	CONCRETE PAVERS	17,204 SF
	GRASS PAVE	1,641 SF
	BITUMINOUS PAVING	62,475 SF
	CONCRETE CURB (FLUSH)	XX LF
	BENCH SEATING	APPROX. XX LF
	BIKE RACK	APPROX. XX

SITE KEYNOTES:		
	1.0 PAVEMENTS, RAMPS, CURBS	DETAIL / SHEET
	1.1 ASPHALT PAVING - PEDESTRIAN	1/L3-00
	1.2 CONCRETE PAVER	2/L3-00
	1.3 STONEDUST PATH	3/L3-00
	1.4 GRASS PAVERS	4/L3-01
	2.0 JOINTING	
	XX NOT USED AT THIS TIME	XXX-XX
	3.0 STEPS	
	XX NOT USED AT THIS TIME	XXX-XX
	4.0 SITE WALLS/ EMBANKMENTS	
	XX NOT USED AT THIS TIME	XXX-XX
	5.0 SITE FURNITURE	
	5.1 STONE BENCH	5/L3-00
	5.2 BIKE RACK	6/L3-00
	6.0 RAILINGS, BARRIERS, FENCING	
	XX NOT USED AT THIS TIME	XXX-XX
	7.0 SITE LIGHTING	DETAIL / SHEET
	7.1 LIGHT POLE BASE	7/L3-00
	8.0 DRAINAGE	
	XX NOT USED AT THIS TIME	XXX-XX
	9.0 PLANTING AND LANDSCAPE	
	9.1 DECIDUOUS TREE PLANTING	1/L3-01
	9.2 MULTI-STEM TREE PLANTING	2/L3-01
	9.3 EVERGREEN TREE PLANTING	3/L3-01
	9.4 SHRUBS PLANTING	4/L3-01
	9.5 PERENNIAL PLANTING	5/L3-01
	9.6 TREE PROTECTION	6/L3-01
	9.7 METAL EDGING	4/L3-00
	10.0 MISCELLANEOUS ELEMENTS	



REVISIONS	DATE
MAJOR SITE PLAN	09/20/2022

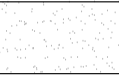
PLANT LIST

SYMB.	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	SPACING
TREES					
AC	ACER x FREEMANII 'ARMSTRONG'	UPRIGHT ARMSTRONG MAPLE	30	2.5" CAL. MIN.	PER PLAN
AM	AMELANCHIER CANADENSIS	SERVICEBERRY (MULTI-STEM)	47	2.5" CAL. MIN.	PER PLAN
BE	BETULA	BIRCH	55	2.5" CAL. MIN.	PER PLAN
QA	QUERCUS ALBA	WHITE OAK	32	2.5" CAL. MIN.	PER PLAN
QR	QUERCUS ROBUR x BICOLOR 'LONG'	REGAL PRINCE OAK	34	2.5" CAL. MIN.	PER PLAN
JA	ULMUS AMERICANA	AMERICAN ELM	26	2.5" CAL. MIN.	PER PLAN

TREES - EVERGREEN					
AB	ABIES FRASERI	FRASER FIR	8	7-8"	PER PLAN
PS	PINUS STROBUS	WHITE PINE	73	7-8"	PER PLAN

SHRUBS					
CS	CORNUS SERICEA	RED-TWIG DOGWOOD	432	#5	PER PLAN
IG	ILEX GLABRA	INKBERRY	496	#2	PER PLAN
PO	PHYSOCARPUS OPULIFOLIUS	COMMON NINEBARK	511	#5	PER PLAN
RA	RHUS AROMATICA	LOW-GRO SUMAC	134	#2	PER PLAN
VD	VIBURNUM DENTATUM 'CHICAGO LUSTRE'	ARROWWOOD VIBURNUM	237	#5	PER PLAN

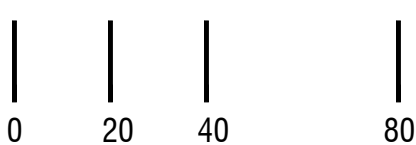
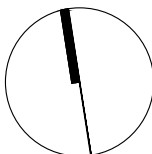
PERENNIALS AND ORNAMENTAL GRASSES					
AT	ASTILBE	FALSE SPIREA	TBD	#1	PER PLAN
AF	ATHYRIUM FILIX-FEMINA	LADY FERN	TBD	#1	PER PLAN
BM	BRUNNERA MACROPHYLLA	BUGLOSS	TBD	#1	PER PLAN
CA	CALAMAGROSTIS ACUTIFLORA 'KARL FOERSTER'	FEATHER REED GRASS	TBD	#1	PER PLAN
LE	LIRIOPE	LILYTURF	TBD	#1	PER PLAN
PB	POLYGONATUM BIFLORUM	SOLOMON'S SEAL	TBD	#1	PER PLAN
PV	PANICUM VIRGATUM 'ROTSTRAHLBUSCH'	SWITCH GRASS	TBD	#1	PER PLAN
NE	NEPETA 'WALKER'S LOW'	CATMINT	TBD	#1	PER PLAN
SS	SCHIZACHYRIUM SCOPARIUM 'PRAIRIE BLUES'	LITTLEBLUE STEM	TBD	#1	PER PLAN
SH	SPOROBOLUS HETEROLEPIS	PRAIRIE DROPSOED	TBD	#1	PER PLAN

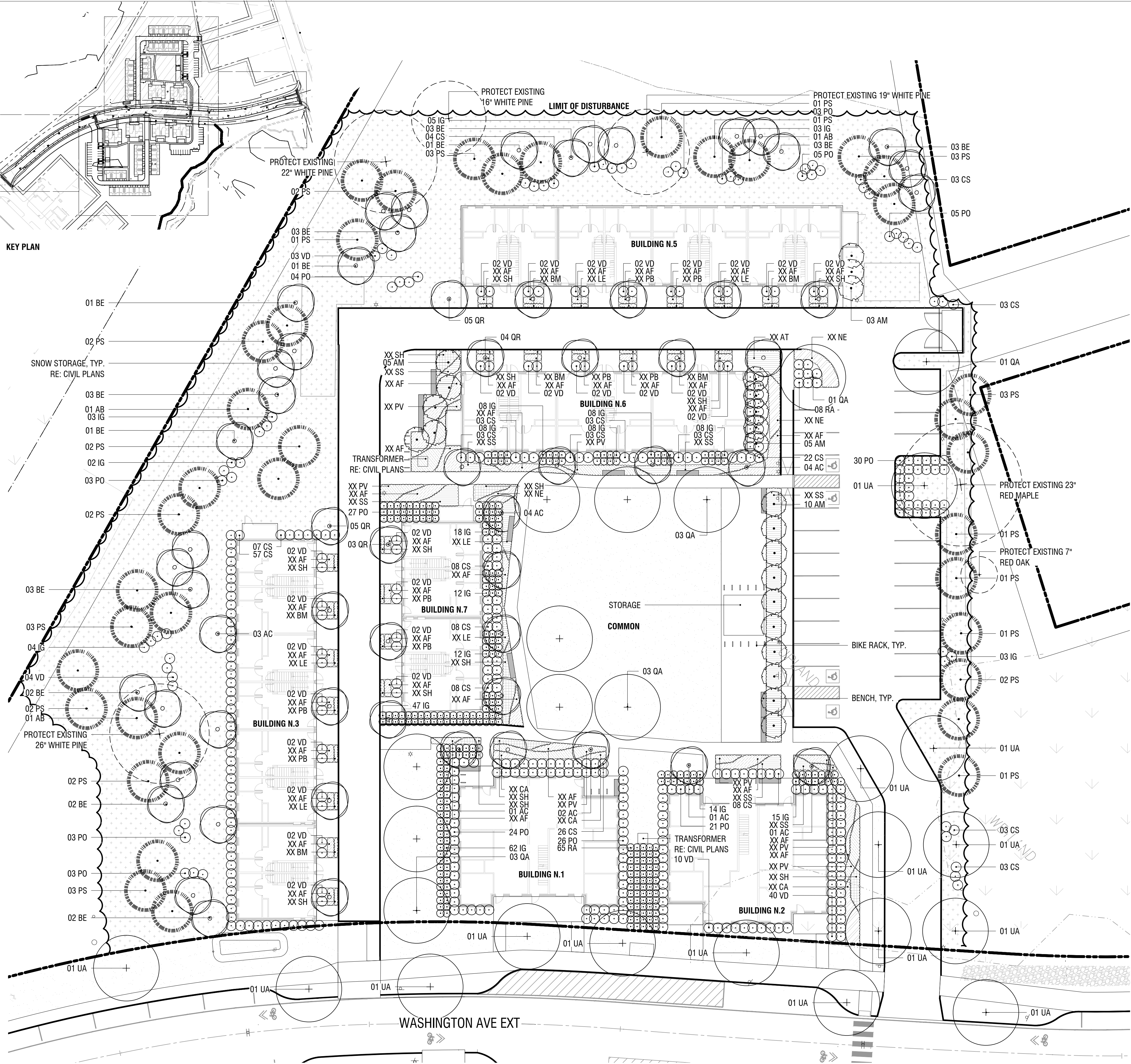
SEEDING	
 RESTORATION MIX NEW ENGLAND CONSERVATION/WILDLIFE MIX MFR: NEW ENGLAND WETLAND PLANTS TOTAL AREA: 33,885 SF APPLICATION RATE 25LBS/ACRE 1750 SQ FT/LB (SEEDING RATE MAY VARY DEPENDING ON TIME OF YEAR, SEE SPEC. SHEET FOR INSTRUCTIONS)	 LAWN WILDFLOWER FARM'S ECO-LAWN GRASS SEED TOTAL AREA: 19,805 SF ECO-LAWN IS A DROUGHT-RESISTANT GRASS THAT REQUIRES MOWING ONLY ONCE PER MONTH. EACH 5 POUND BAG OF SEED COVERS 1,000 SQUARE FEET. A THICK HEALTHY LAWN IS THE BEST DEFENCE AGAINST WEEDS, DISEASE, DROUGHT AND INSECT DAMAGE.

SITE KEYNOTES:

1.0	PAVEMENTS, RAMPS, CURBS	DETAIL / SHEET
1.1	ASPHALT PAVING - PEDESTRIAN	1/L3-00
1.2	CONCRETE PAVER	2/L3-00
1.3	STONEDUST PATH	3/L3-00
1.4	GRASS PAVERS	4/L3-01
2.0	JOINTING	
X.X	NOT USED AT THIS TIME	X/XX-XX
3.0	STEPS	
X.X	NOT USED AT THIS TIME	X/XX-XX
4.0	SITE WALLS/ EMBANKMENTS	
X.X	NOT USED AT THIS TIME	X/XX-XX
5.0	SITE FURNITURE	
5.1	STONE BENCH	5/L3-00
5.2	BIKE RACK	6/L3-00
6.0	RAILINGS, BARRIERS, FENCING	
X.X	NOT USED AT THIS TIME	X/XX-XX

7.0	SITE LIGHTING	DETAIL / SHEET
7.1	LIGHT POLE BASE	7/L3-00
8.0	DRAINAGE	
X.X	NOT USED AT THIS TIME	X/XX-XX
9.0	PLANTING AND LANDSCAPE	
9.1	DECIDUOUS TREE PLANTING	1/L3-01
9.2	MULTI-STEM TREE PLANTING	2/L3-01
9.3	EVERGREEN TREE PLANTING	3/L3-01
9.4	SHRUBS PLANTING	4/L3-01
9.5	PERENNIAL PLANTING	5/L3-01
9.6	TREE PROTECTION	6/L3-01
9.7	METAL EDGING	4/L3-00
10.0	MISCELLANEOUS ELEMENTS	





PLANT LIST

SYMB.	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	SPACING
TREES					
AC	ACER x FREEMANII 'ARMSTRONG'	UPRIGHT ARMSTRONG MAPLE	16	2.5" CAL. MIN.	PER PLAN
AM	AMELANCHIER CANADENSIS	SERVICEBERRY (MULTI-STEM)	23	2.5" CAL. MIN.	PER PLAN
BE	BETULA	BIRCH	28	2.5" CAL. MIN.	PER PLAN
QA	QUERCUS ALBA	WHITE OAK	11	2.5" CAL. MIN.	PER PLAN
QR	QUERCUS ROBUR x BICOLOR 'LONG'	REGAL PRINCE OAK	17	2.5" CAL. MIN.	PER PLAN
JA	ULMUS AMERICANA	AMERICAN ELM	13	2.5" CAL. MIN.	PER PLAN
TREES - EVERGREEN					
AB	ABIES FRASERI	FRASER FIR	3	7'-8"	PER PLAN
PS	PINUS STROBUS	WHITE PINE	35	7'-8"	PER PLAN
SHRUBS					
CS	CORNUS SERICEA	RED-TWIG DOGWOOD	175	#5	PER PLAN
IG	ILEX GLABRA	INKBERRY	240	#2	PER PLAN
PO	PHYSCOCARPUS OPULOFOLIUS	COMMON NINEBARK	154	#5	PER PLAN
RA	RHUS AROMATICA	LOW-GRO SUMAC	73	#2	PER PLAN
VD	VIBURNUM DENTATUM 'CHICAGO LUSTRE'	ARROWWOOD VIBURNUM	113	#5	PER PLAN

PERENNIALS AND ORNAMENTAL GRASSES

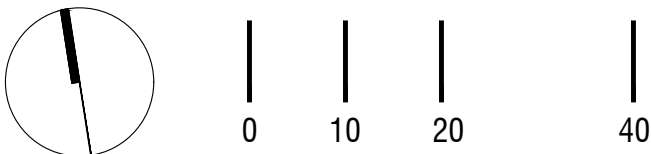
AT	ASTILBE	FALSE SPIREA	TBD	#1	PER PLAN
AF	ATHYRIUM FILIX-FEMINA	LADY FERN	TBD	#1	PER PLAN
BM	BRUNNERA MACROPHYLLA	BUGLOSS	TBD	#1	PER PLAN
CA	CALAMAGROSTIS ACUTIFLORA 'KARL FOERSTER'	FEATHER REED GRASS	TBD	#1	PER PLAN
LE	LIRIOPE	LILYTURF	TBD	#1	PER PLAN
PB	POLYGONATUM BIFLORUM	SOLOMON'S SEAL	TBD	#1	PER PLAN
PV	PANICUM VIRGATUM 'ROTSTRAHLBUSCH'	SWITCH GRASS	TBD	#1	PER PLAN
NE	NEPETA "WALKER'S LOW"	CATMINT	TBD	#1	PER PLAN
SS	SCHIZACHYRIUM SCOPARIUM 'PRAIRIE BLUES'	LITTLEBLUE STEM	TBD	#1	PER PLAN
SH	SPOROBOLUS HETEROLEPIS	PRAIRIE DROPSEED	TBD	#1	PER PLAN

SEEDING

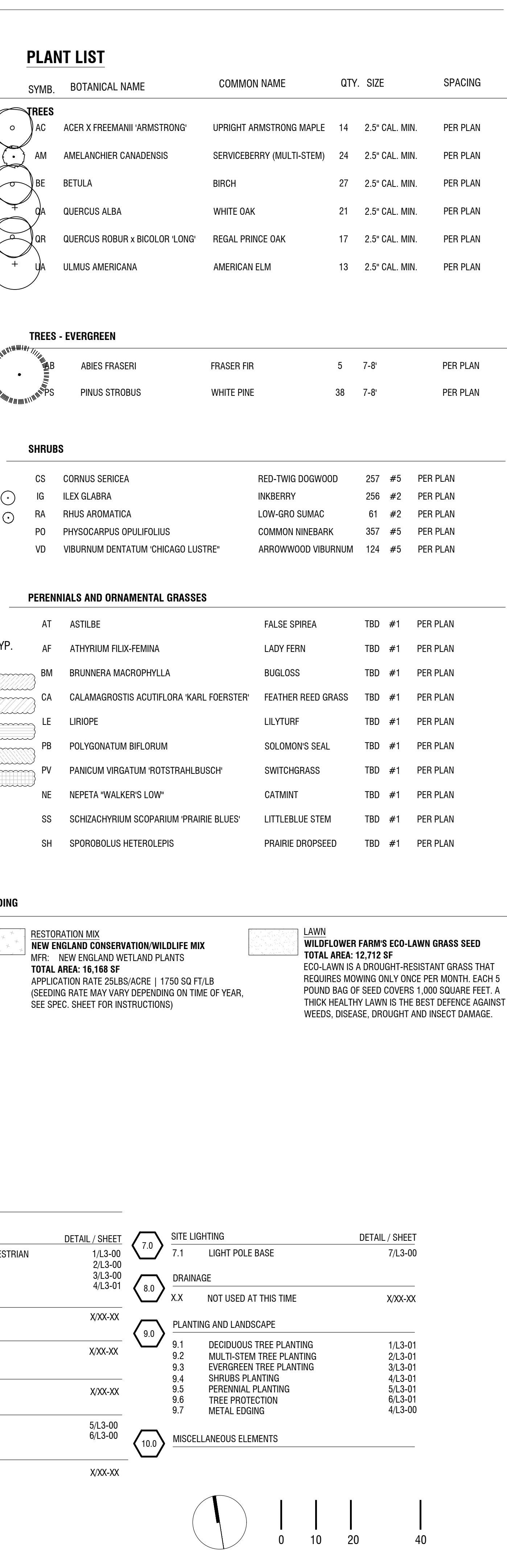
RESTORATION MIX NEW ENGLAND CONSERVATION/WILDLIFE MIX MFR: NEW ENGLAND WETLAND PLANTS TOTAL AREA: 17,717 SF APPLICATION RATE 25LBS/ACRE 1750 SQ FT/LB (SEEDING RATE MAY VARY DEPENDING ON TIME OF YEAR, SEE SPEC. SHEET FOR INSTRUCTIONS)	LAWN WILDFLOWER FARM'S ECO-LAWN GRASS SEED TOTAL AREA: 7,093 SF ECO-LAWN IS A DROUGHT-RESISTANT GRASS THAT REQUIRES MOWING ONLY ONCE PER MONTH. EACH 5 POUND BAG OF SEED COVERS 1,000 SQUARE FEET. A THICK HEALTHY LAWN IS THE BEST DEFENCE AGAINST WEEDS, DISEASE, DROUGHT AND INSECT DAMAGE.
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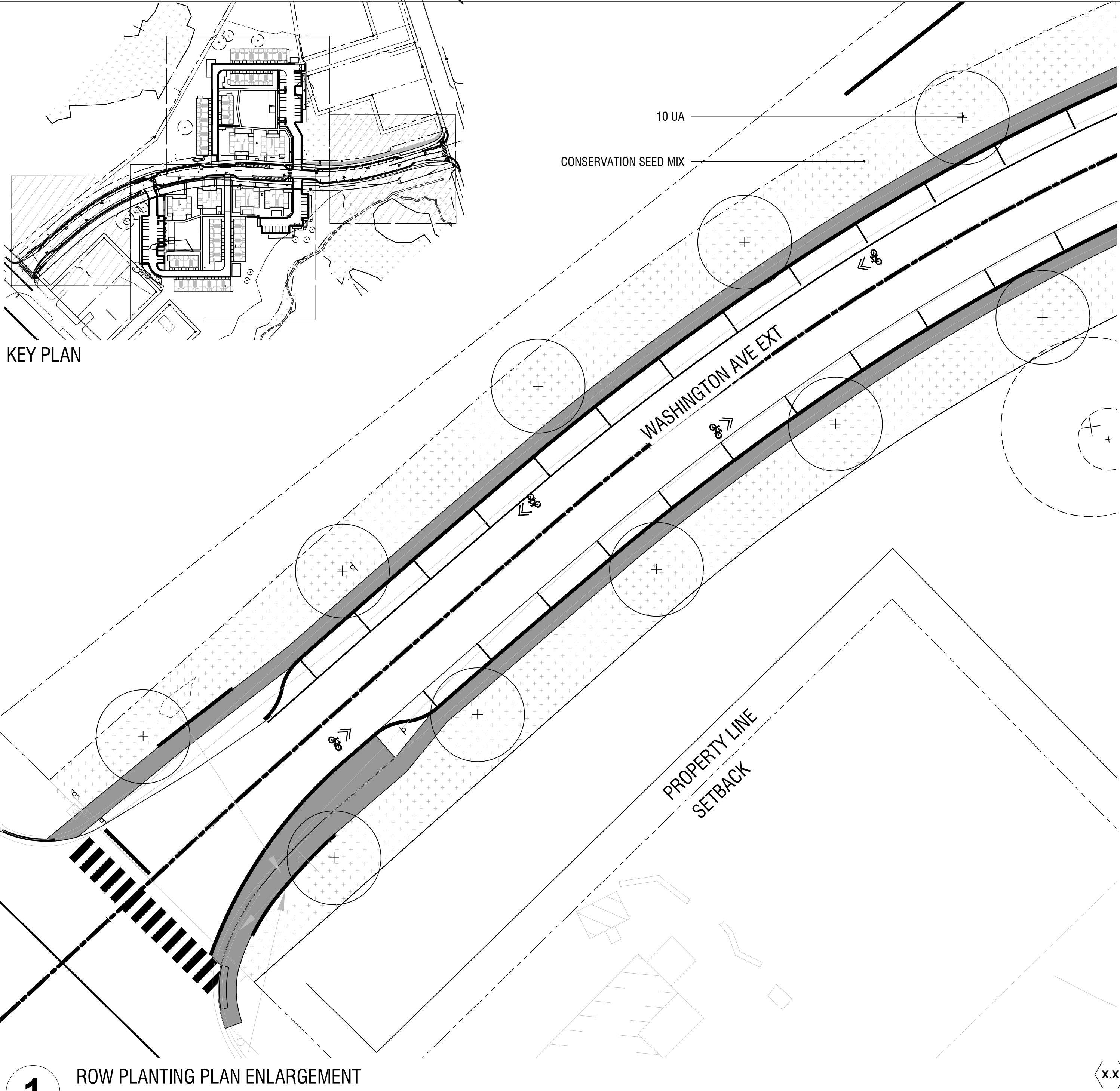
SITE KEYNOTES:

1.0	PAVEMENTS, RAMPS, CURBS	DETAIL / SHEET	7.0	SITE LIGHTING	DETAIL / SHEET	
1.1	ASPHALT PAVING - PEDESTRIAN	1/L3-00	7.1	LIGHT POLE BASE	7/L3-00	
1.2	CONCRETE PAVR	2/L3-00	DRAINAGE			
1.3	STONEDUST PATH	3/L3-00				
1.4	GRASS PAVERS	4/L3-01	8.0	X.X	NOT USED AT THIS TIME	X/XX-XX
2.0	JOINTING		9.0	PLANTING AND LANDSCAPE		
3.0	X.X	NOT USED AT THIS TIME	X/XX-XX	9.1	DECIDUOUS TREE PLANTING	1/L3-01
4.0	STEPS	X.X	X/XX-XX	9.2	MULTI-STEM TREE PLANTING	2/L3-01
				9.3	EVERGREEN TREE PLANTING	3/L3-01
5.0	SITE WALLS/ EMBANKMENTS	X.X	X/XX-XX	9.4	SHRUBS PLANTING	4/L3-01
				9.5	PERENNIAL PLANTING	5/L3-01
6.0	SITE FURNITURE	X.X	X/XX-XX	9.6	TREE PROTECTION	6/L3-01
				9.7	METAL EDGING	4/L3-00
5.1	STONE BENCH	5/L3-00	10.0	MISCELLANEOUS ELEMENTS		
5.2	BIKE RACK	6/L3-00				
RAILINGS, BARRIERS, FENCING						
X.X	NOT USED AT THIS TIME	X/XX-XX				



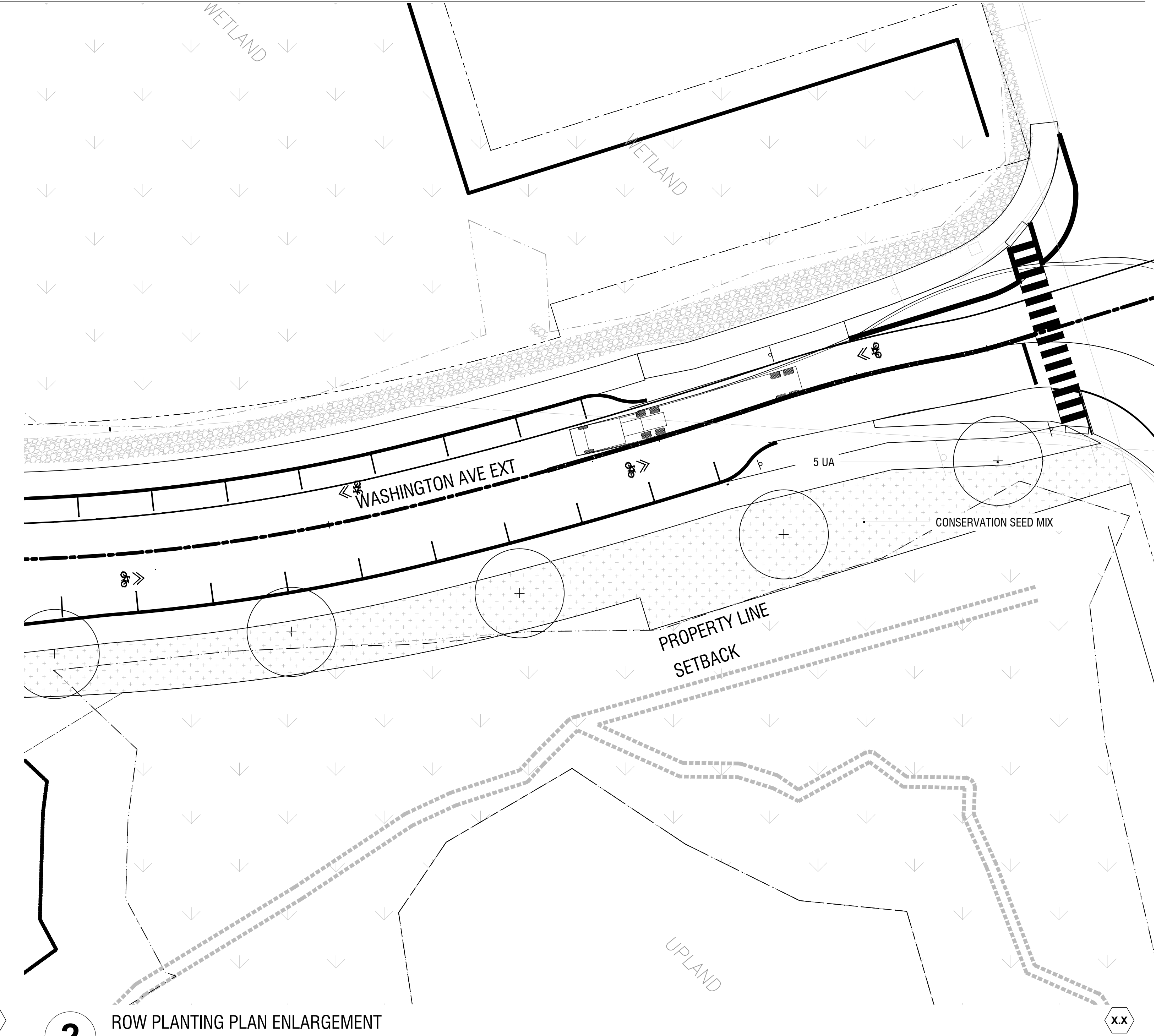
REVISIONS	DATE
MAJOR SITE PLAN	09/20/2022





1 ROW PLANTING PLAN ENLARGEMENT
1":20'-0"

x.x



2 ROW PLANTING PLAN ENLARGEMENT
1":20'-0"

x.x



SEAL

PROJECT TITLE

LAMBERT WOODS
PORTLAND, ME

PREPARED FOR

MAINE COOPERATIVE
DEVELOPMENT PARTNERS

REVISIONS DATE

MAJOR SITE PLAN	09/20/2022

ISSUE DATE

MAJOR SITE PLAN
JUNE 17, 2022

SHEET TITLE

ENLARGED ROW
PLANTING PLANS

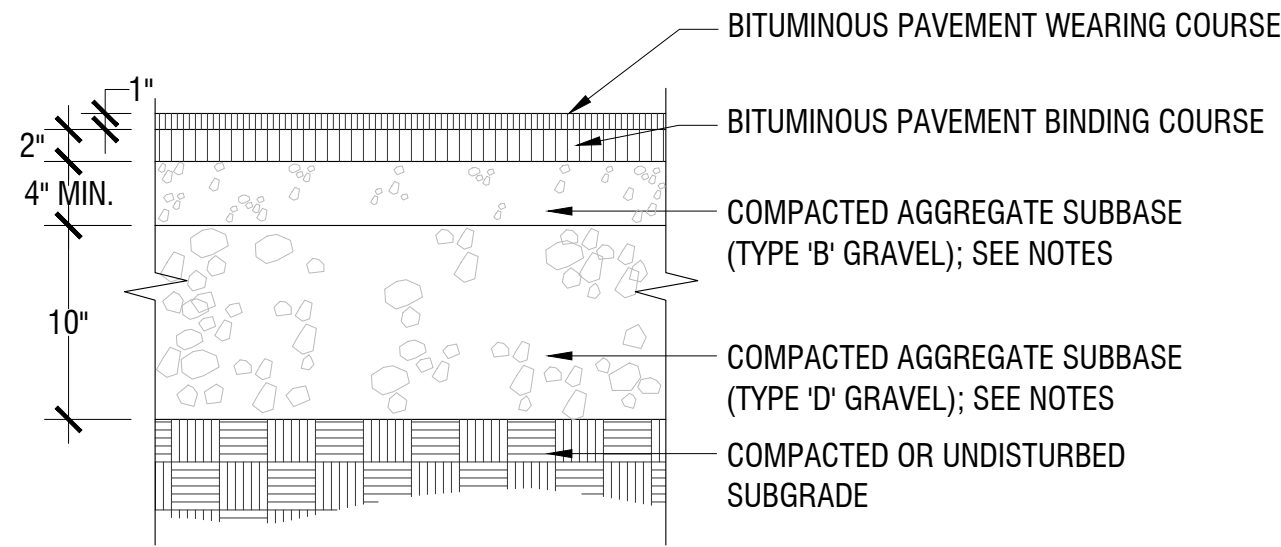
SHEET INFORMATION

L 2-03

NOT FOR CONSTRUCTION

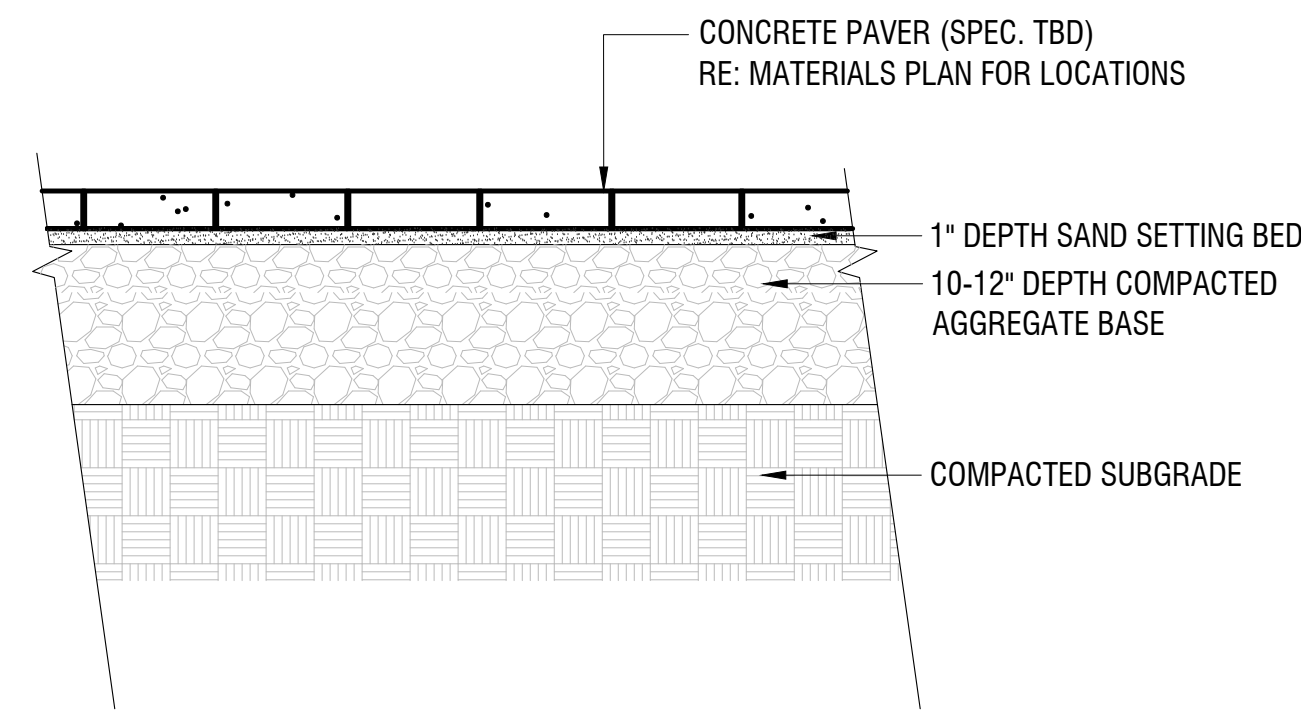
SITE KEYNOTES:

1.0	PAVEMENTS, RAMPS, CURBS	DETAIL / SHEET	7.0	SITE LIGHTING	DETAIL / SHEET
1.1	ASPHALT PAVING - PEDESTRIAN	1/L3-00	7.1	LIGHT POLE BASE	7/L3-00
1.2	CONCRETE PAVER	2/L3-00			
1.3	STONEDUST PATH	3/L3-00	8.0	DRAINAGE	
1.4	GRASS PAVERS	4/L3-01	X.X	NOT USED AT THIS TIME	X/XX-XX
2.0	JOINTING				
X.X	NOT USED AT THIS TIME	X/XX-XX	9.0	PLANTING AND LANDSCAPE	
3.0	STEPS		9.1	DECIDUOUS TREE PLANTING	1/L3-01
X.X	NOT USED AT THIS TIME	X/XX-XX	9.2	MULTI-STEM TREE PLANTING	2/L3-01
4.0	SITE WALLS/ EMBANKMENTS		9.3	EVERGREEN TREE PLANTING	3/L3-01
X.X	NOT USED AT THIS TIME	X/XX-XX	9.4	SHRUBS PLANTING	4/L3-01
5.0	SITE FURNITURE		9.5	PERENNIAL PLANTING	5/L3-01
5.1	STONE BENCH	5/L3-00	9.6	TREE PROTECTION	6/L3-01
5.2	BIKE RACK	6/L3-00	9.7	METAL EDGING	4/L3-00
6.0	RAILINGS, BARRIERS, FENCING		10.0	MISCELLANEOUS ELEMENTS	
X.X	NOT USED AT THIS TIME	X/XX-XX			



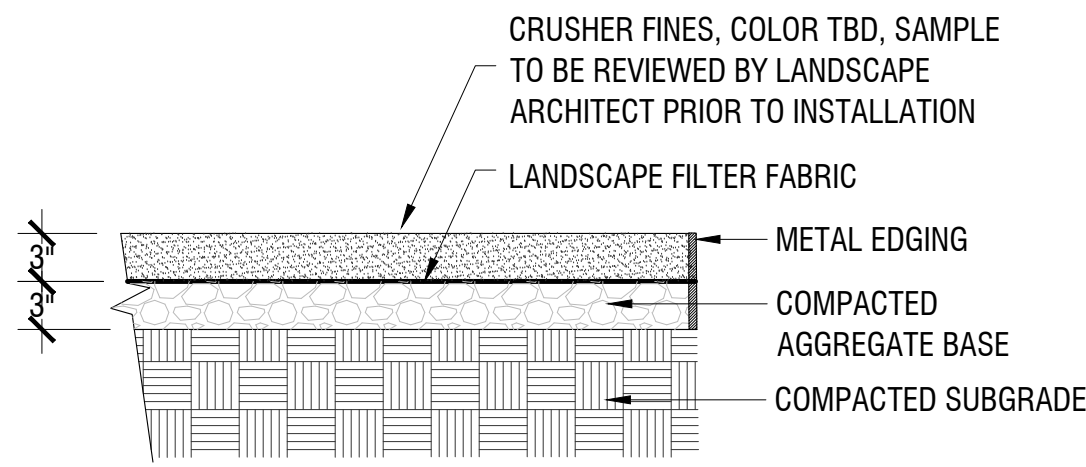
1 ASPHALT PAVING (PEDESTRIAN)
1":1'-0"

1.1



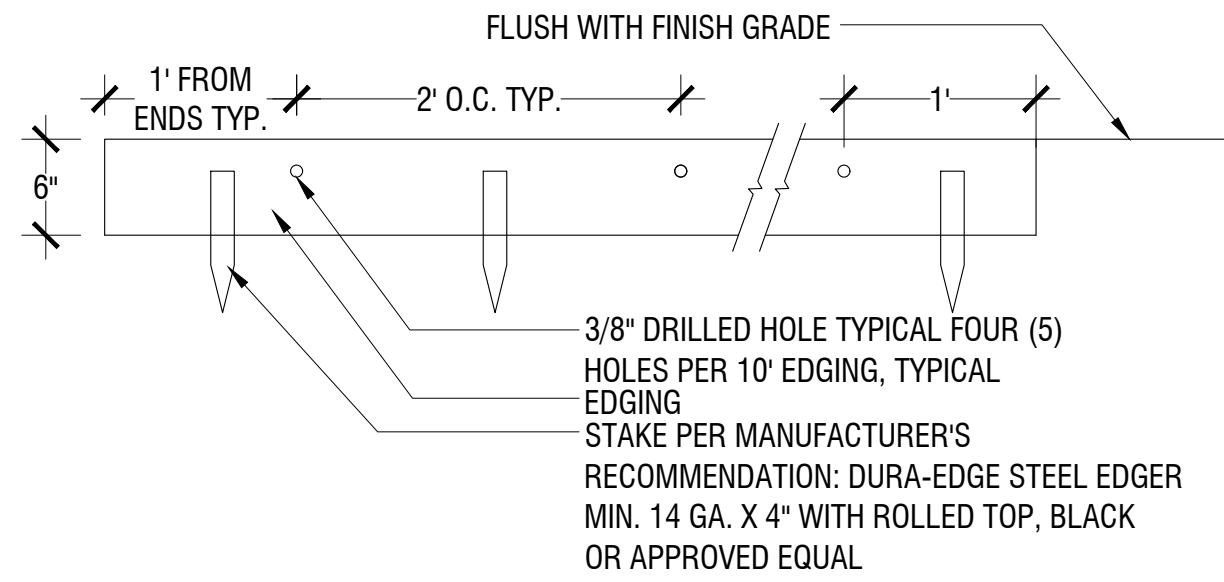
2 CONCRETE PAVER
1":1'-0"

1.2



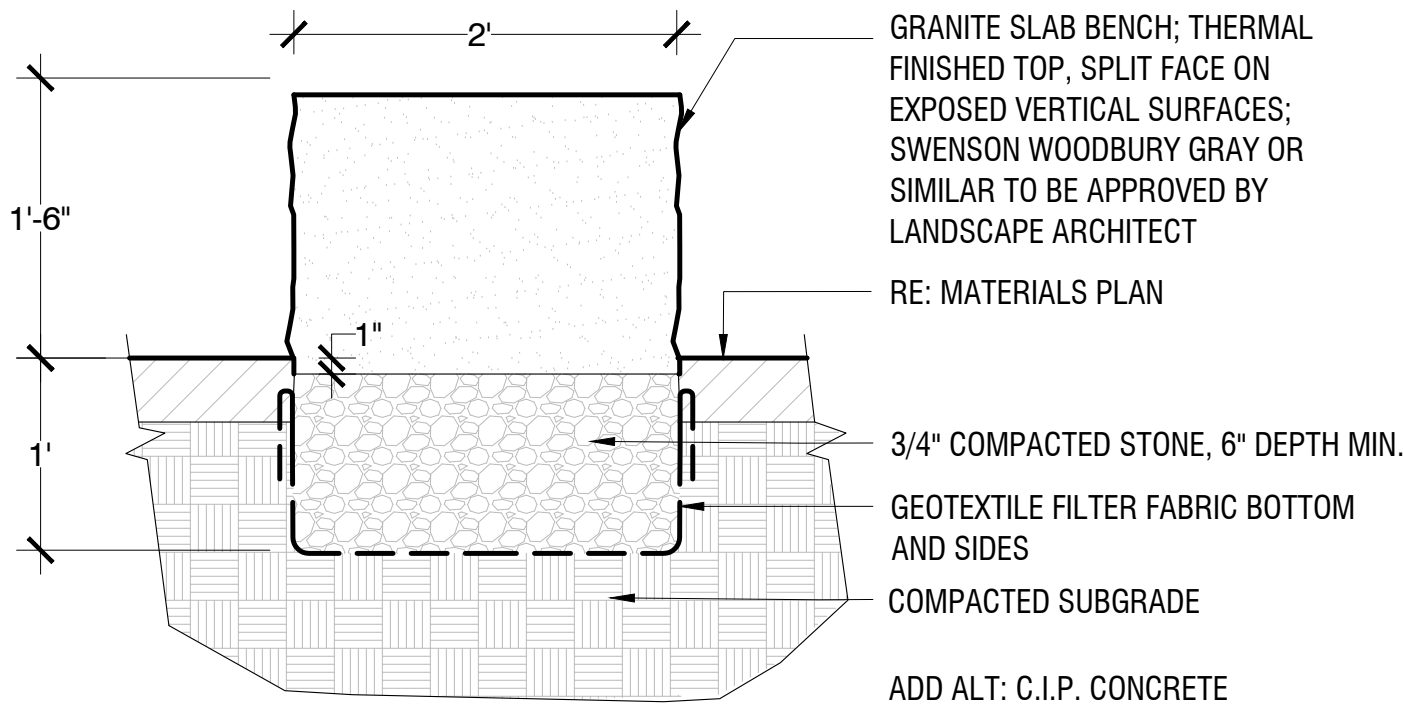
3 STONEDUST PATH
1":1'-0"

1.3



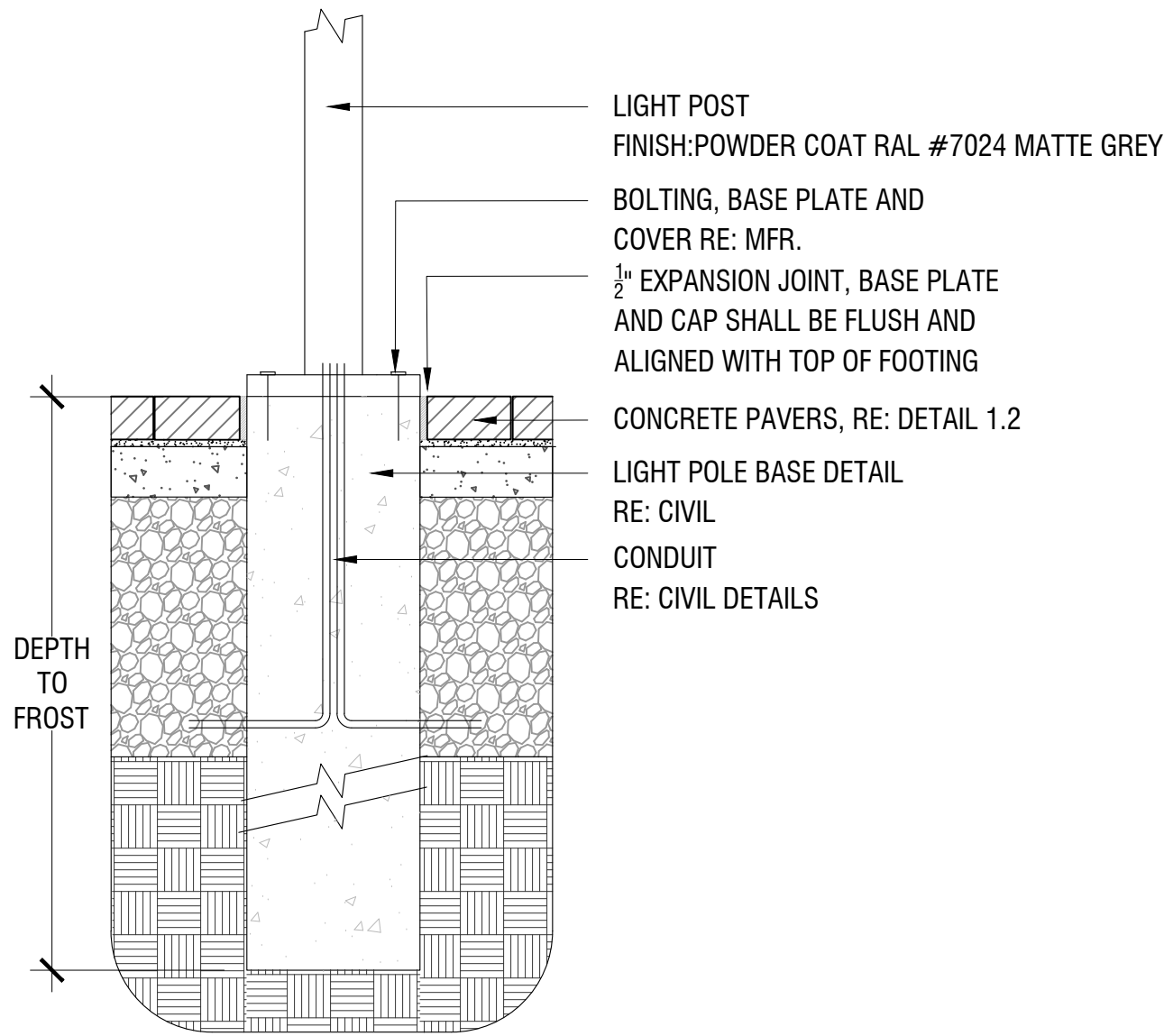
4 METAL EDGING
1":1'-0"

9.7



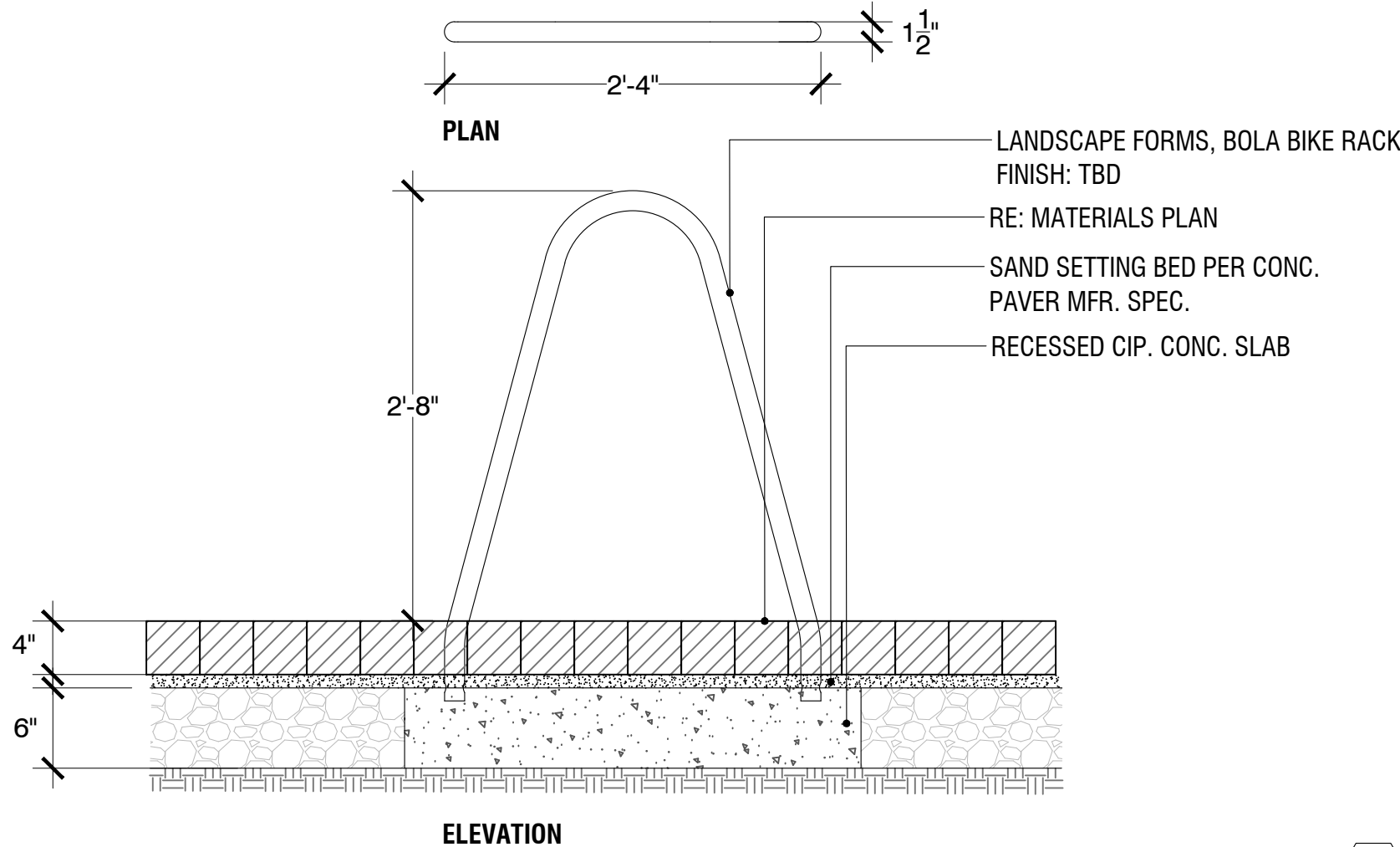
5 STONE BENCH
1":1'-0"

5.1



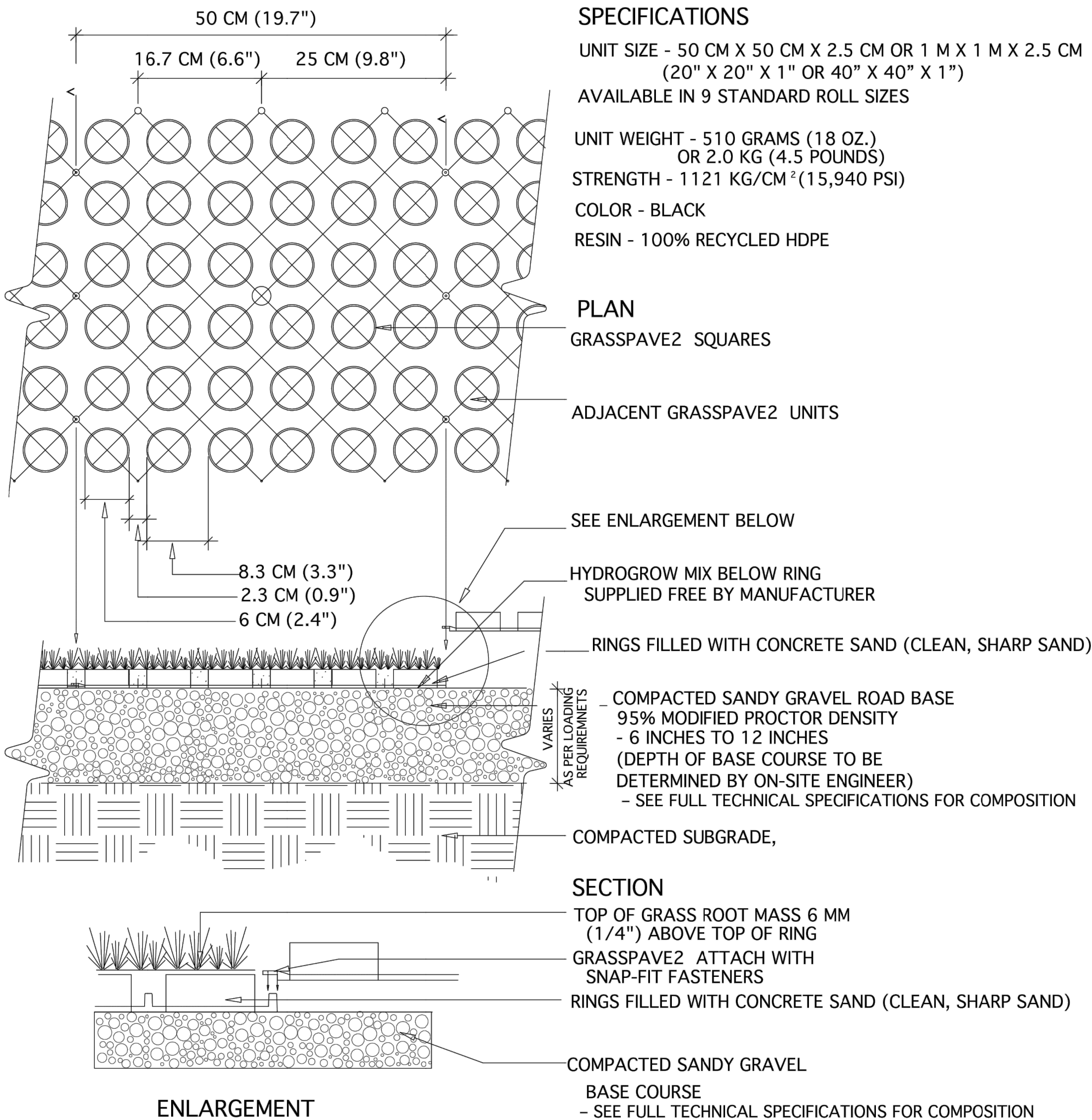
7 LIGHT POLE BASE
N.T.S.

7.1



6 BIKE RACK
N.T.S.

5.2



NOTE: GRASS/PLANT TYPES SHALL BE SPECIFIED BY A LANDSCAPE ARCHITECT OR LANDSCAPE DESIGNER.

8 GRASS PAVE
1":1'-0"

1.4



SEAL

PROJECT TITLE

LAMBERT WOODS
PORTLAND, ME

PREPARED FOR

MAINE COOPERATIVE
DEVELOPMENT PARTNERS

REVISIONS DATE

MAJOR SITE PLAN 09/20/2022

ISSUE DATE

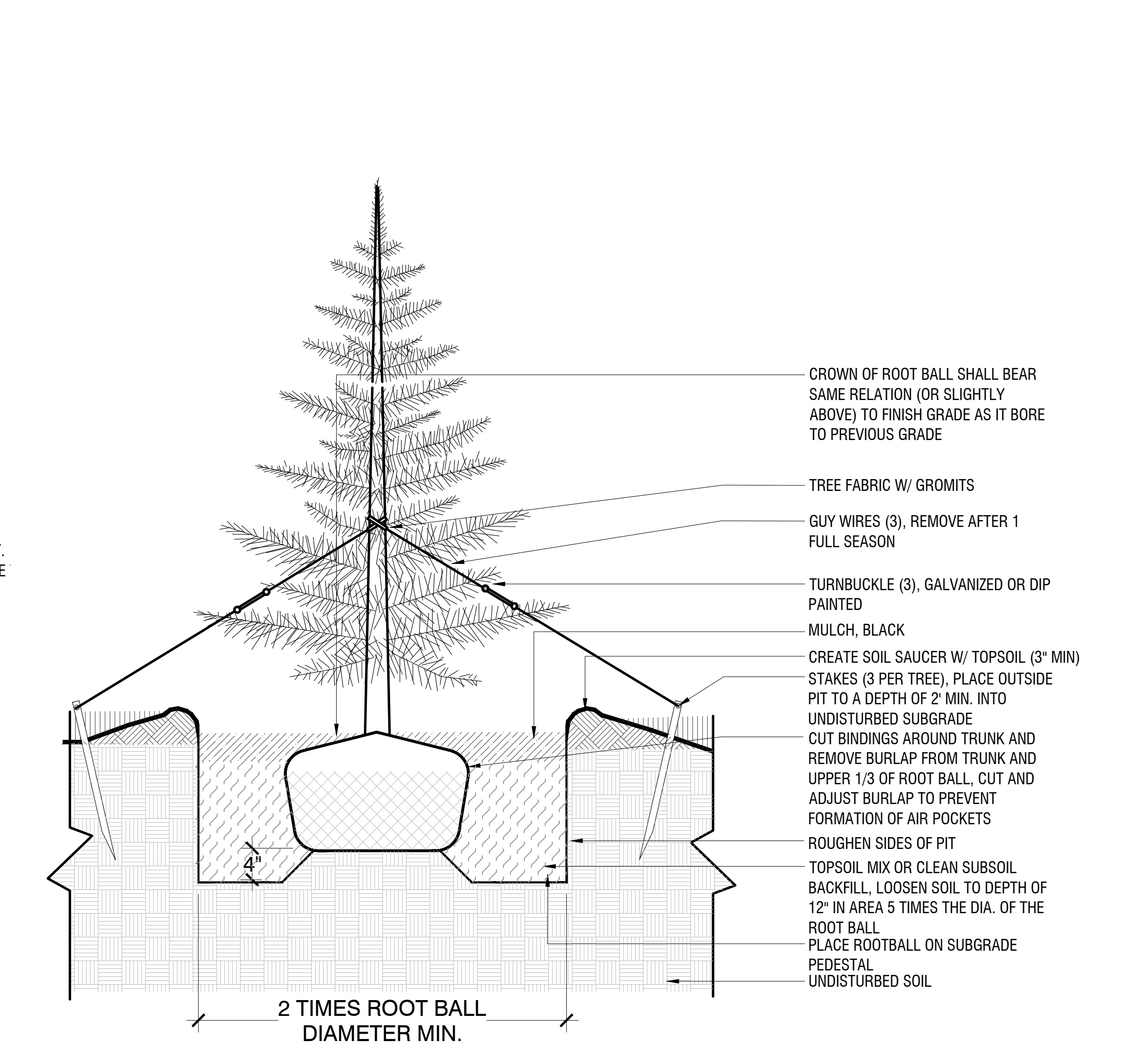
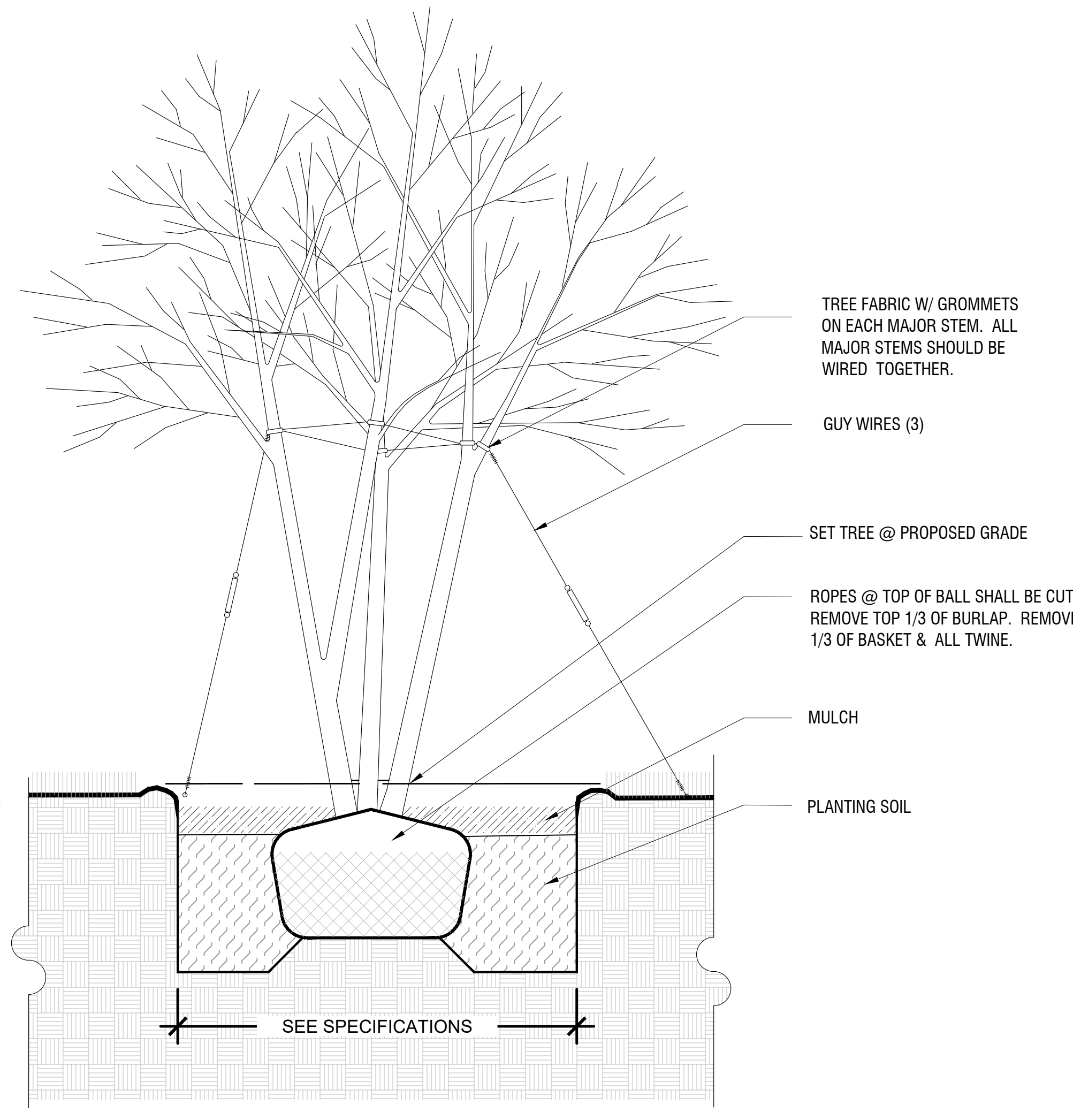
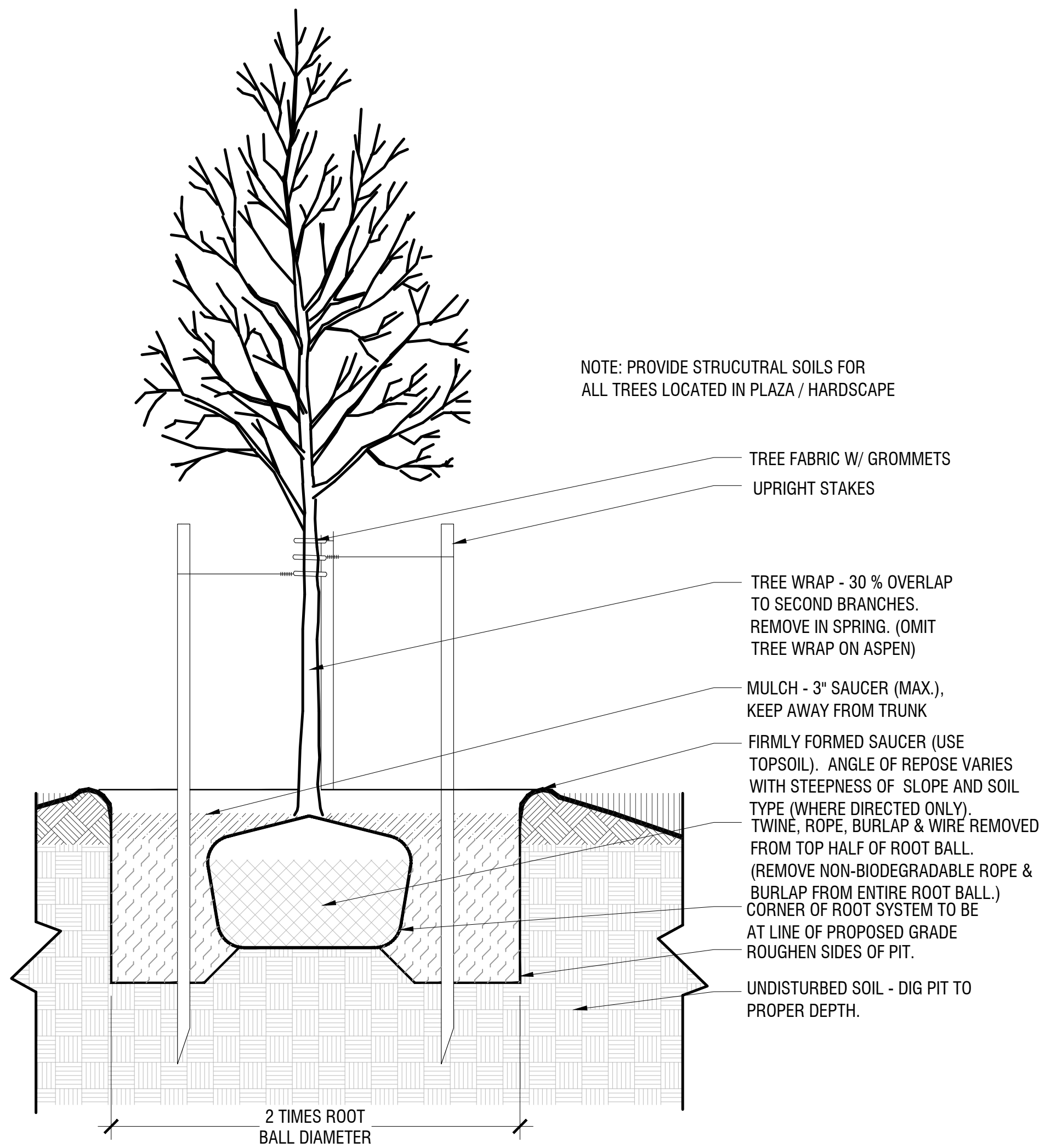
MAJOR SITE PLAN
JUNE 17, 2022

SHEET TITLE

SITE DETAILS

SHEET INFORMATION

L 3-00



1 DECIDUOUS TREE PLANTING
N.T.S.

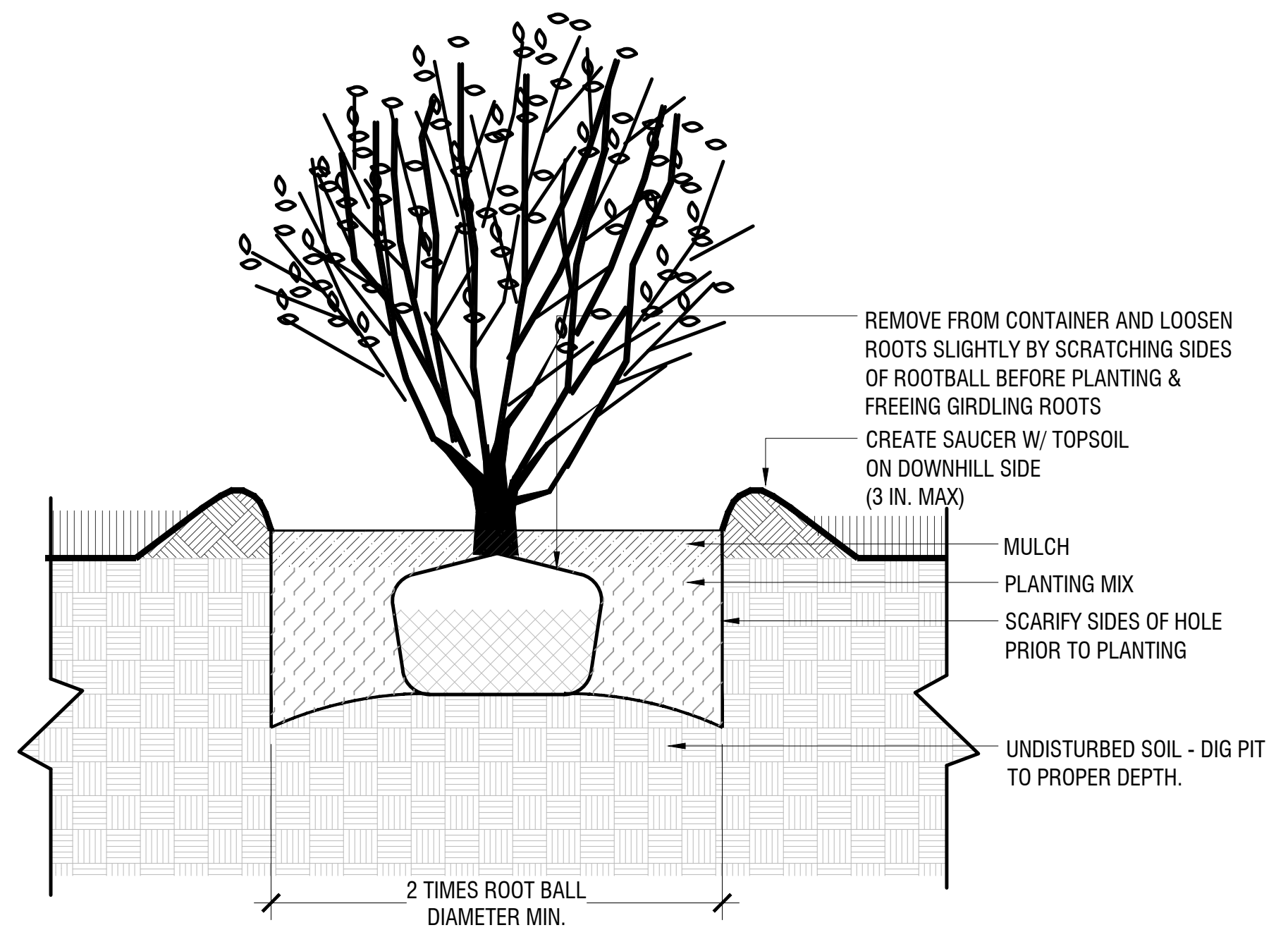
9.1

2 MULTI-STEM TREE PLANTING
N.T.S.

9.2

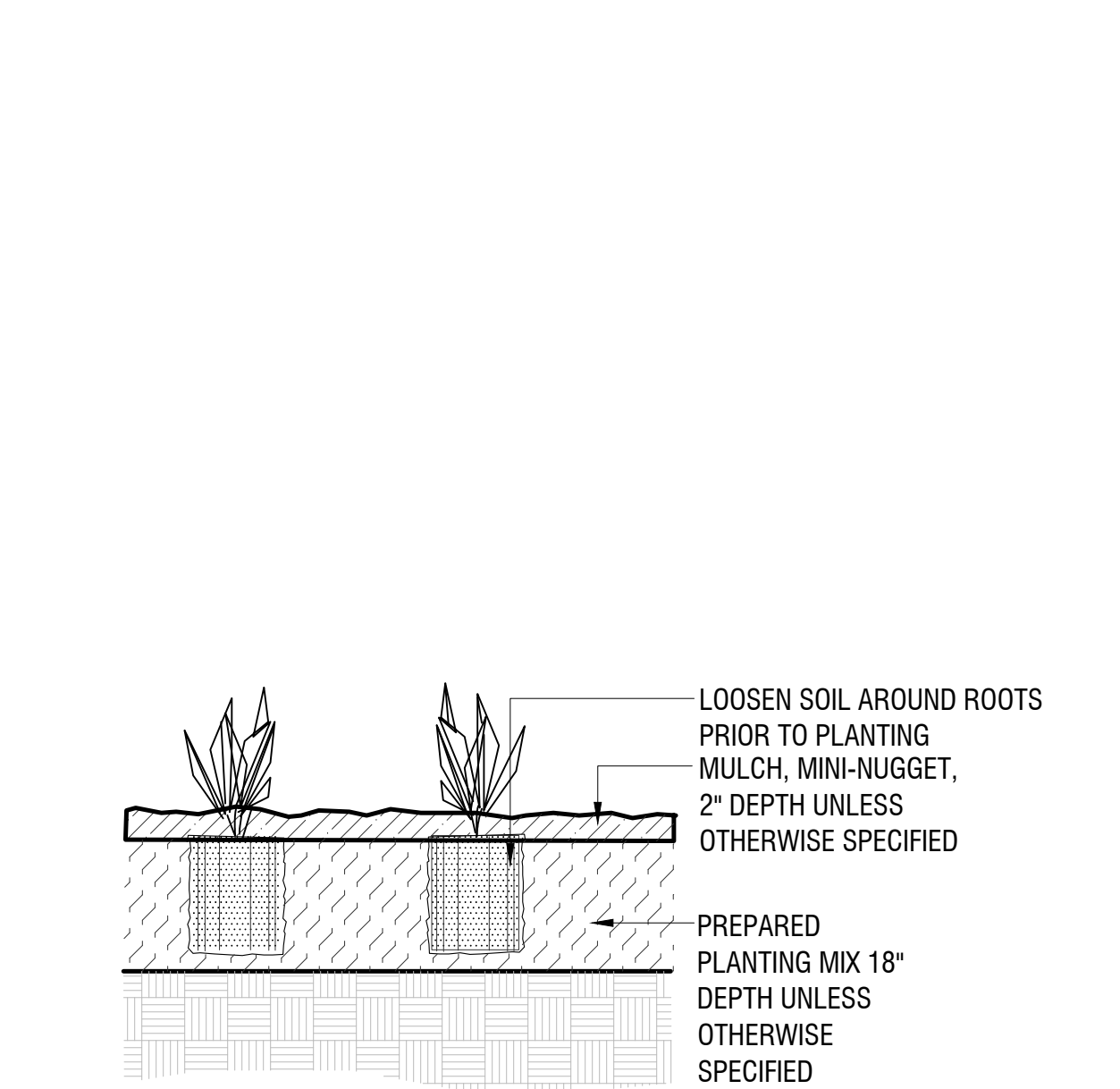
3 EVERGREEN TREE PLANTING
N.T.S.

9.3



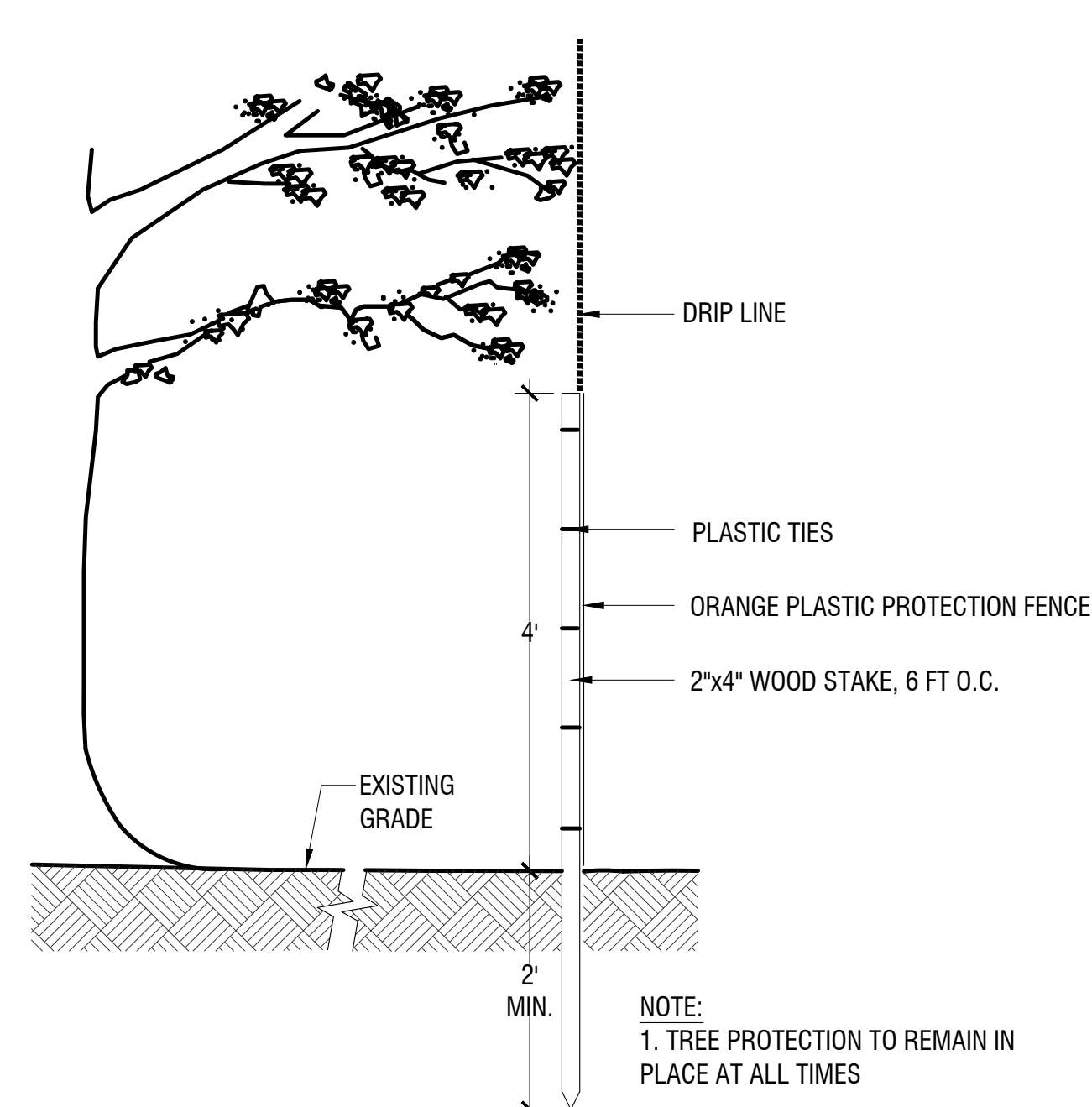
4 SHRUB PLANTING
1":1'-0"

9.4



5 PERENNIAL PLANTING
1":1'-0"

9.5



6 TREE PROTECTION
1":1'-0"

9.6

SITE KEYNOTES:

1.0	PAVEMENTS, RAMPS, CURBS	DETAIL / SHEET
1.1	ASPHALT PAVING - PEDESTRIAN	1/L3-00
1.2	CONCRETE PAVES	2/L3-00
1.3	STONEDUST PATH	3/L3-00
1.4	GRASS PAVERS	4/L3-01
2.0	JOINTING	
X.X	NOT USED AT THIS TIME	X/XX-XX
3.0	STEPS	
X.X	NOT USED AT THIS TIME	X/XX-XX
4.0	SITE WALLS/ EMBANKMENTS	
X.X	NOT USED AT THIS TIME	X/XX-XX
5.0	SITE FURNITURE	
5.1	STONE BENCH	5/L3-00
5.2	BIKE RACK	6/L3-00
6.0	RAILINGS, BARRIERS, FENCING	
X.X	NOT USED AT THIS TIME	X/XX-XX

7.0	SITE LIGHTING	DETAIL / SHEET
7.1	LIGHT POLE BASE	7/L3-00
8.0	DRAINAGE	
X.X	NOT USED AT THIS TIME	X/XX-XX
9.0	PLANTING AND LANDSCAPE	
9.1	DECIDUOUS TREE PLANTING	1/L3-01
9.2	MULTI-STEM TREE PLANTING	2/L3-01
9.3	EVERGREEN TREE PLANTING	3/L3-01
9.4	SHRUBS PLANTING	4/L3-01
9.5	PERENNIAL PLANTING	5/L3-01
9.6	TREE PROTECTION	6/L3-01
9.7	METAL EDGING	4/L3-00
10.0	MISCELLANEOUS ELEMENTS	

165 LAMBERT CO-OP
MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

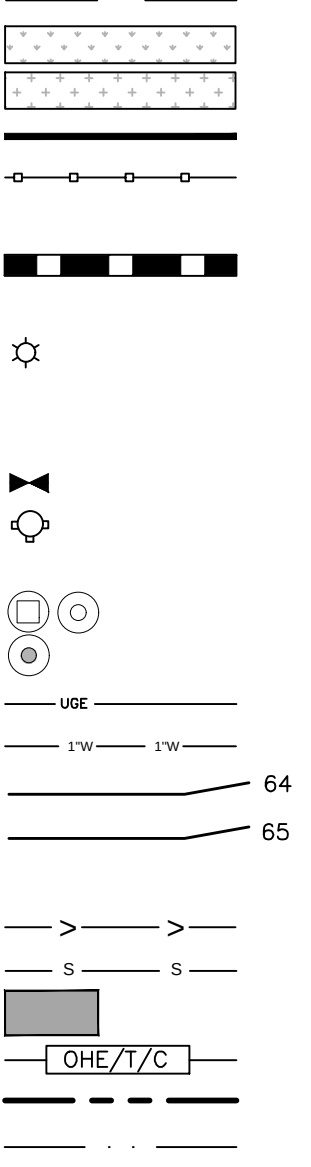
LEGEND

EXISTING

REFER TO THE
EXISTING
CONDITIONS PLAN
FOR ADDITIONAL
INFORMATION



PROPOSED



INDEX

- C-01 COVER SHEET & LEGEND
- C-02 GENERAL NOTES
- EX BOUNDARY AND TOPOGRAPHIC SURVEY BY
OWEN HASKELL, INC.
- C-03 OVERALL CONSTRUCTION MANAGEMENT &
EROSION CONTROL PLAN
- C-09 OVERALL SITE PLAN
- C-10 SITE PLAN - NORTH
- C-11 SITE PLAN - SOUTH
- C-20 UTILITY PLAN - NORTH
- C-21 UTILITY PLAN - SOUTH
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- C-31 GRADING & DRAINAGE PLAN - SOUTH
- C-32 GRADING & DRAINAGE PLAN - R.O.W 1
- C-33 GRADING & DRAINAGE PLAN - R.O.W 2
- C-34 GRADING & DRAINAGE PLAN - R.O.W 3
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- C-40 SITE DETAILS - 1
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- C-45 DRAINAGE DETAILS - 1
- C-46 DRAINAGE DETAILS - 2
- C-47 DRAINAGE DETAILS - 3
- C-48 EROSION & SEDIMENTATION CONTROL NOTES
- C-49 EROSION & SEDIMENTATION CONTROL DETAILS

UTILITIES

SEWER

DEPARTMENT OF PUBLIC WORKS (DPW)
250 CANCO ROAD
PORTLAND, MAINE 04101
CONTACT: KEITH GRAY, P.E.
(207) 874-8834



WATER

PORTLAND WATER DISTRICT
225 DOUGLASS STREET
PO BOX 3553
PORTLAND, MAINE 04104
ATTN: MEANS DIVISION
(207) 774-5961



ELECTRIC

CENTRAL MAINE POWER COMPANY (CMP)
162 CANCO ROAD
PORTLAND, MAINE 04103
CONTACT: JAMIE COUGH
(207) 828-2882



TELEPHONE

CONSOLIDATED COMMUNICATIONS
(FORMERLY FAIRPOINT)
45 FOREST AVENUE
PORTLAND, MAINE 04101
CONTACT: PAT MORRISON
(207) 745-9363



CABLE

SPECTRUM CABLE
118 JOHNSON ROAD
PORTLAND, MAINE, 04102
CONTACT: MARK PELLETIER
(877) 546-0962



DEVELOPER

MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE
CONTACT: MATTHEW PETERS
(207) 415-3870



ARCHITECT

KAPLAN THOMPSON ARCHITECTS
PORTLAND, MAINE
CONTACT: ADAM WALLACE, R.A.
(207) 210-8253



SURVEYOR

OWEN HASKELL, INC
FALMOUTH, MAINE
CONTACT: RANDY LOUBIER P.L.S.
(207) 774-0424



TRAFFIC ENGINEER

BARTON & LOGUIDICE
SCARBOROUGH, MAINE
CONTACT: JOHN Q. ADAMS P.T.O.E
(207) 331-6694



GEOTECHNICAL ENGINEER

SUMMIT GEOENGINEERING SERVICES
LEWISTON, MAINE
CONTACT: BILL PETERLEIN, P.E.
(207) 318-7761



PROJECT TEAM

CIVIL ENGINEER:

ACORN ENGINEERING, INC.
PORTLAND, MAINE
CONTACT: SAM LABEL, P.E.
(207) 775-2655



LANDSCAPE ARCHITECT

ACETO LANDSCAPE ARCHITECTURE
PORTLAND, MAINE
CONTACT: NICK ACETO, RLA
(207) 221-3390



TRANSPORTATION CONSULTANT

CUSHMAN TRANSPORTATION CONSULTING, LLC.
94 BECKETT STREET, 2ND FLOOR
PORTLAND, MAINE
CONTACT: SARAH CUSHMAN
(207) 200-1910



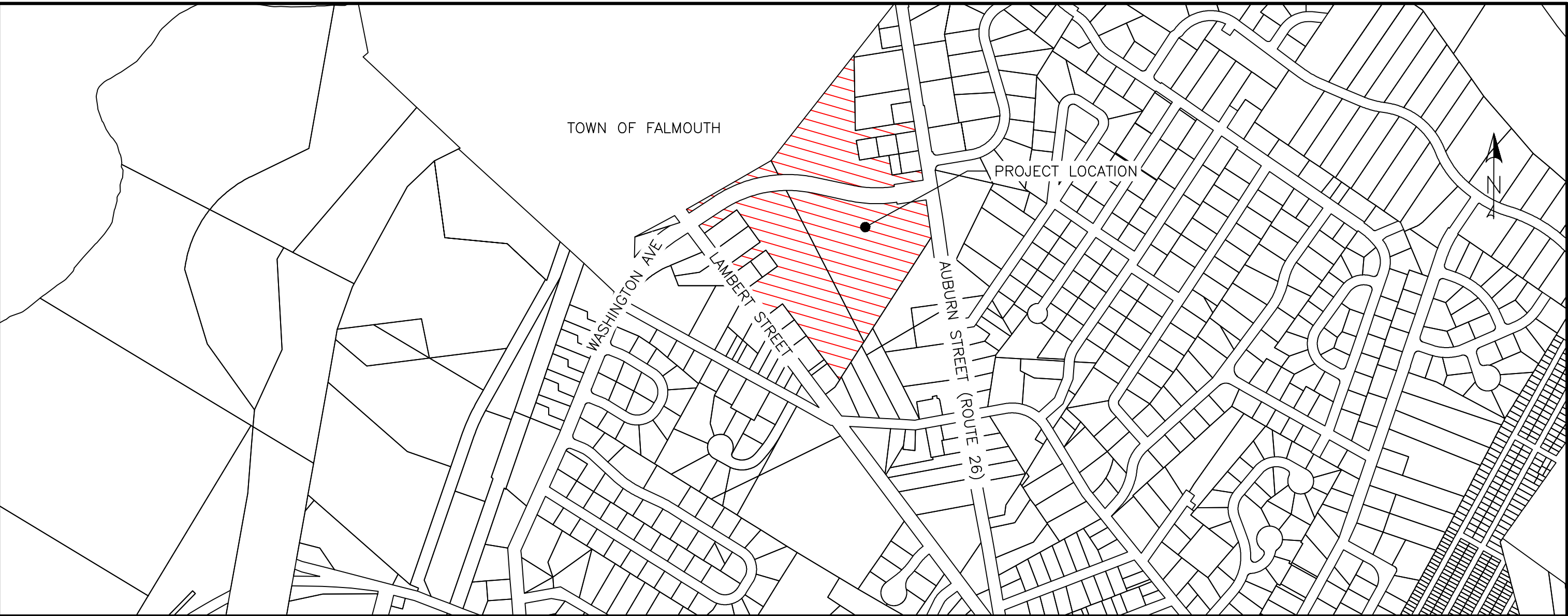
FORESTER

SOUTHERN MAINE FORESTRY SERVICES, INC.
PO BOX 910
WINDHAM, MAINE
CONTACT: RENE D. NOEL, JR. ACF
(207) 892-6562



ABBREVIATIONS

PARTIAL LIST OF ABBREVIATIONS AND THEIR CORRESPONDING MEANING. PLEASE CONTACT THE ENGINEER FOR ANY CLARIFICATION	
APPROX.	APPROXIMATE
BC	BOTTOM OF CURB
BMP	BEST MANAGEMENT PRACTICE
BOT.	BOTTOM
CB	CATCH BASIN
CF	CUBIC FOOT
CIP	CAST IN PLACE
CL	CENTERLINE
CM	CONSTRUCTION MANAGER
CMP	CENTRAL MAINE POWER
CONC.	CONCRETE
CPP	CORRUGATED PLASTIC PIPE
CY	CUBIC YARD
DI	DUCTILE IRON PIPE
DIA.	DIAMETER
DIM.	DIMENSION
EA.	EACH
ELEC.	ELECTRICAL
ELEV.	ELEVATION
EQUIV.	EQUIVALENT
EST.	ESTIMATE
EX.	EXISTING
FEE	FINISH FLOOR ELEVATION
FT.	FEET
HOPE	HIGH DENSITY POLY ETHYLENE
ID	INNER DIAMETER
IN.	INCH
INV.	INVERT
L	LENGTH
MAX.	MAXIMUM
MDEP	MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
MDOT	MAINE DEPARTMENT OF TRANSPORTATION
M.E.P	MECHANICAL, ELECTRICAL, PLUMBING DESIGNER
MFG.	MANUFACTURED
MH	MANHOLE
MIN.	MINIMUM
O.C.	ON CENTER
OD	OUTSIDE DIAMETER
OHE/T/C	OVERHEAD ELECTRIC/TELEPHONE/CABLE
PC	PRECAST
PE	PROFESSIONAL ENGINEER
PL	PROPERTY LINE
PLS	PROFESSIONAL LAND SURVEYOR
PROP.	PROPOSED
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
PWD	PORTLAND WATER DISTRICT
R	RADIUS
RD	ROOF DRAIN
RET.	RETAINING
ROW	RIGHT OF WAY
S	SLOPE
SD	STORM DRAIN
SDR	STANDARD DIMENSION RATIO
SF	SQUARE FEET
SMH	SEWER MANHOLE
SPEC.	SPECIFICATION
TC	TOP OF CURB
TW	TOP OF WALL
TYP.	TYPICAL
UD	UNDERDRAIN
UGE	UNDERGROUND ELECTRIC
VIF	VERIFY IN FIELD



VICINITY MAP

SCALE: 1:500

CALL BEFORE YOU DIG
1-888-DIG-SAFE
1-888-344-7233

PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR
SITE/SUB
COMMENT RESPONSE

BY
DATE
SIL
4/17/22
SIL
5/26/22

COVER SHEET & LEGEND

165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

DRAWING NAME:
PROJECT NAME/ADDRESS:
CLIENT/OWNER OF RECORD:
ENGINEERING, INC.

USE PLAN SHALL NOT BE REPRODUCED WITHOUT WRITTEN PERMISSION FROM ACORN ENGINEERING, INC. ANY ALTERATIONS, AUTHORIZED WITHOUT WRITTEN PERMISSION TO ACORN ENGINEERING, INC.

ACORN ENGINEERING, INC.
PO BOX 3372, PORTLAND, MAINE 04101
(207) 775-2655

FILE: 1145_CIVIL

JN: 1145

SCALE: AS NOTED

DESIGNED BY: SJL

DRAWN BY: NPH

CHECKED BY: WHS

STATE OF MAINE
SAMUEL J. LABEL
16596
LICENSED PROFESSIONAL ENGINEER

DRAWING NO.
C-01

1. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANIES AND DIG SAFE AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION FOR UTILITIES. OTHERWISE IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF UNDERGROUND UTILITIES AND LOCATE ANY POTENTIAL CONFLICTS WITH THE APPROVED PLANS PRIOR TO CONSTRUCTION.

- CIVIL SITE NOTES:

- SPECIAL INSPECTION NOTES

- 5.1. DUTIES AND RESPONSIBILITIES OF THE SPECIAL INSPECTOR SHALL BE TO OBSERVE AND/OR TEST THE WORK ASSIGNED AND OUTLINE ABOVE FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS, ALL DISCREPANCIES SHALL BE BROUGHT TO THE

5.2. THE SPECIAL INSPECTOR SHALL FURNISH REGULAR REPORTS TO THE BUILDING OFFICIAL, THE ARCHITECT AND ENGINEER OF RECORD, AND OTHER DESIGNATED PERSONS. PROGRESS REPORTS FOR CONTINUOUS INSPECTION SHALL BE FURNISHED WEEKLY. INDIVIDUAL REPORTS OF PERIODIC INSPECTIONS SHALL BE FURNISHED WITHIN ONE WEEK OF INSPECTION DATES. THE REPORTS SHALL NOTE UNCORRECTED DEFICIENCIES, AND NET CHANGES TO THE APPROVED CONSTRUCTION DOCUMENTS AUTHORIZED BY THE ENGINEER OF RECORD.

- LAYOUT NOTES:

1. MONUMENTS DELINEATING PROPERTY LINES OR RIGHT OF WAYS SHALL NOT BE DISTURBED DURING CONSTRUCTION OPERATIONS. IN THE CASE A MONUMENT IS DISTURBED, AT THE CONTRACTOR'S EXPENSE, THE MONUMENT SHALL BE RESET TO ITS ORIGINAL LOCATION AND ELEVATION BY A REGISTERED LAND SURVEYOR.
2. ALL DIMENSIONS ON THE FOLLOWING SHEETS TAKE PRECEDENT OVER SCALED DIMENSIONS. EACH DRAWING WITH A BAR SCALE MEANS THAT THE DRAWING/DETAIL HAS BEEN SCALED AS ACCURATELY AS POSSIBLE, AND THE BAR SCALE IS FOR GENERAL REFERENCE ONLY. IF NO BAR SCALE IS PRESENT, THEN THERE IS NO SCALE TO THAT DRAWING/DETAIL. AT NO TIME SHOULD DRAWINGS BE SCALED FROM. ANY DISCREPANCIES BETWEEN DRAWINGS, DETAILS, SPECIFICATIONS AND THE FIELD CONDITION SHALL BE IMMEDIATELY REPORTED TO ACORN FOR FURTHER DIRECTIONS BEFORE ANY ADDITIONAL WORK PROCEEDS.

- ## PERMITTING NOTES

- GRADING AND DRAINAGE NOTES:

9. NATIVE SOILS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LIMIT THE DISTURBANCE TO SUBGRADE SOILS. SHOULD THE SUBGRADE BECOME YIELDING OR DIFFICULT TO WORK, CONTACT ACORN. THE DISTURBED AREAS SHALL BE EXCAVATED AND BACKFILLED WITH COMPACTED SELECT FILL OR CRUSHED STONE AT NO ADDITIONAL EXPENSE TO THE OWNER.
10. ALL SUBGRADE PREPARATION IS SUBJECT TO THE RECOMMENDATIONS OF THE PROJECT GEOTECHNICAL ENGINEER, IF APPLICABLE.

1. DISTURBED AREAS ARE DEFINED AS THOSE SURFACES WHERE EXISTING VEGETATION OR STRUCTURES HAVE BEEN REMOVED, EXPOSING NATIVE SOIL TO THE ELEMENTS.
2. ALL ROUTINE WORK ACTIVITIES SHALL BE CONDUCTED IN SUCH A WAY TO LIMIT THE AMOUNT OF DISTURBED AREA AT ONE TIME TO THE EXTENT PRACTICABLE.
3. PRIOR TO THE START OF ANY CLEARING/LAND DISTURBING ACTIVITIES, THE CONTRACTOR SHALL INSTALL APPLICABLE EROSION CONTROL DEVICES SUCH AS PERIMETER SILT FENCE, AND OTHER APPLICABLE MEASURES. IN THE EVENT THE CONTRACTOR IS NOT SURE EROSION CONTROL MEASURES SHOULD BE IMPLEMENTED, THE CONTRACTOR SHALL CONTACT THE ENGINEER OF RECORD TO CONFIRM IMPLEMENTATION OF ANY EROSION CONTROL DEVICES.

7. REFER TO THE EROSION CONTROL DETAILS & NOTES FOR ADDITIONAL INFORMATION.

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND ELEVATION OF THE EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED UPON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO TEST PIT TO DETERMINE THE EXACT LOCATION AND ELEVATION OF UTILITIES TO COORDINATE WITH THE PROPOSED CONNECTIONS OR CROSSING. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO ACORN FOR FURTHER DIRECTIONS BEFORE ANY ADDITIONAL WORK PROCEEDS.

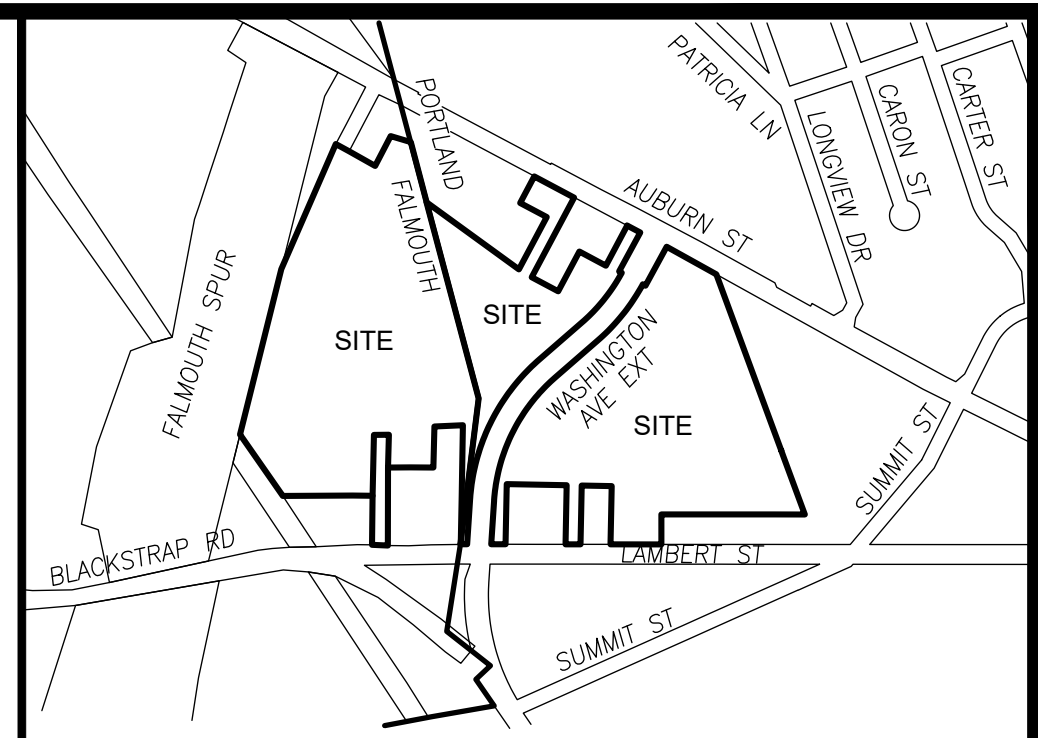
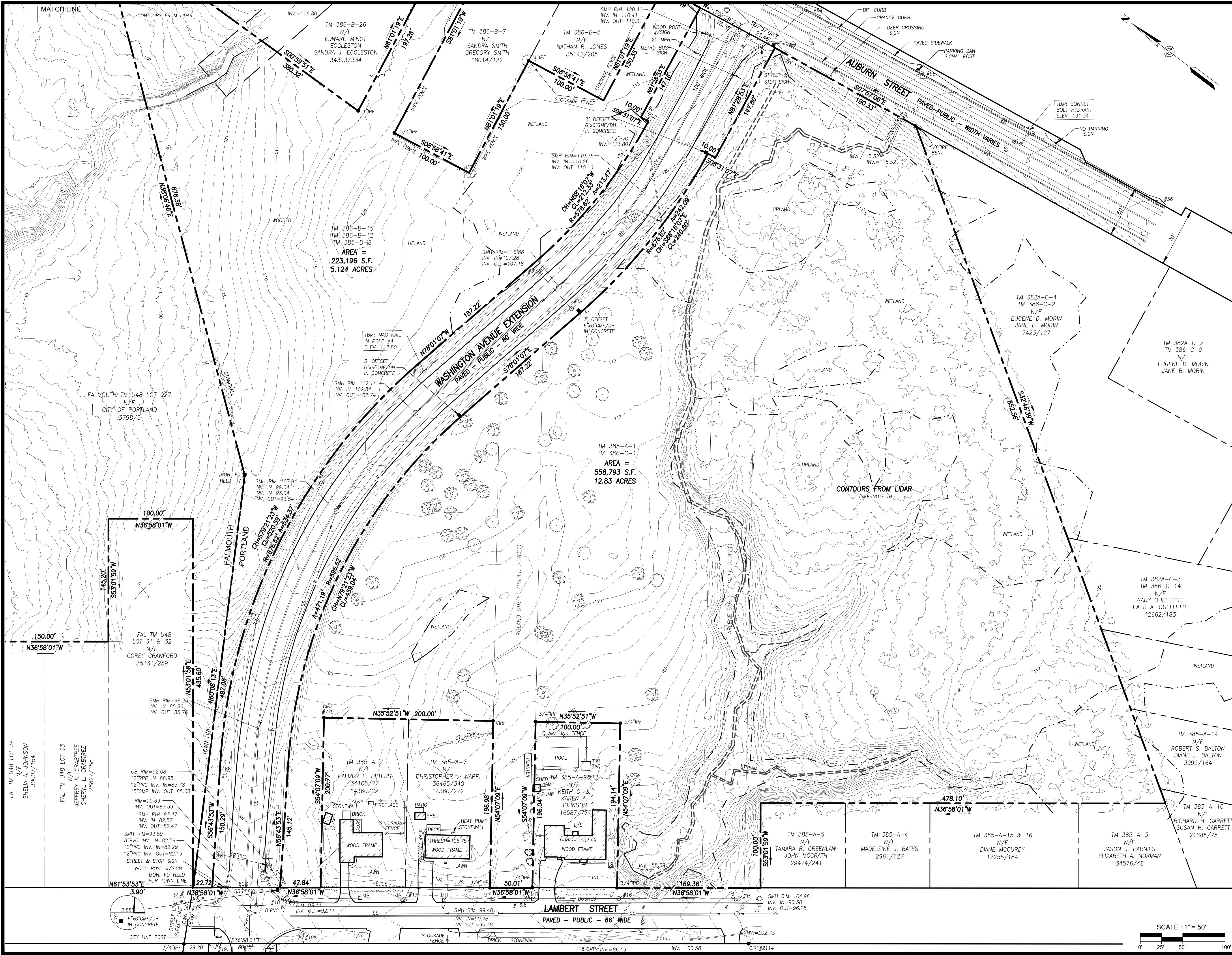
23. ALL ADJUSTMENTS TO FINISHED GRADE ARE TO BE COMPLETED BY THE CONTRACTOR. THE CONTRACTOR SHALL CONFIRM STRUCTURES THAT REQUIRE ADJUSTMENT WITH THE ENGINEER OR OWNERS REPRESENTATIVE PRIOR TO ADJUSTING FRAMES.

1. THE FOLLOWING ITEMS ARE TYPICAL OF MATERIAL WHICH MAY BE ON SITE:

- ROCK AND CONCRETE FOUNDATIONS
- CONCRETE SLABS
- BITUMINOUS ASPHALT PAVEMENT
- CONCRETE PADS AND BLOCKS
- FENCE POST AND FENCING
- UNDERGROUND UTILITY LINES
- ABOVE AND OR BELOW FUEL OIL AND PROPANE GAS TANKS
- STORM DRAIN PIPES AND APPURTENANCE STRUCTURES
- OTHER TRASH & MISCELLANEOUS SOLID WASTES

4. THE CLIENT HAS NOT REQUESTED NOR HAS ACORN COMPLETED A PHASE I - ENVIRONMENTAL SITE ASSESSMENT FOR THE PROPERTY.

STATE OF MAINE
SAMUEL J. LEBEL
16508
LICENSED
PROFESSIONAL ENGINEER
1/26/21



LEGEND	
● IRON PIPE OR ROD FOUND	— STONEWALL
○ MONUMENT FOUND	— CURB
○ CAPPED IRON ROD TO BE SET	— OVERHEAD WIRES
○ UTILITY POLE	— E UNDERGROUND POWER
○ MANHOLE	— W WATER LINE
○ ELECTRIC METER	— G GAS LINE
○ SIGN	— T TELEPHONE
○ MAILBOX	— SD STORM DRAIN
○ CATCH BASIN	— SS SANITARY SEWER
○ HYDRANT	— 100' 1" CONTOUR
○ WATER VALVE OR SHUTOFF	— WETLAND LINE
○ DECIDUOUS TREE	— IPF/IRF IRON PIPE OR ROD FOUND NOW OR FORMERLY
○ CONIFEROUS TREE	— 000/000 DEED BOOK / PAGE
○ BUSH / SHRUB	— L/S LANDSCAPED AREA
	— CONC. CONCRETE
	— GMF/DH GRANITE MONUMENT FOUND/DRILL HOLE

- ### PLAN REFERENCES
- "STREET ACCEPTANCE PLAN OF WASHINGTON AVENUE EXTENSION, PORTLAND, MAINE" DATED FEBRUARY 15, 2011 BY CITY OF PORTLAND, MAINE PUBLIC SERVICES DEPARTMENT, ENGINEERING DIVISION.
 - "PLAN OF LAND IN FALMOUTH AND PORTLAND FOR CITY OF PORTLAND" DATED 1/1/76, BY OWEN HASKELL, INC.
- ### GENERAL NOTES
- OWNER OF RECORD: CITY OF PORTLAND
C.C.R.D. 3702/236, 3795/236, 3798/6, 4550/327, 4593/154, 4599/266
 - BEARINGS ARE BASED ON MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83 PER PLAN REFERENCE 1.
 - ELEVATIONS ARE BASED ON NGVD 1929. BENCHMARK: USC&GS DISC G-163 ELEVATION=66.92
 - WETLANDS DELINEATED BY JONES ASSOCIATES AND FIELD LOCATED BY OWEN HASKELL, INC. EXCEPT FOR THE WETLANDS AND STREAM LOCATIONS SHOWN ON THE SOUTHERLY SIDE OF THE STREAM ON TM 385-A-1 & TM 386-C-1.
 - THE CONTOURS SOUTH OF THE WETLAND LINE ON PORTLAND TM 385-A-1 & TM 386-C-1 AND ALL OF FALMOUTH TM U48 LOT 27 SHOWN ON THIS SURVEY WERE GENERATED USING EXISTING LIDAR DATA COLLECTED IN 2015 AND DOWNLOADED FROM THE NOAA WEB SITE LOCATED AT <https://coast.noaa.gov/dataviewer/#/>
 - THE BOUNDARY SHOWN FOR FALMOUTH TM U48 LOT 27 IS BASED ON PLAN REFERENCE 2. PRIOR TO ANY DEVELOPMENT THESE BOUNDARIES SHOULD BE VERIFIED.

UTILITY NOTE

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEY HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. CALL 1-888-DIGSAFE AT LEAST THREE BUSINESS DAYS BEFORE PERFORMING ANY CONSTRUCTION. DUE TO OSHA CONFINED SPACE REQUIREMENTS, ALL INVERTS AND PIPE SIZES MUST BE VERIFIED PRIOR TO ANY CONSTRUCTION.

CERTIFICATE

OWEN HASKELL, INC. HEREBY CERTIFIES THAT THIS PLAN IS BASED ON, AND THE RESULT OF, AN ON THE GROUND FIELD SURVEY AND THAT TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF, IT CONFORMS TO THE BOARD OF LICENSURE FOR PROFESSIONAL LAND SURVEYORS CURRENT STANDARDS OF PRACTICE.

Randy R. Loubier
RANDY R. LOUBIER, PLS #2407

08/24/22
DATE

STATE OF MAINE
PROFESSIONAL LAND SURVEYOR
RANDY R. LOUBIER
2407

08/24/22
DATE

REV. 2 08-24-2022 ADD FALMOUTH PARCEL TM U48-02
REV. 1 12-16-2021 ADDED TM 386-B-12, TM 386-B-15 & TM 385-D-8

Boundary & Topographic Survey

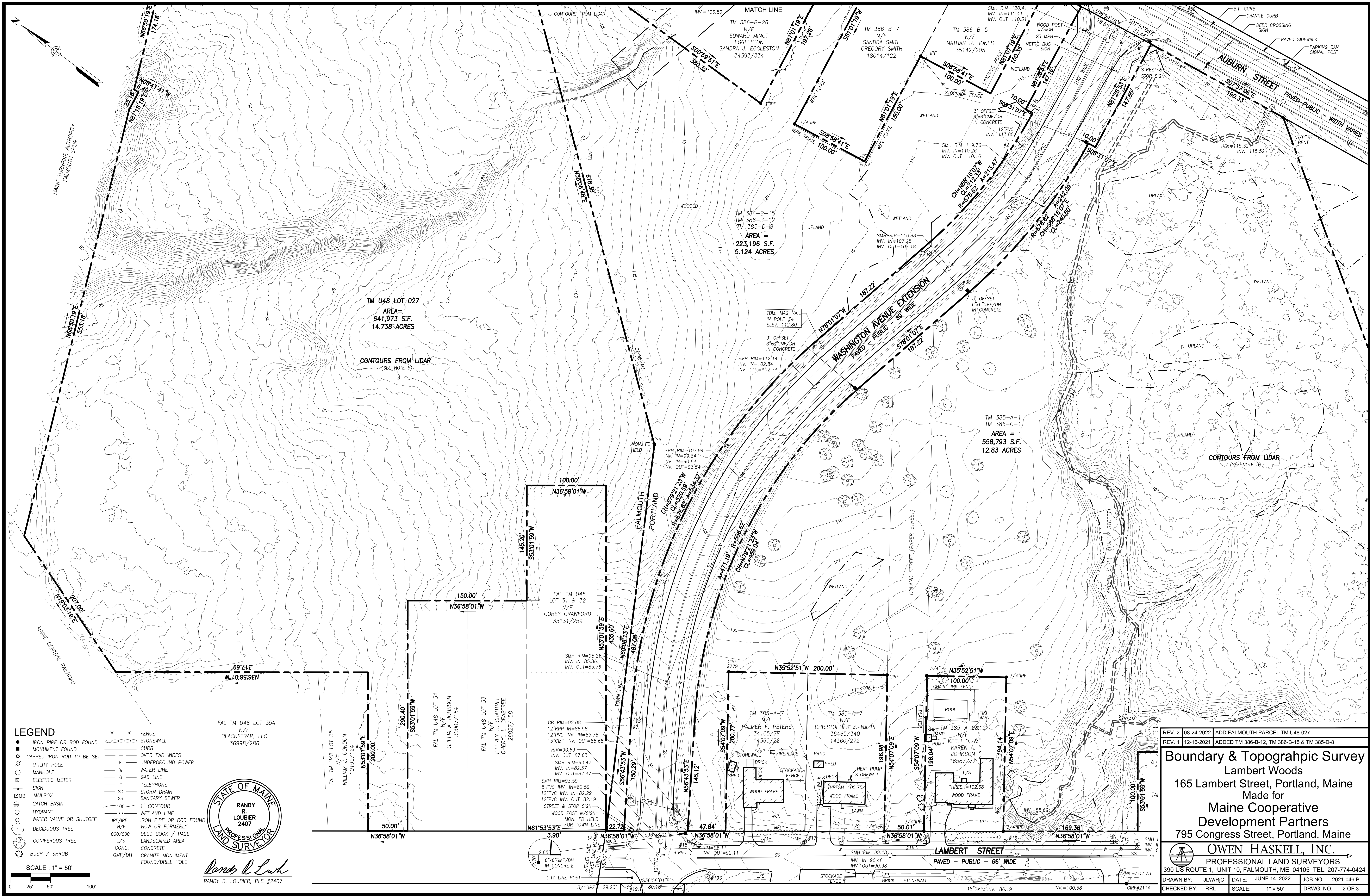
Lambert Woods
165 Lambert Street, Portland, Maine
Made for
Maine Cooperative
Development Partners
795 Congress Street, Portland, Maine

OWEN HASKELL, INC.
PROFESSIONAL LAND SURVEYORS
390 US ROUTE 1, UNIT 10, FALMOUTH, ME 04105 TEL 207-774-0424

DRAWN BY: JLW/RJC
CHECKED BY: RRL

DATE: JUNE 14, 2022
SCALE: 1" = 50'

JOB NO. 2021-046 P
DRWG. NO. 1 OF 3

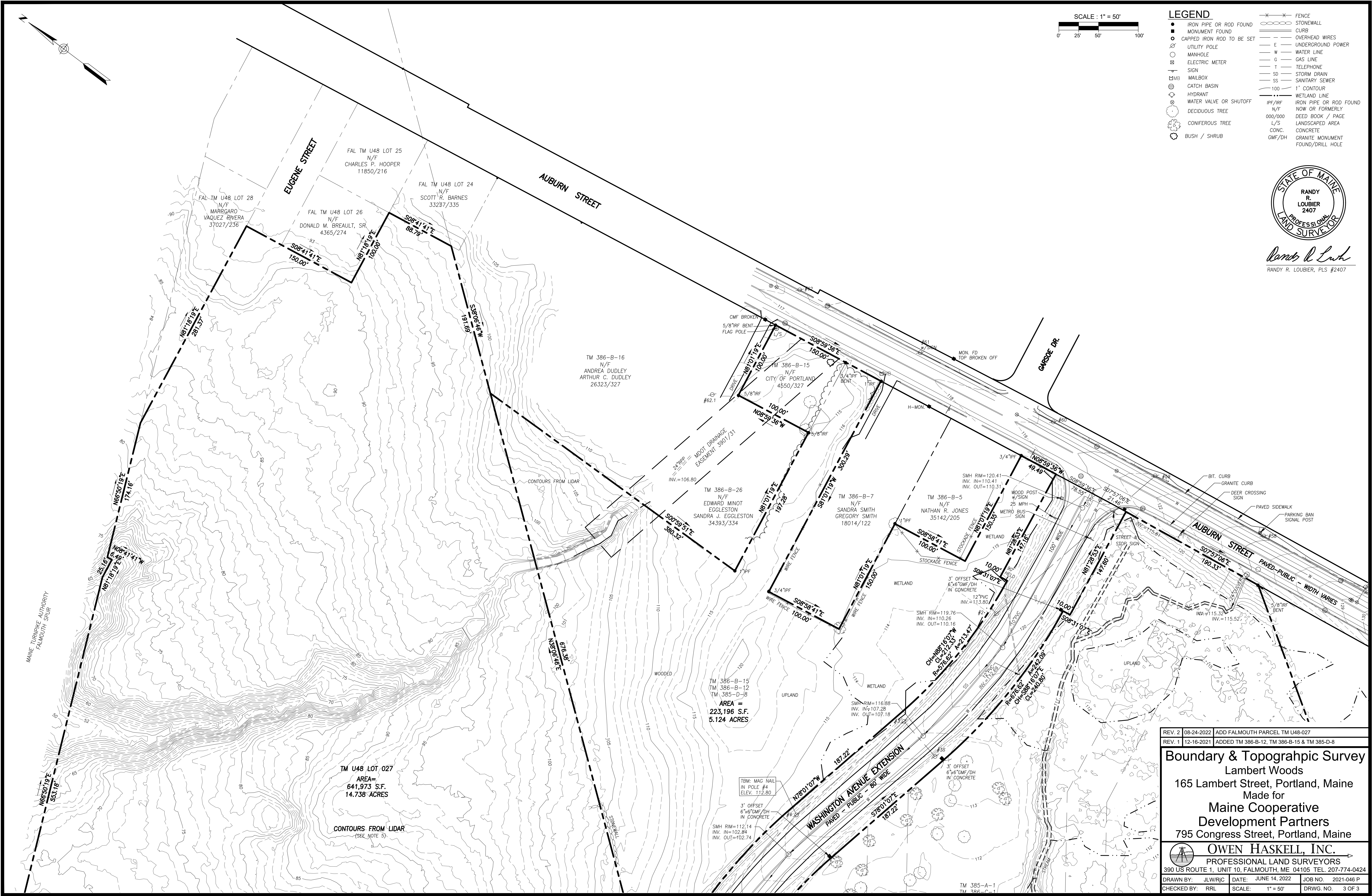


REV. 2	08-24-2022	ADD FALMOUTH PARCEL TM U48-027
REV. 1	12-16-2021	ADDED TM 386-B-12, TM 386-B-15 & TM 385-D-8

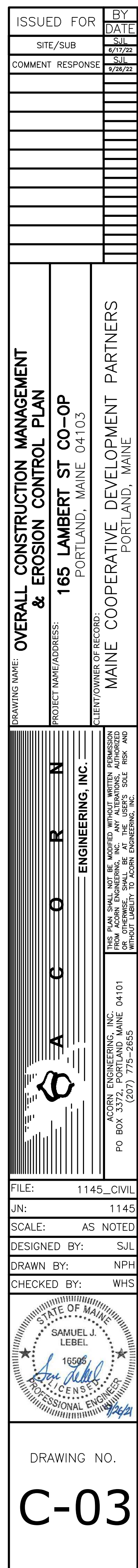
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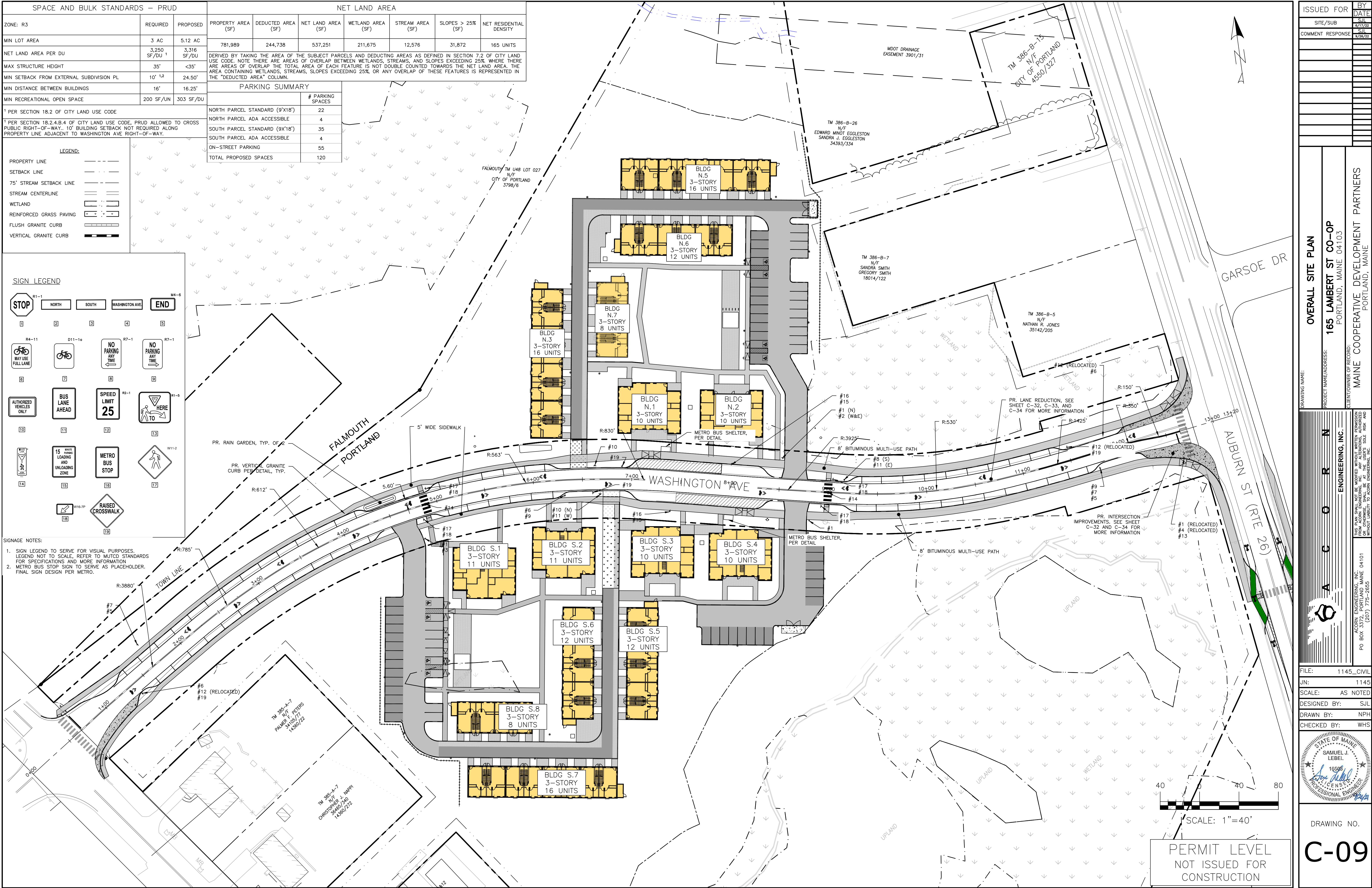
OWEN HASKELL, INC.
PROFESSIONAL LAND SURVEYORS
390 US ROUTE 1, UNIT 10, FALMOUTH, ME 04105 TEL. 207-774-0424

DRAWN BY:	JLW/RJC	DATE:	JUNE 14, 2022	JOB NO.	2021-046 P
CHECKED BY:	RRL	SCALE:	1" = 50'	DRWG. NO.	2 OF 3



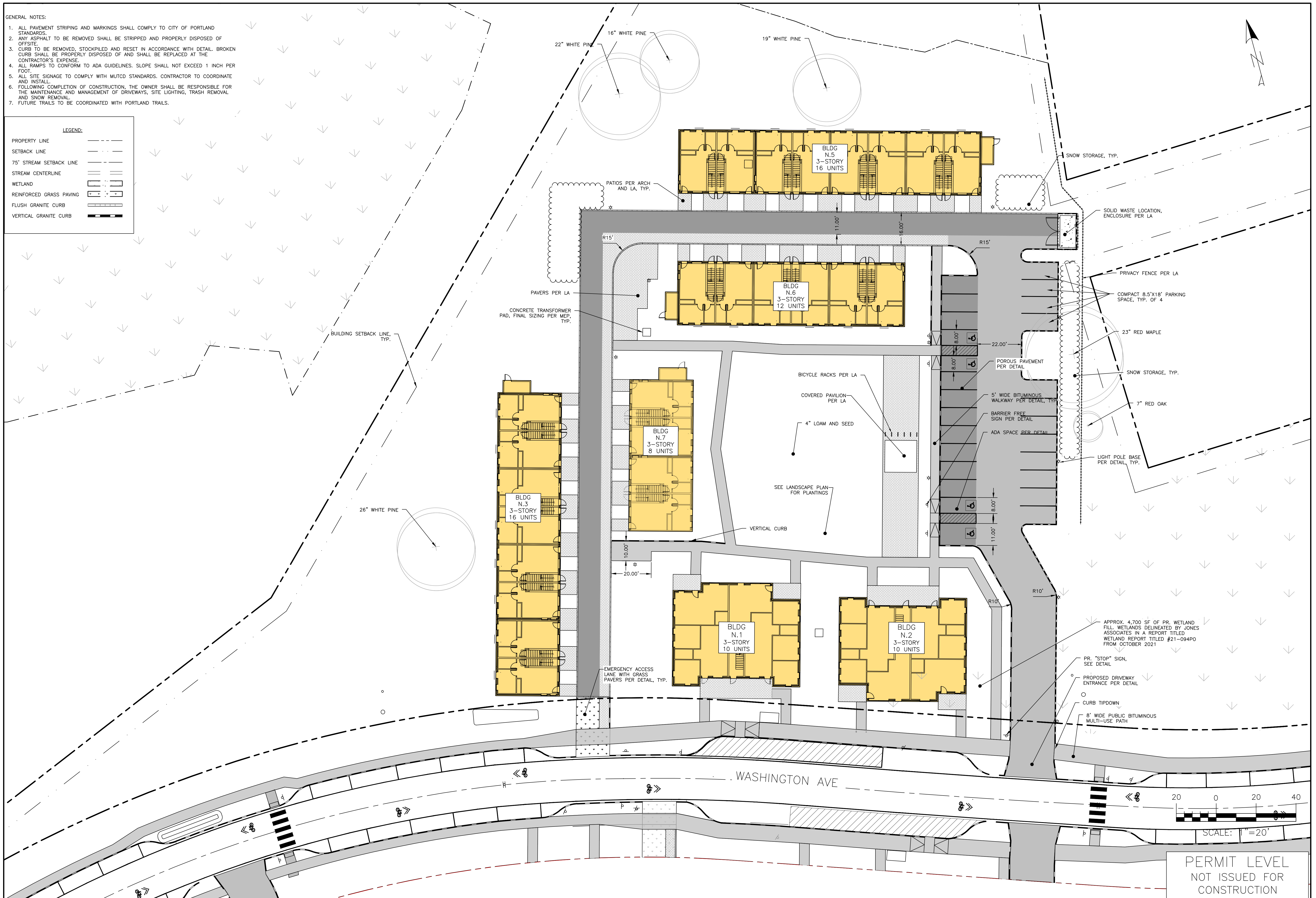
4. ALL DISPOSAL OF DEMOLITION DEBRIS OR WASTE SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE, & FEDERAL REGULATIONS. CONTRACTOR SHALL PROVIDE OWNER WITH APPROPRIATE "BILLS OF LADING" TO DEMONSTRATE PROPER DISPOSAL OF ALL MATERIALS.
5. SITE CLOSURE REQUESTED BY CONTRACTOR SHALL NOT OCCUR UNTIL PROPER ABATEMENT PROCEDURES HAVE OCCURRED. ABATEMENT, IF NECESSARY, SHALL NOT BE THE RESPONSIBILITY OF THE CONTRACTOR.
6. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANIES AND DIG SAFE AT LEAST 72 HOURS PRIOR TO EXISTING EXCAVATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ABATEMENT. THE CONTRACTOR SHALL BE RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF UNDERGROUND UTILITIES AND LOCATE POTENTIAL CONFLICT WITH THE APPROVED PLANS PRIOR TO CONSTRUCTION.
7. ALL CONSTRUCTION SIGNAGE IS TEMPORARY AND WILL BE REMOVED AT PROJECT COMPLETION. FINAL SIGNAGE WORDING AND PLACEMENT LOCATION WILL BE DETERMINED BY THE CITY.
8. SEDIMENT BARRIERS TO BE PLACED DIRECTLY ON THE FRONT AND SIDE PROPERTY LINES, DOWN GRADIENT OF THE PROPOSED PROJECT WORK PER DETAIL. FENCES ARE OFF-SET OF THE PROPERTY LINES AS SHOWN ON THE PLAN FOR CLAY CLOSURES.
9. CONTRACTOR SHALL PLACE CATCH BASIN INLET PROTECTION ON CATCH BASINS AND FIELD INLETS DOWN-GRADIENT OF ALL NON-STABILIZED SURFACES, PER DETAIL.
10. DEMOLITION PLAN IS NOT INCLUSIVE OF ALL EXISTING ITEMS TO BE REMOVED AS PART OF SITE CONSTRUCTION INCLUDING BUT NOT LIMITED TO LANDSCAPE, TREES, AND WORK WITHIN THE ROW, ETC. ALL DEMOLITION WORK SHALL BE IN ACCORDANCE WITH THE CITY OF PORTLAND REGULATIONS.
11. CONTRACTOR TO BE RESPONSIBLE FOR PROVIDING OFF-SITE PARKING TO EMPLOYEES; ON-SITE PARKING WILL NOT BE PROVIDED FOR QUANTITIES EXCEEDING 100 EMPLOYEES. CONTRACTOR TO OBTAIN APPROPRIATE PERMITS FROM THE CITY OF PORTLAND FOR CLOSING ANY ON-STREET PARKING SPACES DURING THE CONSTRUCTION PERIOD.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR SNOW REMOVAL ALONG CONSTRUCTION FENCE AND GATE.
13. CONTRACTOR TO SUBMIT A DOWATERING PLAN FOR REVIEW AND APPROVAL TO THE DEPARTMENT OF PUBLIC WORKS PRIOR TO CONSTRUCTION.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING PERMIT APPLICATION PROCESS, OR FOR ADVANCE ADVANCEMENT OF SITE WORK. CONTACT THE DEPARTMENT OF PUBLIC WORKS FOR ADDITIONAL INFORMATION AND CURRENT REGULATIONS.
15. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM THE FOLLOWING:
 - 11.1. ADVANCE REVIEW AND APPROVAL OF ALL SUMMARY FINDINGS FROM ANY INITIAL ENVIRONMENTAL DUE DILIGENCE ACTIVITIES COMPLETED AT THE SITE PERFORMED.
 - 12.1. DETERMINE WHAT, IF ANY, RECOGNIZED ENVIRONMENTAL CONDITIONS (ReCs) IDENTIFIED SUBSEQUENT TO ENVIRONMENTAL DUE DILIGENCE ACTIVITIES MAY AFFECT THE CONTRACTOR'S WORK.
 - 13.1. DETERMINE IF THE SITE IS/HAS BEEN IDENTIFIED AS A STATE &/OR FEDERAL HAZARDOUS SUBSTANCE SITE, OR STATE OR FEDERALLY REGULATED SUBSTANCE (SRS) RESPONSIBILITY OF THE CONTRACTOR TO COMMUNICATE AND COORDINATE WITH AN ENVIRONMENTAL PROFESSIONAL (EP) TO UNDERSTAND WHAT CONTAMINANTS &/OR HAZARDS HAVE BEEN IDENTIFIED FOR THE SITE AND HOW THEIR RESPECTIVE IMPACTS MAY AFFECT THE CONTRACTOR'S WORK. THE EP SHALL BE EMPLOYED BY THE CLIENT, SHOULD THE CLIENT REQUIRE ACONR'S EP SERVICES IT SHALL BE REQUESTED AND PAID FOR BY THE CLIENT.
 - 14.1. COMMUNICATE AND COORDINATE WITH AN EP TO REQUEST, REVIEW AND ADHERE TO RELEVANT DOCUMENTS PREPARED FOR THE SITE DESCRIBING BEST MANAGEMENT PRACTICES FOR IMPACTED OR POTENTIALLY IMPACTED MEDIA THAT MAY BE ENCOUNTERED AS PART OF THE CONTRACTOR'S WORK INCLUDING BUT NOT LIMITED TO THE SOIL MANAGEMENT PLAN (EMMP).
 - 15.1. ENSURE THE APPROPRIATE STATE &/OR FEDERAL REGULATORY AGENCY(IES) HAVE BEEN NOTIFIED OF THE CONTRACTOR'S PLANNED WORK ACTIVITIES.





1. ALL PAVEMENT STRIPING AND MARKINGS SHALL COMPLY TO CITY OF PORTLAND STANDARDS.
2. ANY ASPHALT TO BE REMOVED SHALL BE STRIPPED AND PROPERLY DISPOSED OF OFFSITE.
3. CURB TO BE REMOVED, STOCKPILED AND RESET IN ACCORDANCE WITH DETAIL. BROKEN CURB SHALL BE PROPERLY DISPOSED OF AND SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
4. ALL RAMPS TO CONFORM TO ADA GUIDELINES. SLOPE SHALL NOT EXCEED 1 INCH PER FOOT.
5. ALL SITE SIGNAGE TO COMPLY WITH MUTCD STANDARDS. CONTRACTOR TO COORDINATE AND INSTALL.
6. FOLLOWING COMPLETION OF CONSTRUCTION, THE OWNER SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND MANAGEMENT OF DRIVEWAYS, SITE LIGHTING, TRASH REMOVAL AND SNOW REMOVAL.
7. FUTURE TRAILS TO BE COORDINATED WITH PORTLAND TRAILS.

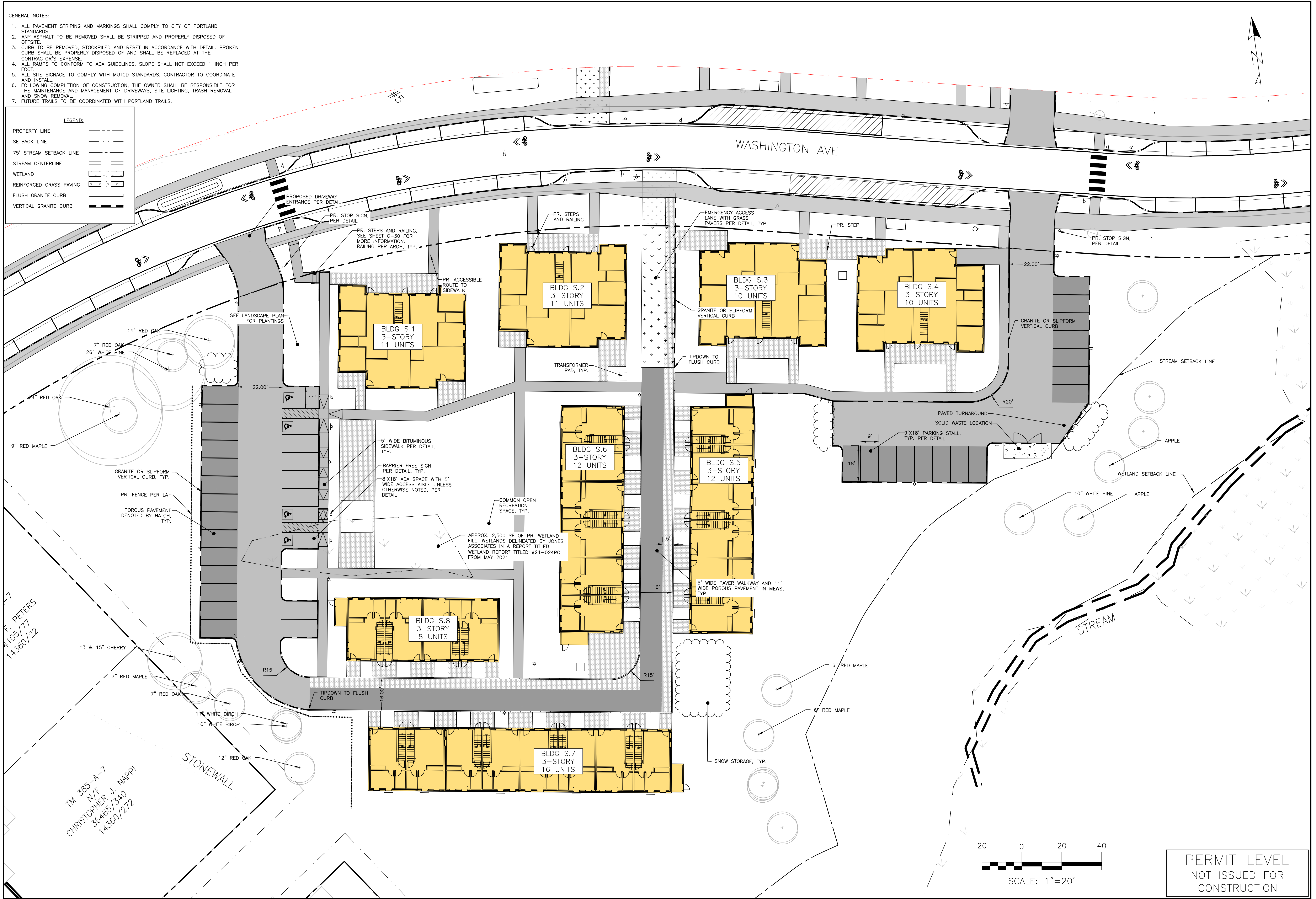
PROPERTY LINE	
SETBACK LINE	
75' STREAM SETBACK LINE	
STREAM CENTERLINE	
WETLAND	
REINFORCED GRASS PAVING	
FLUSH GRANITE CURB	
VERTICAL GRANITE CURB	

[illegible]

- GENERAL NOTES:
1. ALL PAVEMENT STRIPING AND MARKINGS SHALL COMPLY TO CITY OF PORTLAND STANDARDS.
 2. ANY ASPHALT TO BE REMOVED SHALL BE STRIPPED AND PROPERLY DISPOSED OF OFFSITE.
 3. CURB TO BE REMOVED, STOCKPILED AND RESET IN ACCORDANCE WITH DETAIL. BROKEN CURB SHALL BE PROPERLY DISPOSED OF AND SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
 4. ALL RAMPS TO CONFORM TO ADA GUIDELINES. SLOPE SHALL NOT EXCEED 1 INCH PER FOOT.
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LEGEND:

PROPERTY LINE	---
SETBACK LINE	- - -
75' STREAM SETBACK LINE	---
STREAM CENTERLINE	---
WETLAND	---
REINFORCED GRASS PAVING	---
FLUSH GRANITE CURB	---
VERTICAL GRANITE CURB	---



ISSUED FOR	BY
SITE/SUB	DATE
COMMENT RESPONSE	SJL
	12/28/22

DRAWING NAME:	PROJECT NAME/ADDRESS:	CLIENT/OWNER OF RECORD:	ENGINEERING, INC.	ACORN ENGINEERING, INC. PO BOX 3372, PORTLAND MAINE 04101 (207) 775-2655

FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS

STATE OF MAINE
SAMUEL J. LEBEL
16508
PROFESSIONAL ENGINEER

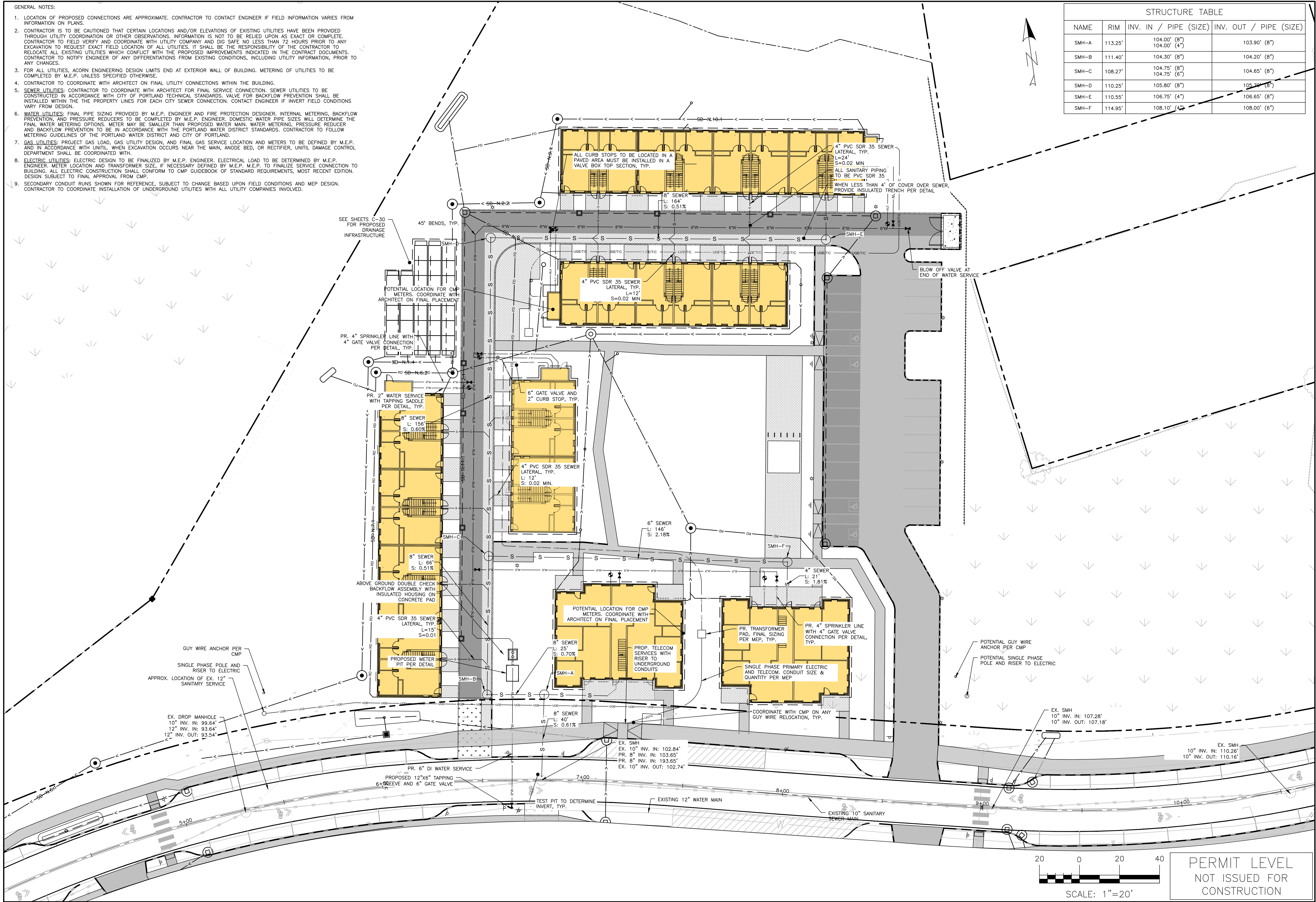
DRAWING NO.
C-11

GENERAL NOTES:

1. LOCATION OF PROPOSED CONNECTIONS ARE APPROXIMATE. CONTRACTOR TO CONTACT ENGINEER IF FIELD INFORMATION VARIES FROM INFORMATION ON PLANS.
2. CONTRACTOR IS TO BE CAUTIONED THAT CERTAIN LOCATIONS AND/OR ELEVATIONS OF EXISTING UTILITIES HAVE BEEN PROVIDED THROUGH UTILITY COORDINATION OR OTHER OBSERVATIONS. INFORMATION IS NOT TO BE RELIED UPON AS EXACT OR COMPLETE. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH UTILITY COMPANY AND DIG SAFE NO LESS THAN 72 HOURS PRIOR TO ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF ALL UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS INDICATED IN THE CONTRACT DOCUMENTS. CONTRACTOR TO NOTIFY ENGINEER OF ANY DIFFERENTIATIONS FROM EXISTING CONDITIONS, INCLUDING UTILITY INFORMATION, PRIOR TO ANY CHANGES.
3. FOR ALL UTILITIES, ACORN ENGINEERING DESIGN LIMITS END AT EXTERIOR WALL OF BUILDING. METERING OF UTILITIES TO BE COMPLETED BY M.E.P. UNLESS SPECIFIED OTHERWISE.
4. CONTRACTOR TO COORDINATE WITH ARCHITECT ON FINAL UTILITY CONNECTIONS WITHIN THE BUILDING.
5. SEWER UTILITIES: CONTRACTOR TO COORDINATE WITH ARCHITECT FOR FINAL SERVICE CONNECTION. SEWER UTILITIES TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF PORTLAND TECHNICAL STANDARDS. VALVE FOR BACKFLOW PREVENTION SHALL BE INSTALLED WITHIN THE PROPERTY LINES FOR EACH CITY SEWER CONNECTION. CONTACT ENGINEER IF INVERT FIELD CONDITIONS VARY FROM DESIGN.
6. WATER UTILITIES: FINAL PIPE SIZING PROVIDED BY M.E.P. ENGINEER AND FIRE PROTECTION DESIGNER. INTERNAL METERING, BACKFLOW PREVENTION, AND PRESSURE REDUCERS TO BE COMPLETED BY M.E.P. ENGINEER. DOMESTIC WATER PIPE SIZES WILL DETERMINE THE FINAL WATER METERING OPTIONS. METER MAY BE SMALLER THAN PROPOSED WATER MAIN. WATER METERING, PRESSURE REDUCER AND BACKFLOW PREVENTION TO BE IN ACCORDANCE WITH THE PORTLAND WATER DISTRICT STANDARDS. CONTRACTOR TO FOLLOW METERING GUIDELINES OF THE PORTLAND WATER DISTRICT AND CITY OF PORTLAND.
7. GAS UTILITIES: PROJECT GAS LOAD, GAS UTILITY DESIGN, AND FINAL GAS SERVICE LOCATION AND METERS TO BE DEFINED BY M.E.P. AND IN ACCORDANCE WITH UNTIL. WHEN EXCAVATION OCCURS NEAR THE MAIN, ANODE BED, OR RECTIFIER, UNTIL DAMAGE CONTROL DEPARTMENT SHALL BE COORDINATED WITH.
8. ELECTRIC UTILITIES: ELECTRIC DESIGN TO BE FINALIZED BY M.E.P. ENGINEER. ELECTRICAL LOAD TO BE DETERMINED BY M.E.P. ENGINEER. METER LOCATION AND TRANSFORMER SIZE, IF NECESSARY DEFINED BY M.E.P. M.E.P. TO FINALIZE SERVICE CONNECTION TO BUILDING. ALL ELECTRIC CONSTRUCTION SHALL CONFORM TO CMP GUIDEBOOK OF STANDARD REQUIREMENTS, MOST RECENT EDITION. DESIGN SUBJECT TO FINAL APPROVAL FROM CMP.
9. SECONDARY CONDUIT RUNS SHOWN FOR REFERENCE, SUBJECT TO CHANGE BASED UPON FIELD CONDITIONS AND MEP DESIGN. CONTRACTOR TO COORDINATE INSTALLATION OF UNDERGROUND UTILITIES WITH ALL UTILITY COMPANIES INVOLVED.

STRUCTURE TABLE

NAME	RIM	INV. IN / PIPE (SIZE)	INV. OUT / PIPE (SIZE)
SMH-A	113.25'	104.00' (8") 104.00' (4")	103.90' (8")
SMH-B	111.40'	104.30' (8")	104.20' (8")
SMH-C	108.27'	104.75' (8") 104.75' (6")	104.65' (8")
SMH-D	110.25'	105.80' (8")	105.70' (8")
SMH-E	110.55'	106.75' (4")	106.65' (8")
SMH-F	114.95'	108.10' (4")	108.00' (6")



ISSUED FOR

BY

DATE

SITE/SUB

COMMENT RESPONSE

DATE

UTILITY PLAN - NORTH

165 LAMBERT ST CO-OP

PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD

MAINE COOPERATIVE DEVELOPMENT PARTNERS

PORTLAND, MAINE

ACORN ENGINEERING, INC.

ENGINEERING, INC.

PO BOX 3372, PORTLAND MAINE 04101

(207) 775-2655

FILE:

1145_CIVIL

JN:

1145

SCALE:

AS NOTED

DESIGNED BY:

SUL

DRAWN BY:

NPH

CHECKED BY:

WHS

STATE OF MAINE

SAMUEL J. LEBEL

16508

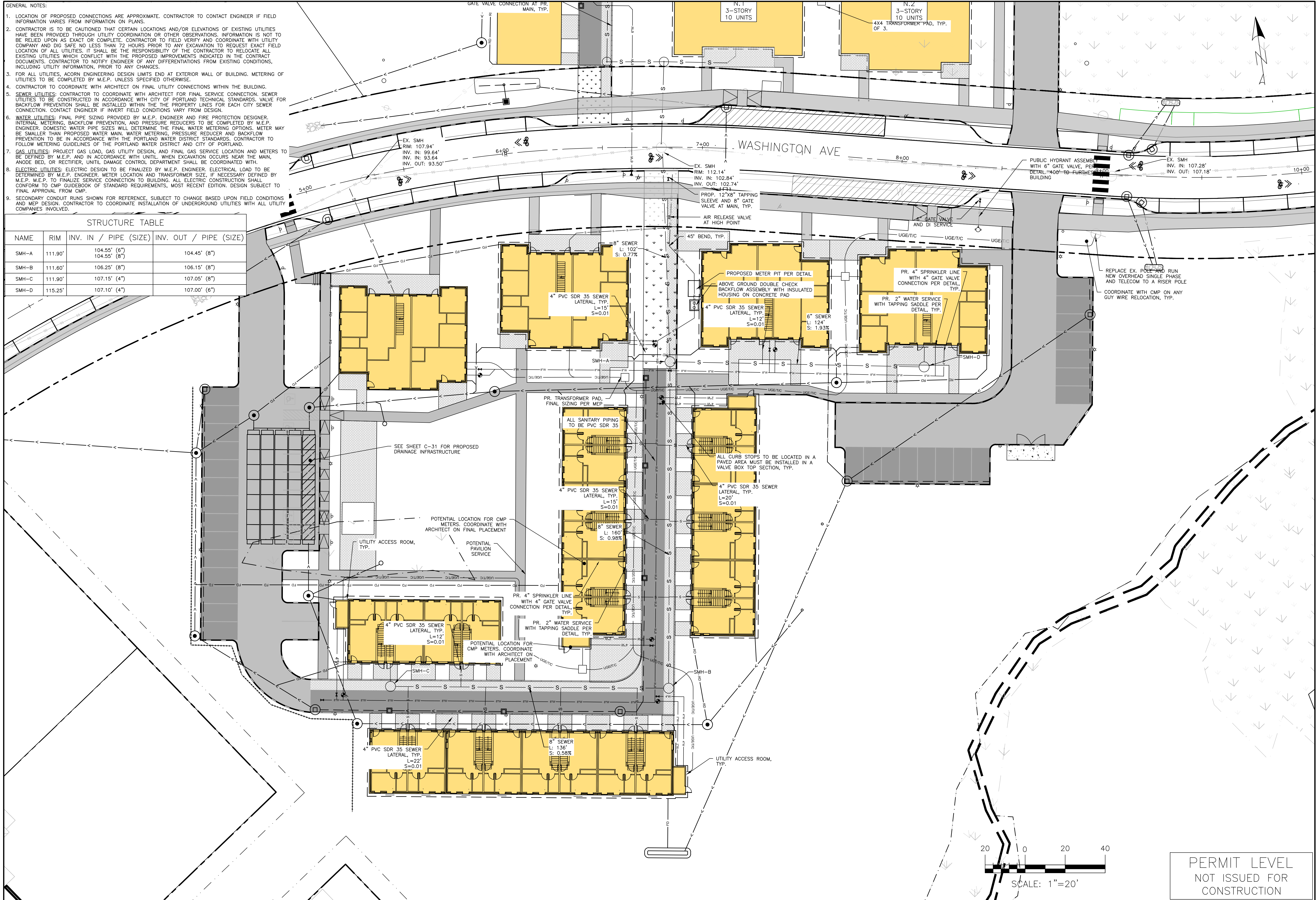
PROFESSIONAL ENGINEER

DRAWING NO.

C-20

1. LOCATION OF PROPOSED CONNECTIONS ARE APPROXIMATE. CONTRACTOR TO CONTACT ENGINEER IF FIELD INFORMATION VARIES FROM INFORMATION ON PLANS.
2. CONTRACTOR IS TO BE CAUTIONED THAT CERTAIN LOCATIONS AND/OR ELEVATIONS OF EXISTING UTILITIES HAVE BEEN PROVIDED THROUGH UTILITY COORDINATION OR OTHER SOURCES. INFORMATION IS NOT TO BE USED FOR CONSTRUCTION OR FOR COMPLIANCE. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH UTILITY COMPANY AND DIG SAFE NO LESS THAN 72 HOURS PRIOR TO ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF ALL UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL UTILITIES TO THE PROPOSED LOCATIONS. ANY CHANGES MUST BE INDICATED IN THE CONTRACT DOCUMENTS. CONTRACTOR TO NOTIFY ENGINEER OF ANY DIFFERENTIATIONS FROM EXISTING CONDITIONS, INCLUDING UTILITY INFORMATION, PRIOR TO ANY CHANGES.
3. UTILITIES TO BE FIELD VERIFIED BY M.E.P. ENGINEER, UNLESS OTHERWISE SPECIFIED.
4. CONTRACTOR TO COORDINATE WITH ARCHITECT ON FINAL UTILITY CONNECTIONS WITHIN THE BUILDING.
5. SEWER UTILITIES: CONTRACTOR TO COORDINATE WITH ARCHITECT FOR FINAL SERVICE CONNECTION. SEWER UTILITIES TO BE CONSTRUCTED IN ACCORDANCE WITH CITY OF PORTLAND TECHNICAL STANDARDS. VALVE FOR BACKFLOW PREVENTION SHALL BE INSTALLED WITHIN THE PROPERTY LINES FOR EACH CITY SEWER CONNECTION. CONTRACTOR TO FIELD VERIFY ALL SEWER CONNECTIONS.
6. WATER UTILITIES: FINAL PIPE SIZING PROVIDED BY M.E.P. ENGINEER AND FIRE PROTECTION DESIGNER. INTERNAL METERING, BACKFLOW PREVENTION, AND PRESSURE REDUCERS TO BE COMPLETED BY M.E.P. ENGINEER. DOMESTIC WATER PIPE SIZES WILL DETERMINE THE FINAL WATER METERING OPTIONS. METER SHALL BE SMALLER THAN OR EQUAL TO THAT SPECIFIED BY METER MANUFACTURER. CONTRACTOR TO FOLLOW PREVENTION TO BE IN ACCORDANCE WITH THE PORTLAND WATER DISTRICT STANDARDS. CONTRACTOR TO FOLLOW METERING GUIDELINES OF THE PORTLAND WATER DISTRICT AND CITY OF PORTLAND.
7. GAS UTILITIES: PROJECT GAS LOAD, GAS UTILITY DESIGN, AND FINAL GAS SERVICE LOCATION AND METERS TO BE DETERMINED BY M.E.P. ENGINEER. GAS UTILITY DESIGN TO BUILDING, ELECTRICAL CONSTRUCTION, MAIN, ANODE BED, OR RECTIFIER, UNTIL DAMAGE CONTROL DEPARTMENT SHALL BE COORDINATED WITH.
8. ELECTRIC UTILITIES: ELECTRIC DESIGN TO BE FINALIZED BY M.E.P. ENGINEER. ELECTRICAL LOAD TO BE DETERMINED BY M.E.P. ENGINEER. METER LOCATION AND TRANSFORMER SIZE, IF NECESSARY DEFINED BY M.E.P. ENGINEER. TO FIELD VERIFY ALL ELECTRICAL CONNECTIONS. CONTRACTOR TO CONFORM TO CMP GUIDEBOOK OF STANDARD REQUIREMENTS, MOST RECENT EDITION. DESIGN SUBJECT TO FINAL APPROVAL FROM CMP.
9. SECONDARY CONDUIT RUNS SHOWN FOR REFERENCE. SUBJECT TO CHANGE BASED UPON FIELD CONDITIONS.
10. CONTRACTOR TO COORDINATE INSTALLATION UNDERGROUND UTILITIES WITH ALL UTILITY COMPANIES INVOLVED.

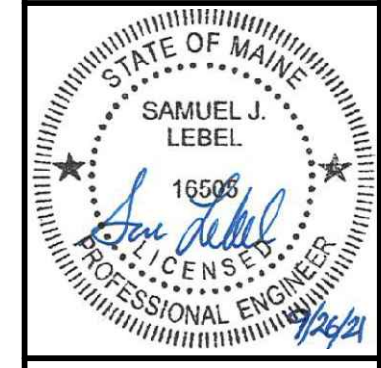
NAME	RIM	INV. IN / PIPE (SIZE)	INV. OUT / PIPE (SIZE)
SMH-A	111.90'	104.55' (6") 104.55' (8")	104.45' (8")
SMH-B	111.60'	106.25' (8")	106.15' (8")
SMH-C	111.90'	107.15' (4")	107.05' (8")
SMH-D	115.25'	107.10' (4")	107.00' (6")

[illegible]

DRAWING NAME:	UTILITY PLAN – SOUTH
PROJECT NAME/ADDRESS:	165 LAMBERT ST CO-OP PORTLAND, MAINE 04103
CLIENT/OWNER OF RECORD:	MAINE COOPERATIVE DEVELOPMENT PARTNERS PORTLAND, MAINE

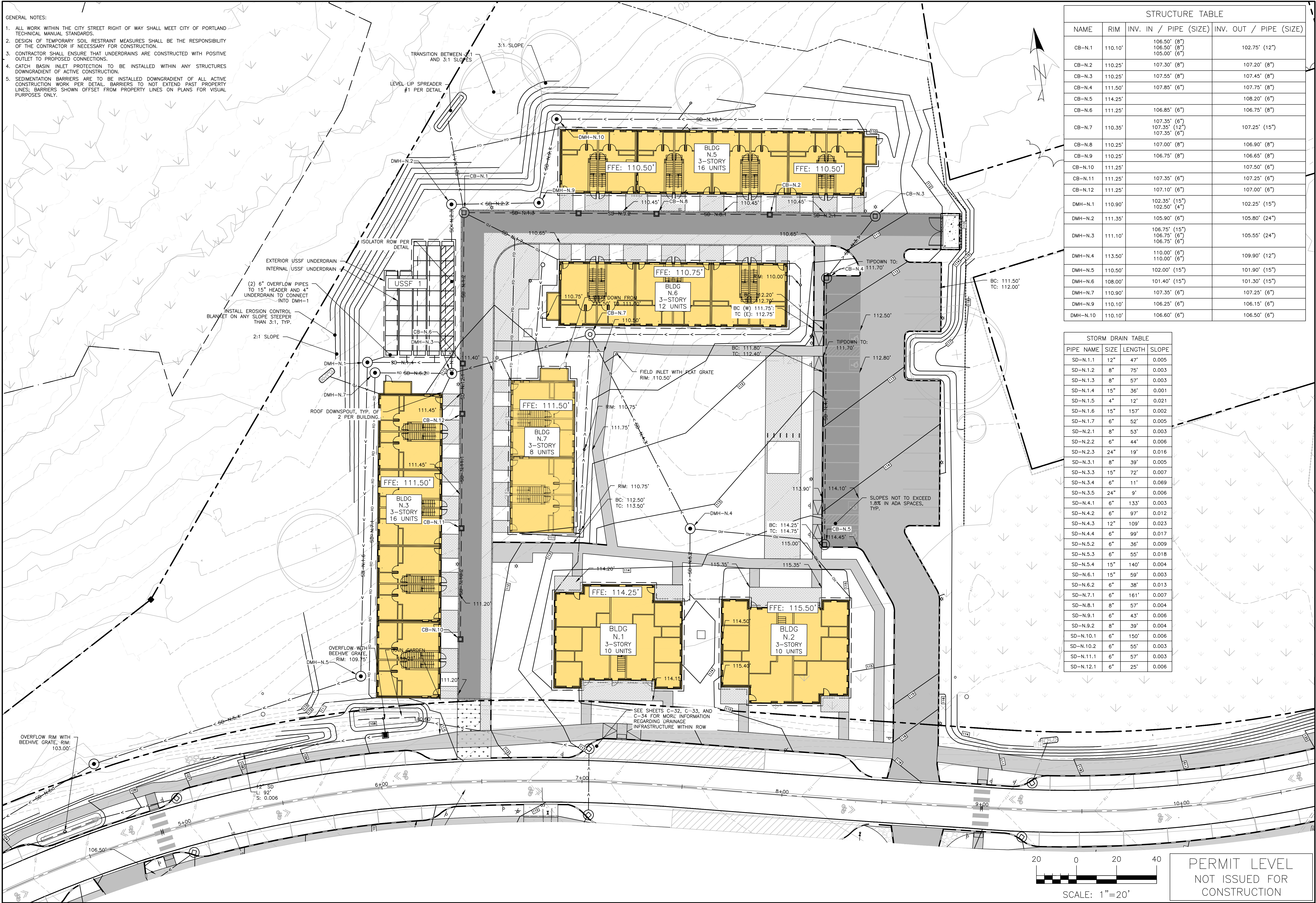

ACCOR ENGINEERING, INC.
 PO BOX 3372, PORTLAND, MAINE 04101
 (207) 775-2655
 THE PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM ACCOR ENGINEERING, INC. ANY ALTERATIONS AUTHORIZED BY ACCOR ENGINEERING, INC. SHALL BE SHOWN ON THE PLAN WITHOUT LIABILITY TO ACCOR ENGINEERING, INC.

FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS



DRAWING NO.

C-21



- GENERAL NOTES:
1. ALL WORK WITHIN THE CITY STREET RIGHT OF WAY SHALL MEET CITY OF PORTLAND TECHNICAL MANUAL STANDARDS.
 2. DESIGN OF TEMPORARY SOIL RESTRAINT MEASURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR IF NECESSARY FOR CONSTRUCTION.
 3. CONTRACTOR SHALL ENSURE THAT UNDERDRAINS ARE CONSTRUCTED WITH POSITIVE OUTLET TO PROPOSED CONNECTIONS.
 4. CATCH BASIN INLET PROTECTION TO BE INSTALLED WITHIN ANY STRUCTURES DOWNGRADIENT OF ACTIVE CONSTRUCTION.
 5. SEDIMENTATION BARRIERS ARE TO BE INSTALLED DOWNGRADIENT OF ALL ACTIVE CONSTRUCTION WORK PER DETAIL. BARRIERS TO NOT EXTEND PAST PROPERTY LINES; BARRIERS SHOWN OFFSET FROM PROPERTY LINES ON PLANS FOR VISUAL PURPOSES ONLY.

STRUCTURE TABLE			
NAME	RIM	INV. IN / PIPE (SIZE)	INV. OUT / PIPE (SIZE)
CB-N.1	110.10'	106.50' (8") 106.50' (8") 105.00' (6")	102.75' (12")
CB-N.2	110.25'	107.30' (8")	107.20' (8")
CB-N.3	110.25'	107.55' (8")	107.45' (8")
CB-N.4	111.50'	107.85' (6")	107.75' (8")
CB-N.5	114.25'		108.20' (6")
CB-N.6	111.25'	106.85' (6")	106.75' (8")
CB-N.7	110.35'	107.35' (6") 107.35' (12") 107.35' (6")	107.25' (15")
CB-N.8	110.25'	107.00' (8")	106.90' (8")
CB-N.9	110.25'	106.75' (8")	106.65' (8")
CB-N.10	111.25'		107.50' (6")
CB-N.11	111.25'	107.35' (6")	107.25' (6")
CB-N.12	111.25'	107.10' (6")	107.00' (6")
DMH-N.1	110.90'	102.35' (15") 102.50' (4")	102.25' (15")
DMH-N.2	111.35'	105.90' (6")	105.80' (24")
DMH-N.3	111.10'	106.75' (15") 106.75' (6") 106.75' (6")	105.55' (24")
DMH-N.4	113.50'	110.00' (6") 110.00' (6")	109.90' (12")
DMH-N.5	110.50'	102.00' (15")	101.90' (15")
DMH-N.6	108.00'	101.40' (15")	101.30' (15")
DMH-N.7	110.90'	107.35' (6")	107.25' (6")
DMH-N.9	110.10'	106.25' (6")	106.15' (6")
DMH-N.10	110.10'	106.60' (6")	106.50' (6")

STORM DRAIN TABLE			
PIPE NAME	SIZE	LENGTH	SLOPE
SD-N.1.1	12"	47'	0.005
SD-N.1.2	8"	75'	0.003
SD-N.1.3	8"	57'	0.003
SD-N.1.4	15"	36'	0.001
SD-N.1.5	4"	12'	0.021
SD-N.1.6	15"	157'	0.002
SD-N.1.7	6"	52'	0.005
SD-N.2.1	8"	53'	0.003
SD-N.2.2	6"	44'	0.006
SD-N.2.3	24"	19'	0.016
SD-N.3.1	8"	39'	0.005
SD-N.3.3	15"	72'	0.007
SD-N.3.4	6"	11'	0.069
SD-N.3.5	24"	9'	0.006
SD-N.4.1	6"	133'	0.003
SD-N.4.2	6"	97'	0.012
SD-N.4.3	12"	109'	0.023
SD-N.4.4	6"	99'	0.017
SD-N.5.2	6"	36'	0.009
SD-N.5.3	6"	55'	0.018
SD-N.5.4	15"	140'	0.004
SD-N.6.1	15"	59'	0.003
SD-N.6.2	6"	38'	0.013
SD-N.7.1	6"	161'	0.007
SD-N.8.1	8"	57'	0.004
SD-N.9.1	6"	43'	0.006
SD-N.9.2	8"	39'	0.004
SD-N.10.1	6"	150'	0.006
SD-N.10.2	6"	55'	0.003
SD-N.11.1	6"	57'	0.003
SD-N.12.1	6"	25'	0.006



PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR

BY

DATE

SJS

6/17/22

6/28/22

SITE/SUB

COMMENT RESPONSE

DATE

6/17/22

6/28/22

PROJECT NAME/ADDRESS:

CLIENT/OWNER OF RECORD:

DATE

6/17/22

GRADING & DRAINAGE PLAN - NORTH

165 LAMBERT ST CO-OP

PORTLAND, MAINE 04103

MAINE COOPERATIVE DEVELOPMENT PARTNERS

PORTLAND, MAINE

FILE:

JN:

SCALE:

DESIGNED BY:

DRAWN BY:

CHECKED BY:

1145_CIVIL

1145

AS NOTED

SUL

NPH

WHS

STATE OF MAINE

SAMUEL J. LEBEL

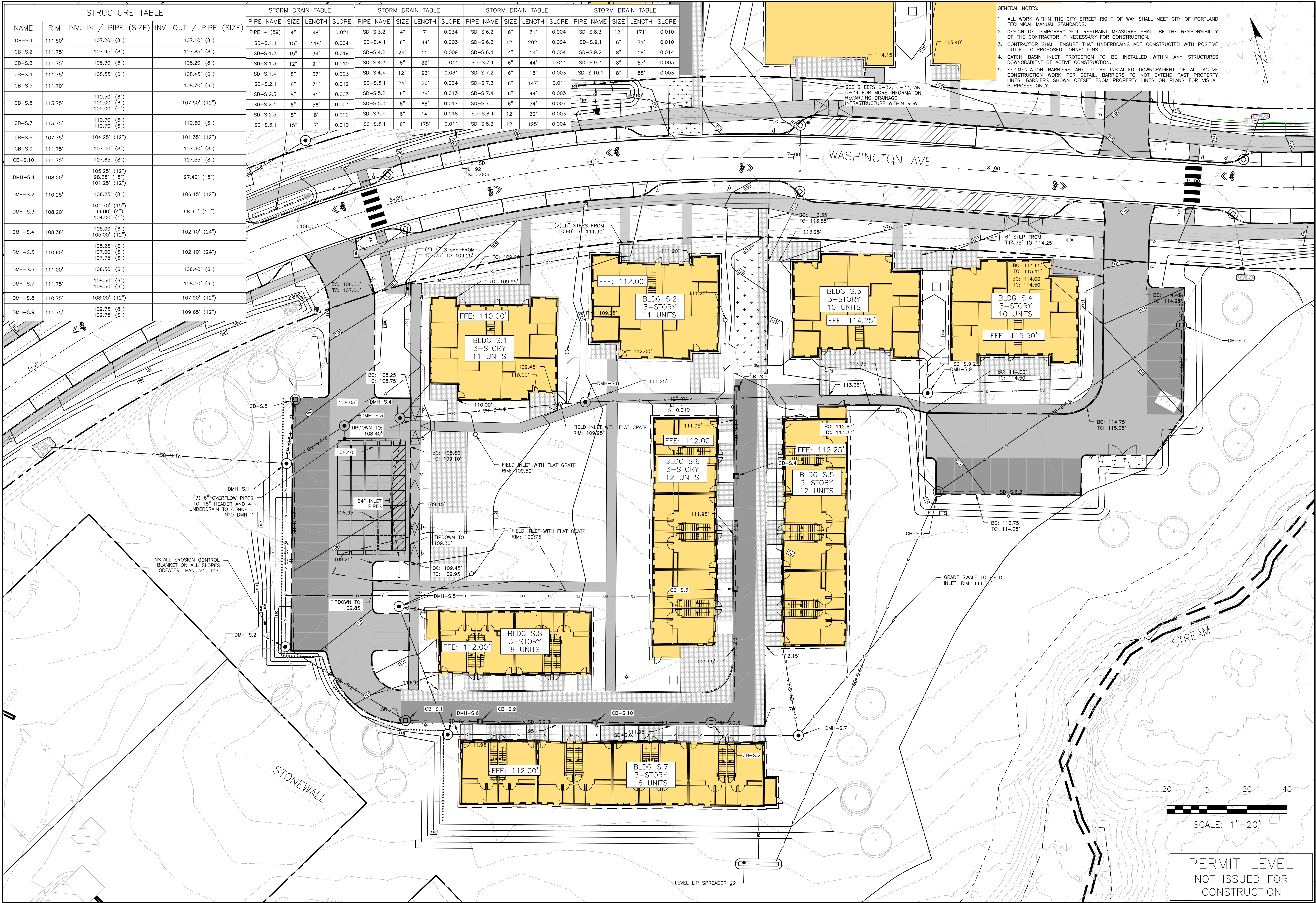
16506

PROFESSIONAL ENGINEER

2024

DRAWING NO.

C-30



ISSUED FOR: BY: DATE: 11/17/22

SITE/SUB: 1145 CIVIL

COMMENT RESPONSE: SUL

11/28/22

GRADING & DRAINAGE PLAN - SOUTH

PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD: MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

DRAWING NAME: ENGINEERING, INC.

ACORN ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101
(207) 775-2655

FILE: 1145_CIVIL

JN: 1145

SCALE: AS NOTED

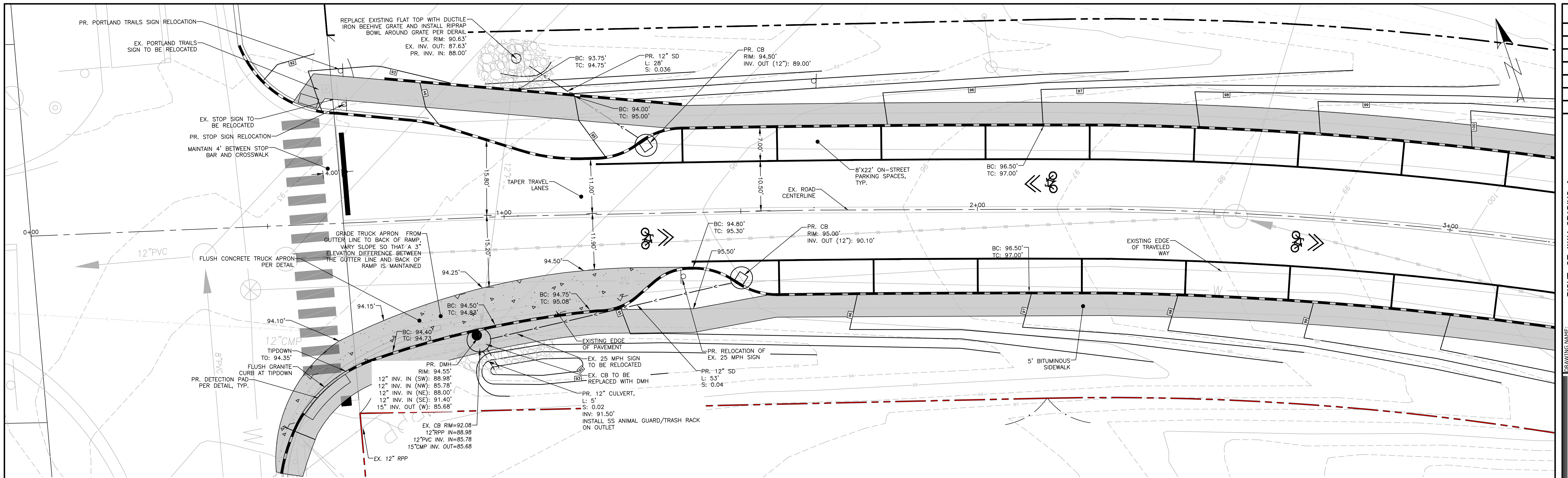
DESIGNED BY: SUL

DRAWN BY: NPH

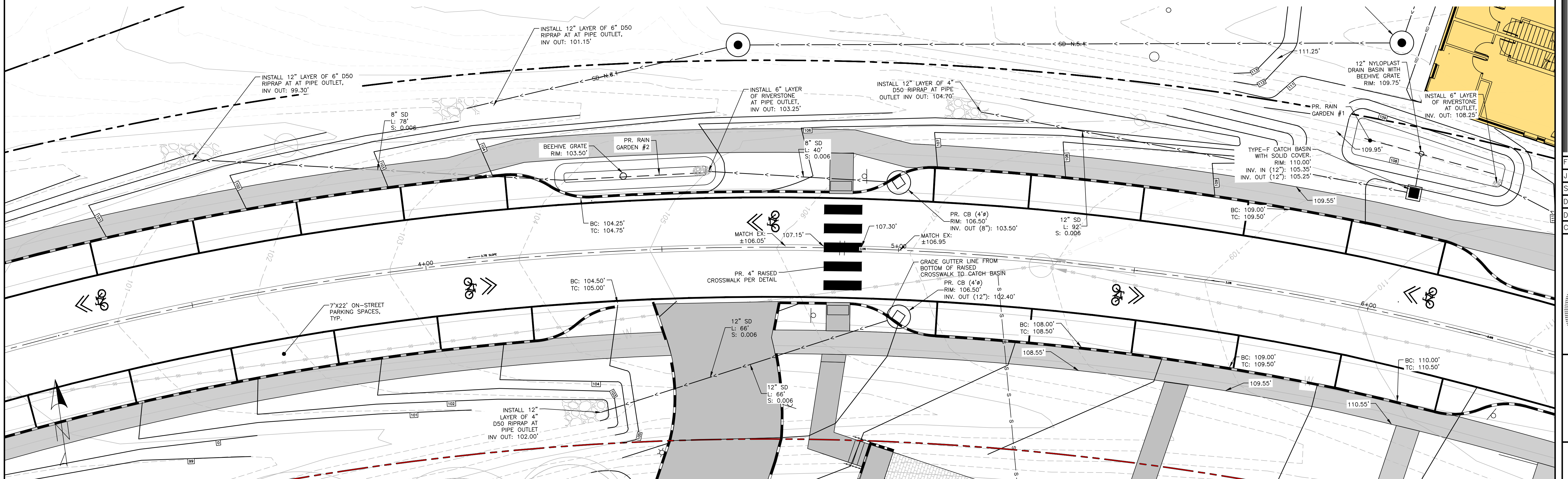
CHECKED BY: WHS

STATE OF MAINE
SAMUEL J. LEBEL
16508
Professional Engineer

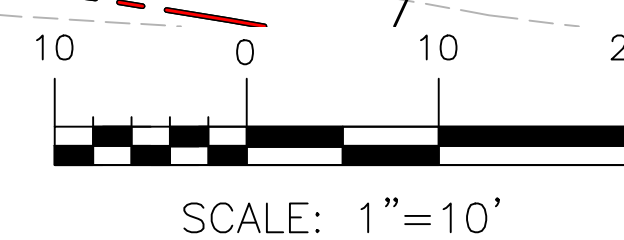
DRAWING NO. C-31



LAMBERT STREET INTERSECTION - STATIONS: 0+00 - 3+00

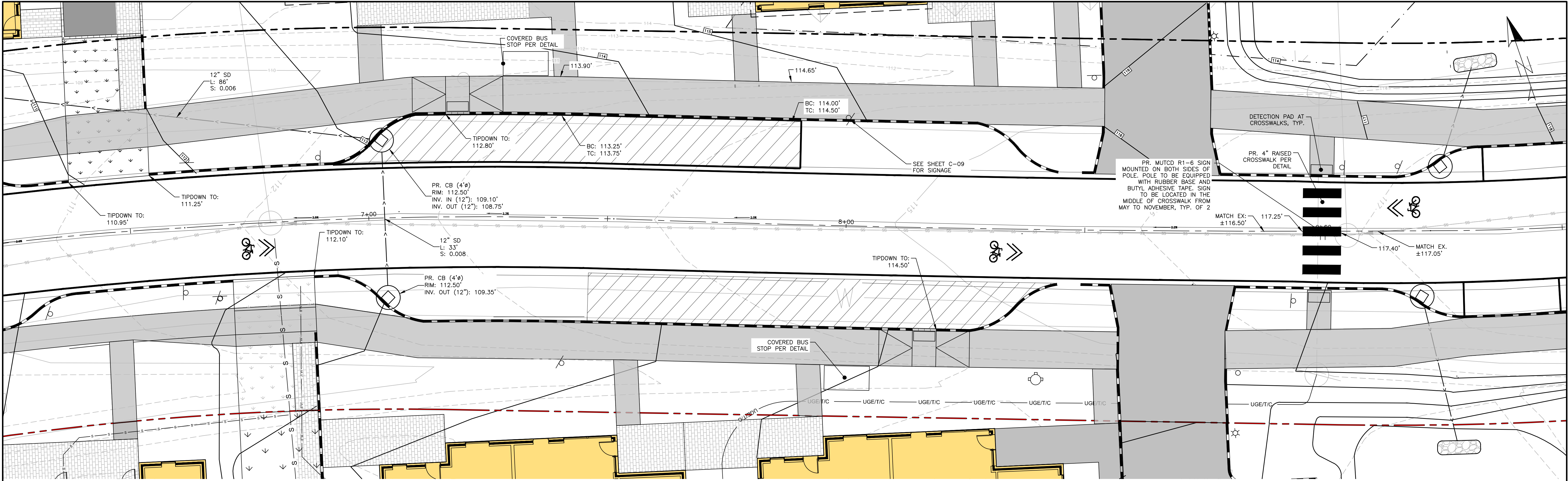


STATIONS: 3+00 - 6+00

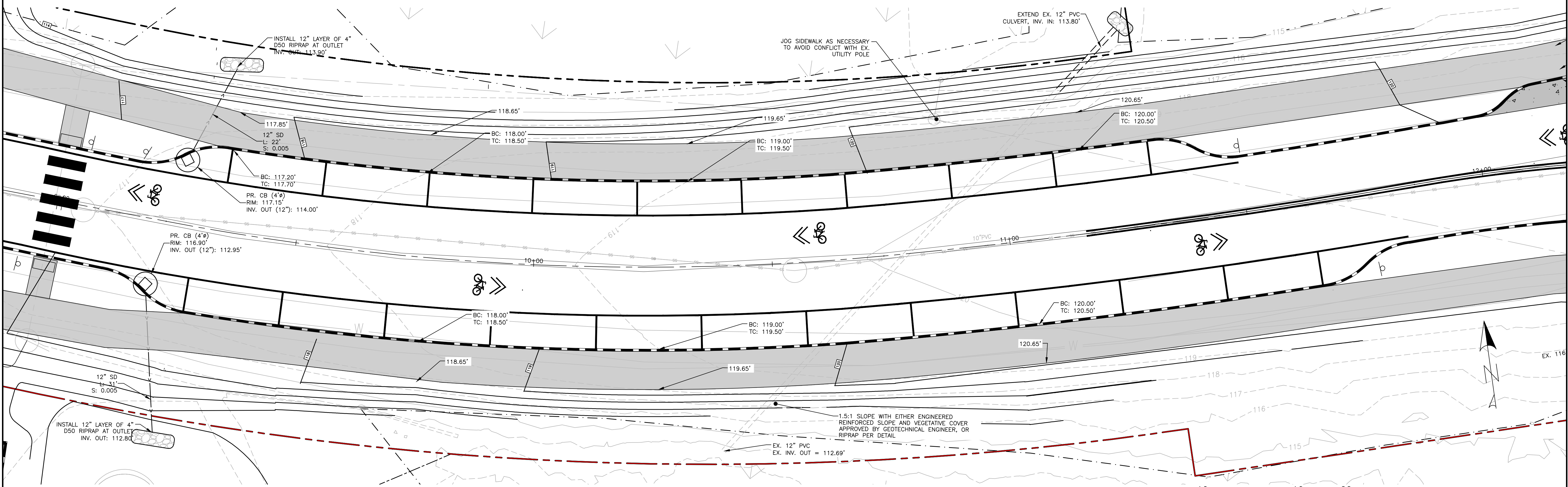


PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR		BY
SITE/SUB		DATE
HUD PRE-APP		6/7/22
		SJL
		7/13/21
DRAWING NAME: RIGHT-OF-WAY GRADING & SITE PLAN - +0 - +6		
PROJECT NAME/ADDRESS: 165 LAMBERT ST CO-OP		
PORTLAND, MAINE 04103		
CLIENT/OWNER OF RECORD: MAINE COOPERATIVE DEVELOPMENT PARTNERS		
PORTLAND, MAINE		
FILE: 1145_CIVIL		
JN: 1145		
SCALE: AS NOTED		
DESIGNED BY: SJL		
DRAWN BY: NPH		
CHECKED BY: WHS		
STATE OF MAINE SAMUEL J. LABEL 16506 LICENSE PROFESSIONAL ENGINEER 7/2/21		
DRAWING NO. C-32		



STATIONS: 6+00 - 9+00

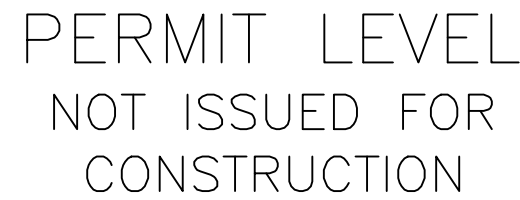
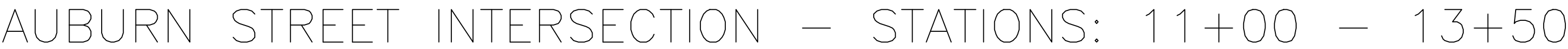


STATIONS: 9+00 - 12+00

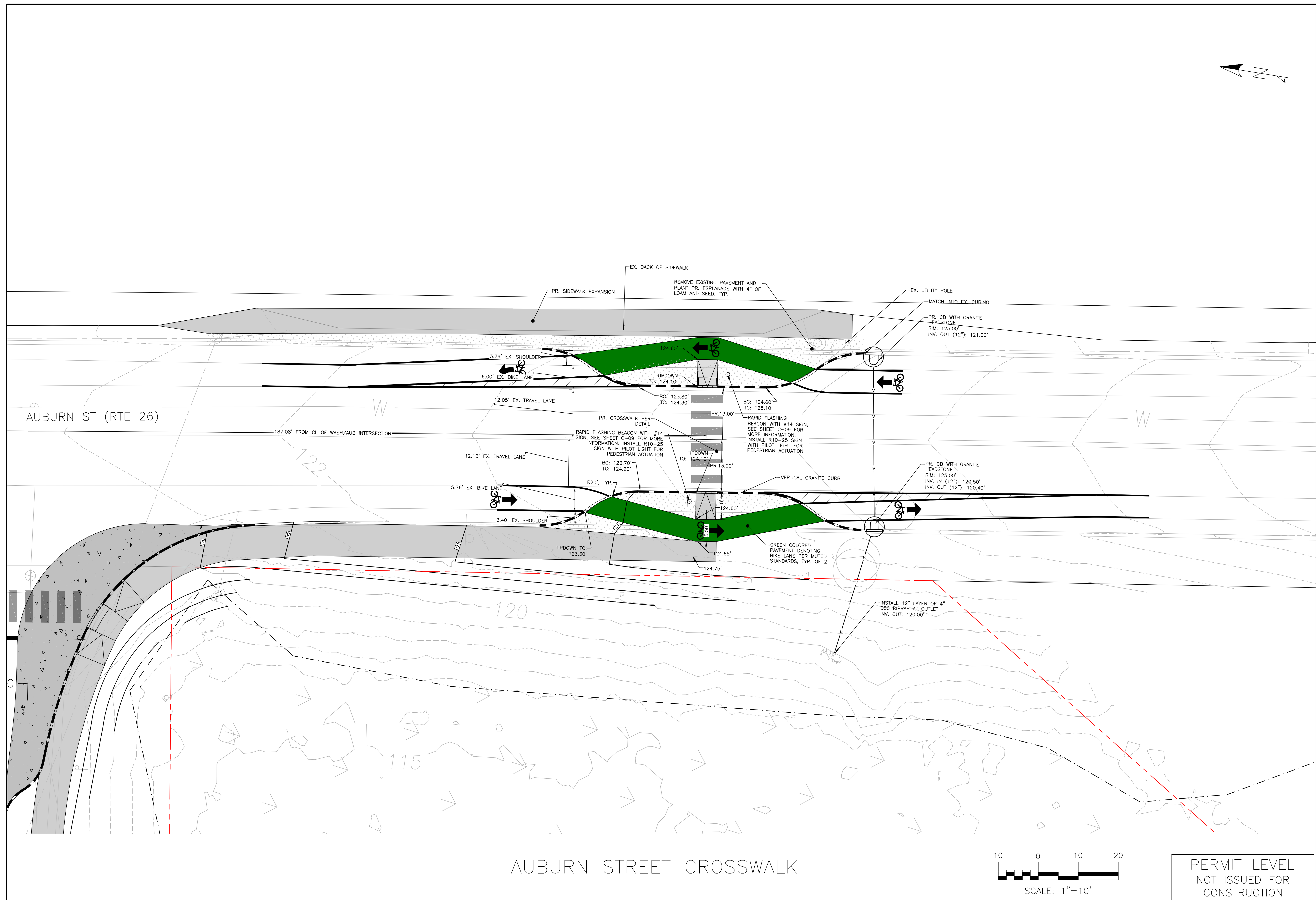


PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR		BY
SITE/SUB		DATE
HUD PRE-APP		6/7/22
		SJL
		7/13/21
DRAWING NAME:		PROJECT NAME/ADDRESS:
RIGHT-OF-WAY GRADING & SITE PLAN - +6 - +12		165 LAMBERT ST CO-OP
		PORTLAND, MAINE 04103
CLIENT/OWNER OF RECORD:		MAINE COOPERATIVE DEVELOPMENT PARTNERS
		PORTLAND, MAINE
FILE: 1145_CIVIL		
JN: 1145		
SCALE: AS NOTED		
DESIGNED BY: SJL		
DRAWN BY: NPH		
CHECKED BY: WHS		
DRAWING NO.		
C-33		



C-34



ISSUED FOR		BY
		DATE
SITE/SUB		6/27/92
HUD PRE-APP		SJL
		7/13/21

1. FOR INFORMATION REGARDING PROPOSED GROUND LEVEL LAYOUT, REFER TO SITE PLAN, SHEET C-10 AND C-11, MOST RECENT VERSION.
2. FOR INFORMATION REGARDING PROPOSED UTILITIES, REFER TO THE UTILITY PLAN, SHEET C-20 AND C-21, MOST RECENT VERSION.
3. FOR INFORMATION REGARDING PROPOSED GRADING AND STORMWATER, REFER TO THE GRADING & DRAINAGE PLAN, SHEET C-30 AND C-31, MOST RECENT VERSION.
4. UNIT TABULATION PROVIDED BY KAPLAN, THOMPSON ARCHITECTS; REFER TO ARCHITECTURAL PLANS FOR FLOOR PLANS AND BUILDING HEIGHTS.
5. TOTAL SITE AREA INCLUDES 12.83 ACRES (558,793 S.F.) CONTAINED WITHIN THE SOUTH PARCEL AND PORTLAND MAP 2223,196 (2013). THE NORTH BOUNDARY OF THE BOUNDARIES PER BOUNDARY SURVEY OF 2013 TOPOGRAPHICAL MAP WITHIN THE NORTH BOUNDARY OF THE BOUNDARIES PER BOUNDARY SURVEY OF 2013 TOPOGRAPHICAL & TOPOGRAPHIC SURVEY LAMBERT WOODS" DATED JUNE 2021 REVISED DECEMBER 2021.
6. AS OF 6/14/2022, THE SITE IS BOUNDED BY THE R3 ZONE TO THE NORTH, WEST, AND SOUTH. THE BOUNDARY OF THE UNBUNDLED R3 ZONE TO THE EAST. ZONE INFORMATION WAS OBTAINED FROM THE CITY OF PORTLAND'S GIS WEBSITE.
7. LOCUS PARCEL IS SHOWN ON THE CITY OF PORTLAND ASSESSOR'S MAP CHART, BOOK, LOT: 385-A-1, 386-C-1, 385-D-8, 386-B-12, AND 386-B-15.
8. LOCUS PARCEL IS SHOWN ON THE CITY OF PORTLAND FLOOD HAZARD AREA PER FEMA FLOOD INSURANCE RATE MAP COMMUNITY-PANEL NUMBER 230051 0002 C DATED 12/8/1998 AND 230045 0011 B DATED 10/16/1984.
9. ALL BUILDING CORNER OFFSETS TO BOUNDARY LINES ARE FROM CORNERBOLTS AND NOT BUILDING LINES, UNLESS OTHERWISE NOTED.
10. THIS SHEET IS THE SUBDIVISION PLAN FOR THE CREATION OF UP TO ONE-HUNDRED SIXTY FIVE (165) DWELLING UNITS ON THE EXISTING SUBJECT PROPERTY.
11. ANY PROPERTY OR PORTION THEREOF THAT IS ARIAN OR VEHICULAR WAY SHALL BE FLUSH OR BELOW GRADE AT THE DISCRETION OF THE PROFESSIONAL LAND SURVEYOR AND/OR ENGINEER.
12. THE OWNER SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND MANAGEMENT OF THE SITE INCLUDING ALL DRIVEWAYS, SIDEWALKS, STORMWATER DEVICES, SITE LIGHTING, TRASH REMOVAL, RETAINING WALLS, AND EROSION REMEDIATION.
13. THE OWNER SHALL BE RESPONSIBLE FOR COMPLYING WITH THE CONDITIONS OF CHAPTER 302 STORMWATER INCLUDING ARTICLE III, POST-CONSTRUCTION STORMWATER MANAGEMENT AGREEMENT, WHICH IS THE ANNUAL REPORT TO THE CITY OF PORTLAND.
14. THE OWNER SHALL BE RESPONSIBLE FOR COMPLYING WITH THE CONDITIONS OF THE SUBMITTED STORMWATER MANAGEMENT PLAN AND THE APPROVED PLANS, AND MEET CITY STANDARDS AND STATE GUIDELINES.
- 14.1. POST-CONSTRUCTION STORMWATER MANAGEMENT AGREEMENT:

1. OWNER OF RECORD:
CITY OF PORTLAND
C.C.R.D. 3702/236, 3795/236, 3798/6, 4550/327, 4593/154, 4599/266
2. BEARINGS ARE BASED ON MAINE STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD 83 PER PLAN REFERENCE 1.
3. ELEVATIONS ARE BASED ON NVD 1929 BENCHMARK: USCGS DISC G-163 ELEVATION=66.92
4. WETLANDS DELINEATED BY JONES ASSOCIATES AND FIELD LOCATED BY OWEN HASKELL, INC. EXCEPT FOR THE WETLANDS AND STREAM LOCATIONS SHOWN ON THE SOUTHERLY SIDE OF THE STREAM ON TM 385 LOT 10. TM 385 IS LOCATED ON ALMOUTH PARCEL, HAVE NOT BEEN FIELD LOCATED.
5. THE CONTOURS SOUTH OF THE WETLAND LINE SHOWN ON THIS SURVEY WERE GENERATED USING DATA COLLECTED IN 2012. DOWNLOADED FROM THE NOAA WEB SITE LOCATED AT
<https://coast.noaa.gov/dataviewer/#/>

1. "STREET ACCEPTANCE PLAN OF WASHINGTON AVENUE EXTENSION, PORTLAND, MAINE" DATED FEBRUARY 15, 2011 BY CITY OF PORTLAND, MAINE PUBLIC SERVICES DEPARTMENT, ENGINEERING DIVISION.
2. "PLAN OF LAND IN FALMOUTH AND PORTLAND FOR CITY OF PORTLAND" DATED 1/1/76, BY OWEN HASKELL, INC.

TBD

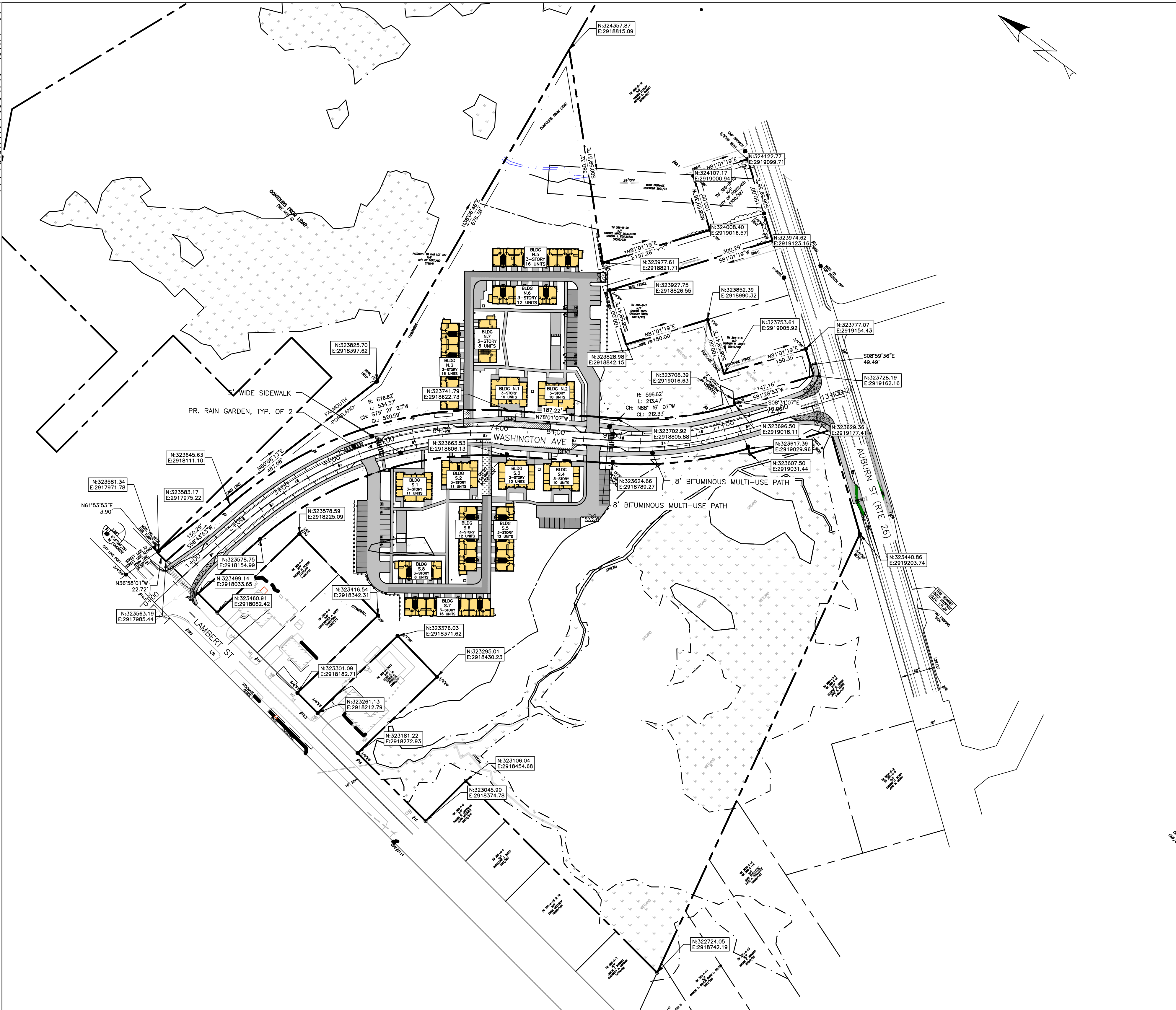
ALL PROPOSED EASEMENTS ARE TO BE REVIEWED BY OWEN HASKELL, INC. AND RECORDED IN CCRD. ALL EXISTING EASEMENTS ARE TO REMAIN.

1. A DRAINAGE EASEMENT BENEFITING MAINE DOT AS RECORDED IN THE CUMBERLAND COUNTY REGISTRY OF DEEDS BOOK 3901/31.

1. TBD



VICINITY MAP
SCALE: 1"=1000'



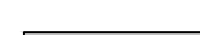
RECORDING INFORMATION
STATE OF MAINE,
CUMBERLAND COUNTY
REGISTRY OF DEEDS

RECEIVED: _____

RECORDED IN: _____

ATTEST: _____

REGISTRAR

PROPERTY LINE	
SETBACK	
PROPERTY MARKER (FOUND)	
PROPERTY MARKER (TO BE SET)	
WETLANDS	
PAVEMENT	
POROUS PAVEMENT	

THIS SURVEY CONFORMS TO THE CURRENT STANDARDS OF PRACTICE SET FORTH BY THE MAINE STATE BOARD OF LICENSURE FOR LAND SURVEYORS.

RANDY R. LOUBIER #2407
OWEN HASKELL, INC.

DATE: _____

MAINE COOPERATIVE DEVELOPMENT PARTNERS
6 CITY CENTER, FL 3
PORTLAND, MAINE
CONTACT: MATT PETERS & LIZ TRICE

ACORN ENGINEERING, INC.
P.O. BOX 3372
PORTLAND, MAINE
CONTACT: SAM LABEL, P.E.

OWEN HASKELL, INC.
390 U.S. ROUTE 1
FALMOUTH, MAINE
CONTACT: RANDY LOUBIER, P.L.S.

APPROVED: PORTLAND PLANNING BOARD

CHAIRPERSON:

DATE _____



SCALE: 1"=100'

FOR PERMITTING
NOT FOR CONSTRUCTION

[illegible]

SUBDIVISION PLAT – 165 LAMBERT STREET AND 622 AUBURN STREET

165 LAMBERT ST CO-OP

OWNER OF RECORD:
MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, ME 04103


A C O R N
ENGINEERING, INC.
 ACORN ENGINEERS, INC.
 P.O. BOX 3372, PORTLAND, MAINE 04101
 (207) 775-2655

FILE: 1145 CIVIL

JN:	1145
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SCALE: AS NOTED

DESIGNED BY: SJL

DRAWN BY: NPH

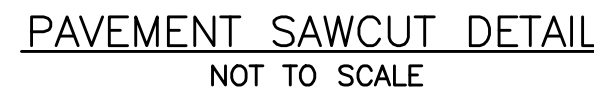
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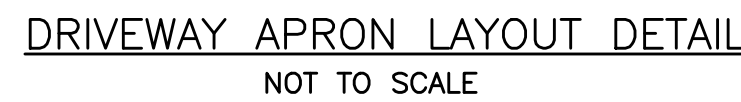
DRAWING NO.

PLAT

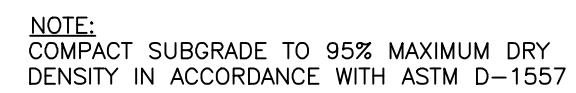
1. SAWCUT EXISTING PAVEMENT AND REMOVE 2" STRIP OF EXISTING PAVEMENT. CREATE UNIFORM AND RIGID BUTT JOINT AND APPLY BITUMINOUS TACK COAT AT AN APPLICATION RATE OF 0.10 TO 0.14 GALLONS PER SQUARE YARD PRIOR TO PLACEMENT OF NEW BITUMINOUS PAVEMENT.
2. THE NEW PAVEMENT SECTION SHALL MEET THE CITY OF PORTLAND BITUMINOUS PAVEMENT SECTION DETAIL AT A MINIMUM OR THE EXISTING PAVEMENT AND AGGREGATE BASE AND SUBBASE DEPTH WHICHEVER IS GREATER.



1. REFER TO GRADING, DRAINAGE AND EROSION CONTROL PLAN FOR SITE GRADING
2. REFER TO INTERNAL PARKING AND PRIVATE DRIVE PAVEMENT PROFILE FOR APRON CROSS-SECTION
3. MATERIALS/DETAILS OF DRIVEWAY APRON TO BE APPROVED BY CITY (DPW AND PLANNING) PRIOR TO IMPLEMENTATION



WASHINGTON AVE & LAMBERT ST
PAVEMENT PROFILE
NOT TO SCALE



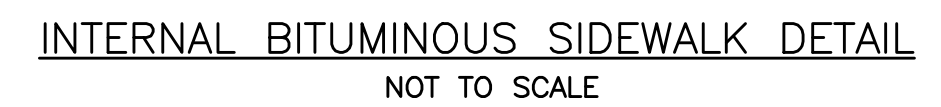
INTERNAL PARKING AND PRIVATE DRIVE PAVEMENT PROFILE
NOT TO SCALE



AUBURN STREET PROFILE
NOT TO SCALE



1. COMPACT GRAVEL SUBBASE, BASE COURSE TO 95% MAXIMUM DENSITY USING HEAVY ROLLER COMPACTION.
2. CONTRACTOR SHALL SET GRADE STAKES MARKING SUBBASE AND FINISH GRADE ELEVATIONS FOR CONSTRUCTION REFERENCE.



1. ALL DETECTABLE WARNING PLATES SHALL BE UNCOATED CAST IRON. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION.
2. CLASS A IN PLACE CONCRETE SHALL MEET SPECIFICATIONS FOR MOOT CLASS A STRUCTURAL CONCRETE, MINIMUM COMPRESSIVE STRENGTH 4,000 PSI. THE EXPOSED CONCRETE BORDER SHALL RECEIVE A UNIFORM BROOM FINISH PERPENDICULAR TO THE FLOW OF PEDESTRIAN TRAFFIC.
3. TRUNCATED DOWMS SHALL BE ALIGNED IN ROWS, PARALLEL AND PERPENDICULAR TO THE PREDOMINANT DIRECTION OF TRAVEL. TRUNCATED DOME BRICKS AND GRANITE PAVERS ARE NOT ALLOWED.
4. SIZE: THE DETECTABLE WARNING PLATES SHALL EXTEND 24 INCHES MINIMUM IN THE DIRECTION OF TRAVEL AND THE FULL WIDTH OF THE CURB RAMP, LANDING, OR BLENDED TRANSITION TO THE STREET.
5. ORIENTATION: THE DETECTABLE WARNING PANEL SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS 6 INCHES MINIMUM AND 8 INCHES MAXIMUM FROM THE CURB LINE. THE PANEL SHALL BE ORIENTED TO THE DIRECTION OF TRAVEL AS IDENTIFIED BY THE POINT OF EGRESS.



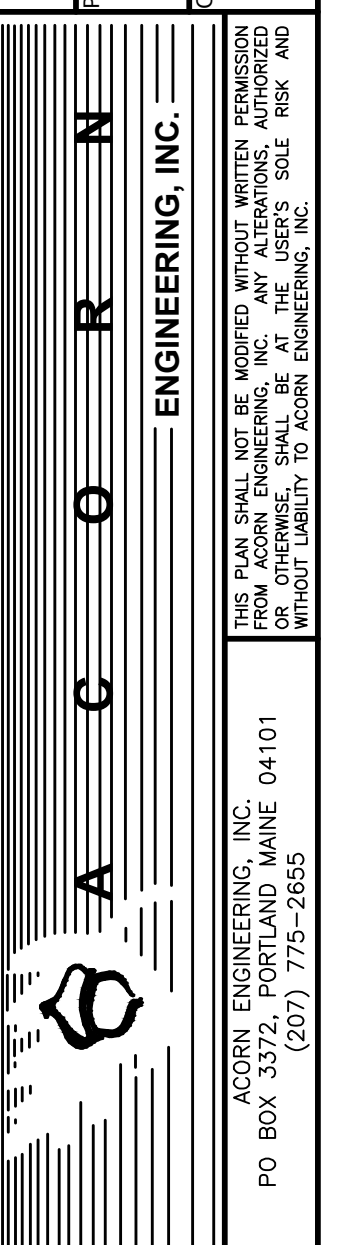
PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

[illegible]

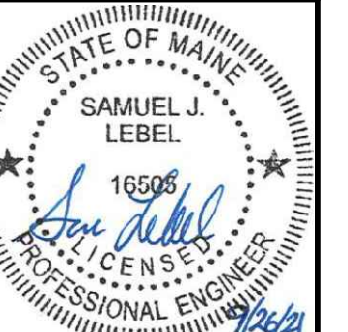
SITE DETAILS - 1

PROJECT NAME/ADDRESS: **165 LAMBERT ST CO-OP**
PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD: **MAINE COOPERATIVE DEVELOPMENT PARTNERS**
PORTLAND, MAINE

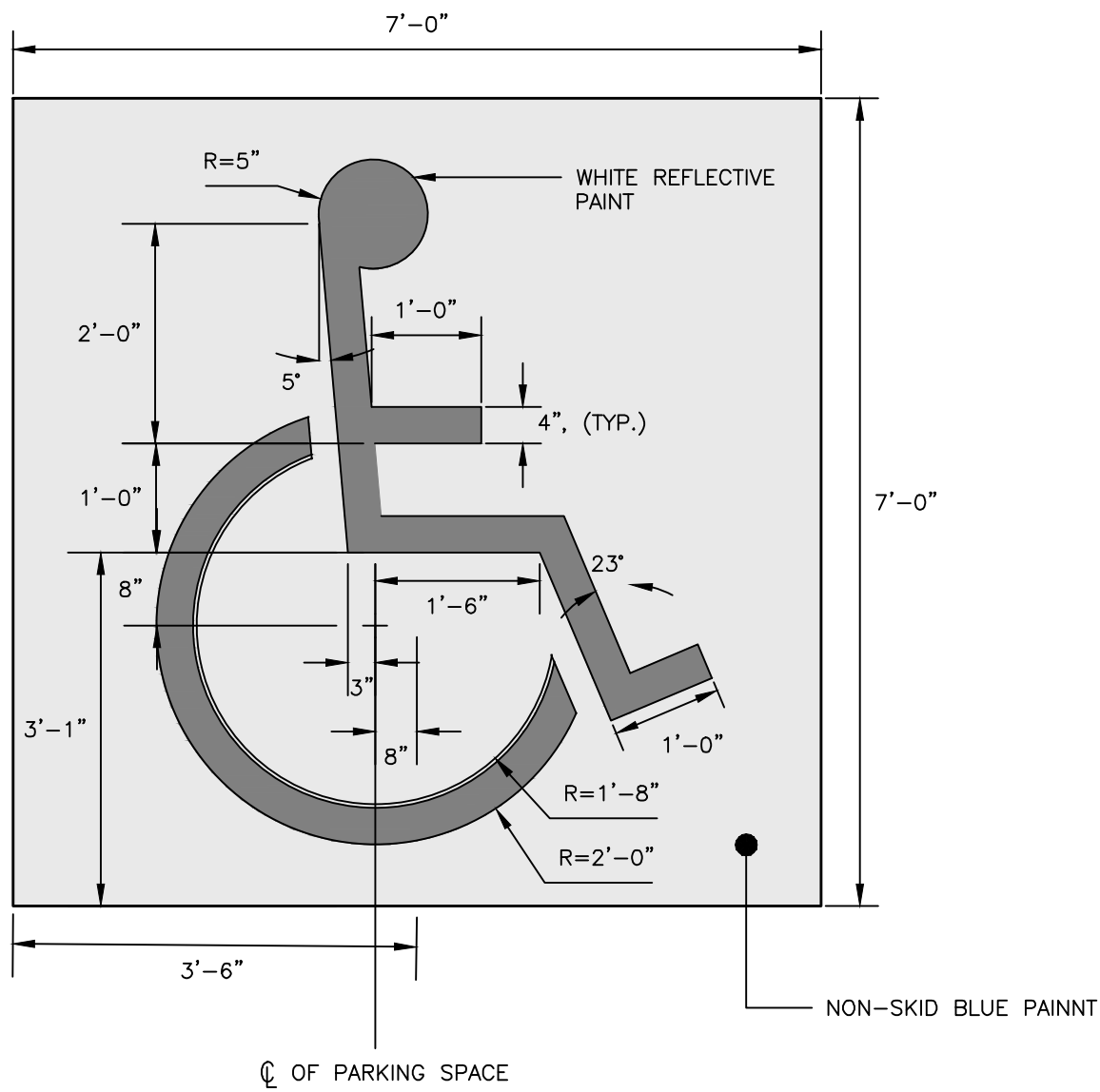


DATE:	1145_CIVIL
TIME:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS



RAWING NO.

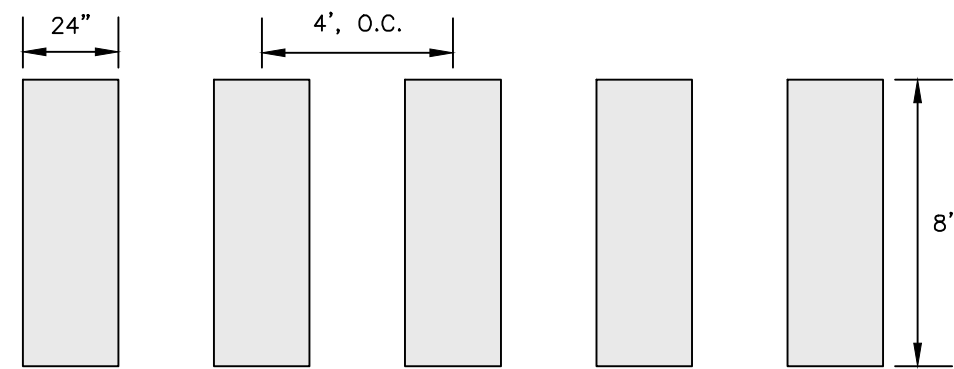
C-40



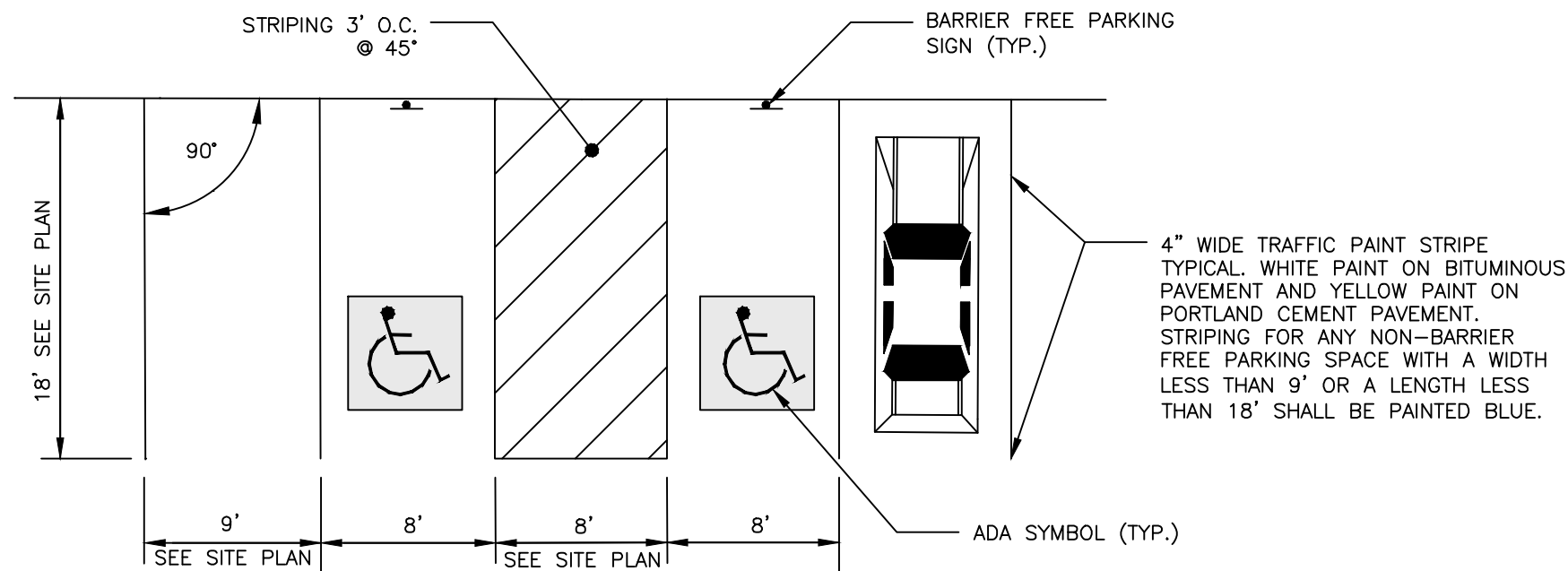
INTERNATIONAL BARRIER FREE SYMBOL
NOT TO SCALE

NOTE:

1. CROSSWALKS TO BE BUILT IN CONFORMANCE WITH MUTCD STANDARDS, LATEST EDITION.
2. CROSSWALKS ARE TO BE PAINTED WHITE MEETING MAINE DOT SPECIFICATIONS.
3. BLOCKS TO BE PARALLEL TO THE DIRECTION OF CAR TRAFFIC.



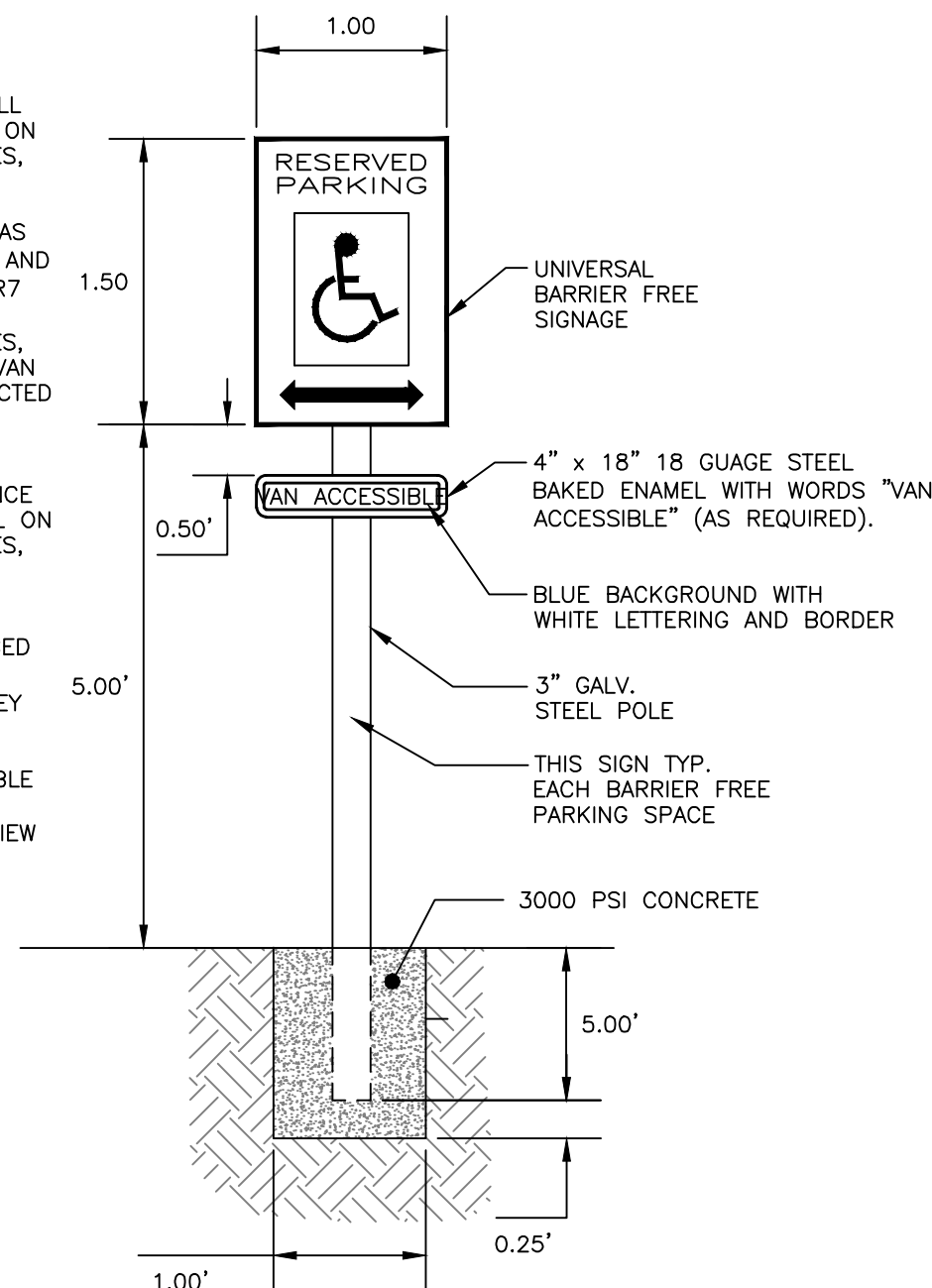
BLOCK CROSSWALK
NOT TO SCALE



PARKING SPACE DIMENSIONS
NOT TO SCALE

NOTES:

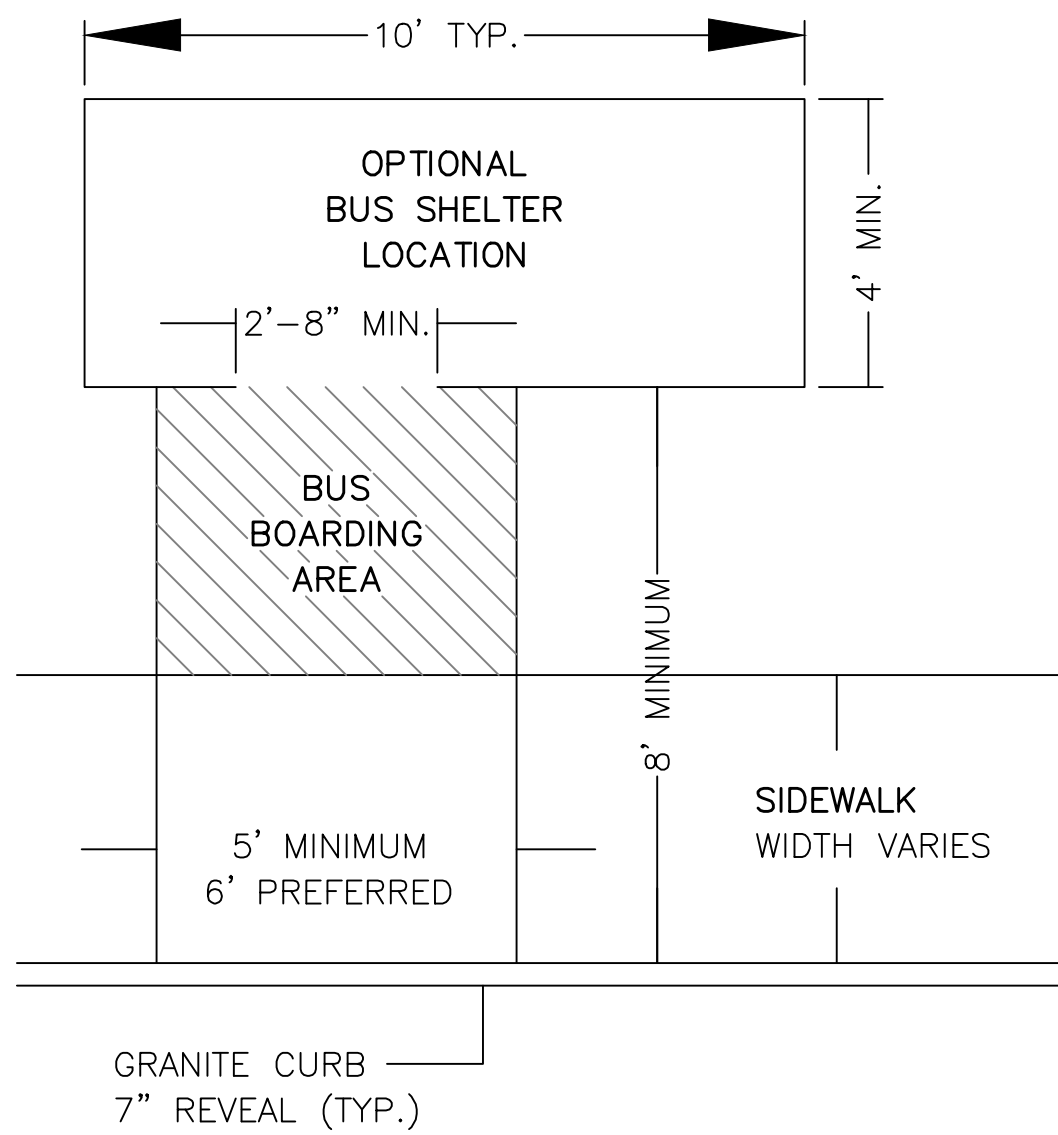
1. ALL ASPECTS OF RESERVED PARKING SIGN CONSTRUCTION SHALL BE IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 OR MOST RECENT EDITION.
2. SIGN SHALL BE CONSTRUCTED AS SIGN R7-8 UNDER THE "PARKING AND STANDING SIGNS AND PLAQUES" (R7 SERIES) WITHIN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 OR MOST RECENT EDITION. VAN ACCESSIBILITY SHALL BE CONSTRUCTED AS SIGN R7-8a OR R7-8b.
3. SIGN POST CONSTRUCTION AND MOUNTING SHALL BE IN ACCORDANCE WITH CHAPTER 2A OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 OR MOST RECENT EDITION.
4. SIGN SHALL BE INSTALLED ON BUILDING. SIGNS SHOULD BE PLACED AT SUCH A HEIGHT (AT LEAST 60 INCHES ABOVE SURFACE) THAT THEY DO NOT GET OBSCURED BY ANY PARKED VEHICLES OR OTHER OBSTRUCTIONS AND MUST BE VISIBLE FROM THE DRIVER'S SEAT OF THE VEHICLE AND LOCATED RIGHT IN VIEW OF PARKING.



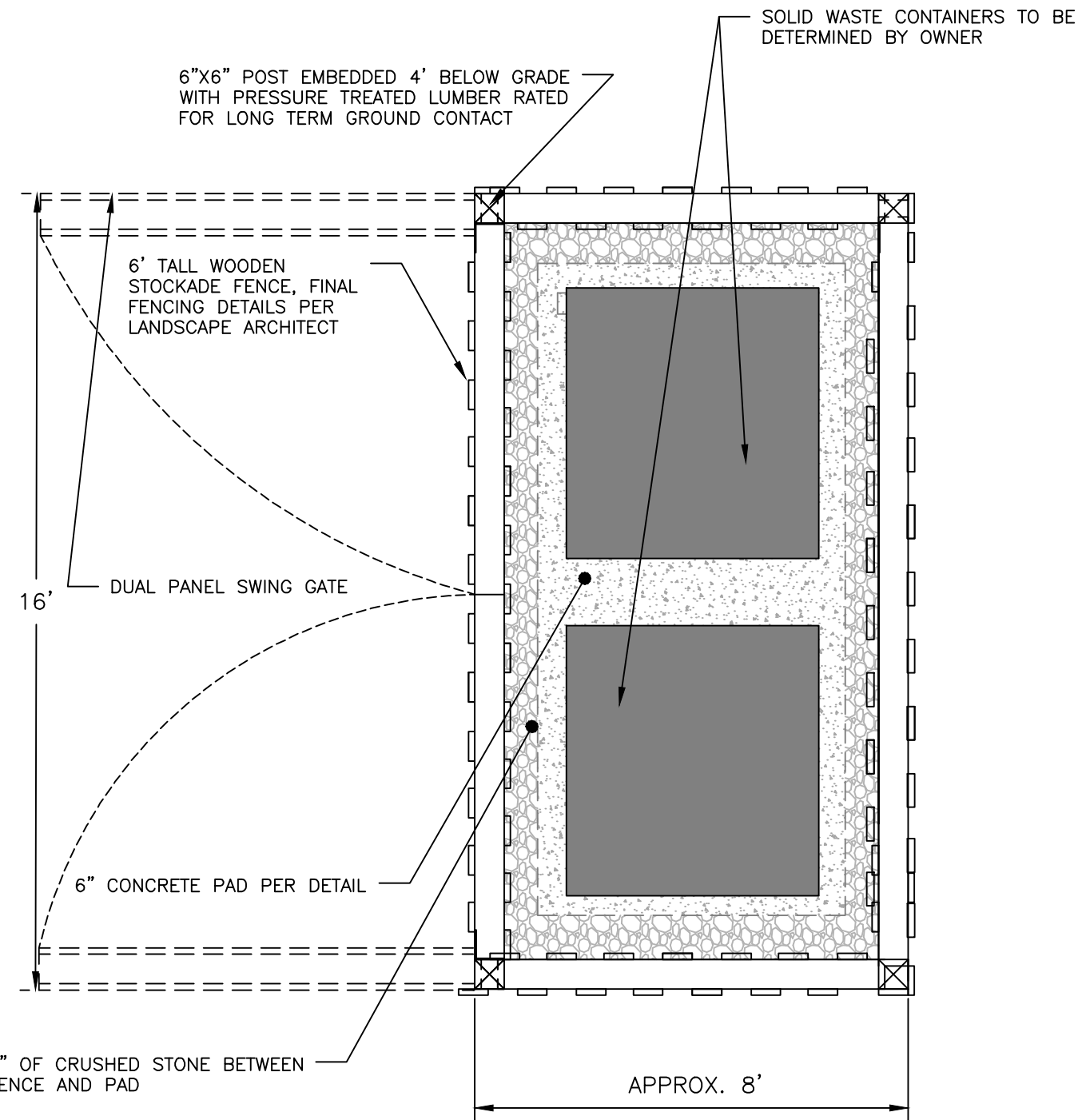
BARRIER FREE PARKING SIGN
NOT TO SCALE

NOTES:

1. DIMENSIONS. MINIMUM CLEAR FLOOR INTERIOR AREA ENTIRELY WITHIN THE PERIMETER OF THE SHELTER IS 2'-6" WIDE BY 4' DEEP TO PERMIT WHEELCHAIR OR MOBILITY AID USER ACCESS. THE MINIMUM SHELTER OPENING FOR WHEELCHAIR ACCESS IS 2'-8".
2. CONNECTION. BUS SHELTER OPENINGS WILL BE CONNECTED TO THE BUS BOARDING AREA BY AN ADA ACCESSIBLE ROUTE.
3. SLOPE. PARALLEL TO THE ROADWAY, THE SLOPE OF THE BUS BOARDING AREA SHALL BE THE SAME AS THE ROADWAY, TO THE MAXIMUM EXTENT PRACTICABLE. PERPENDICULAR TO THE ROADWAY, THE SLOPE OF THE BUS BOARDING AREA SHALL NOT EXCEED 2%.



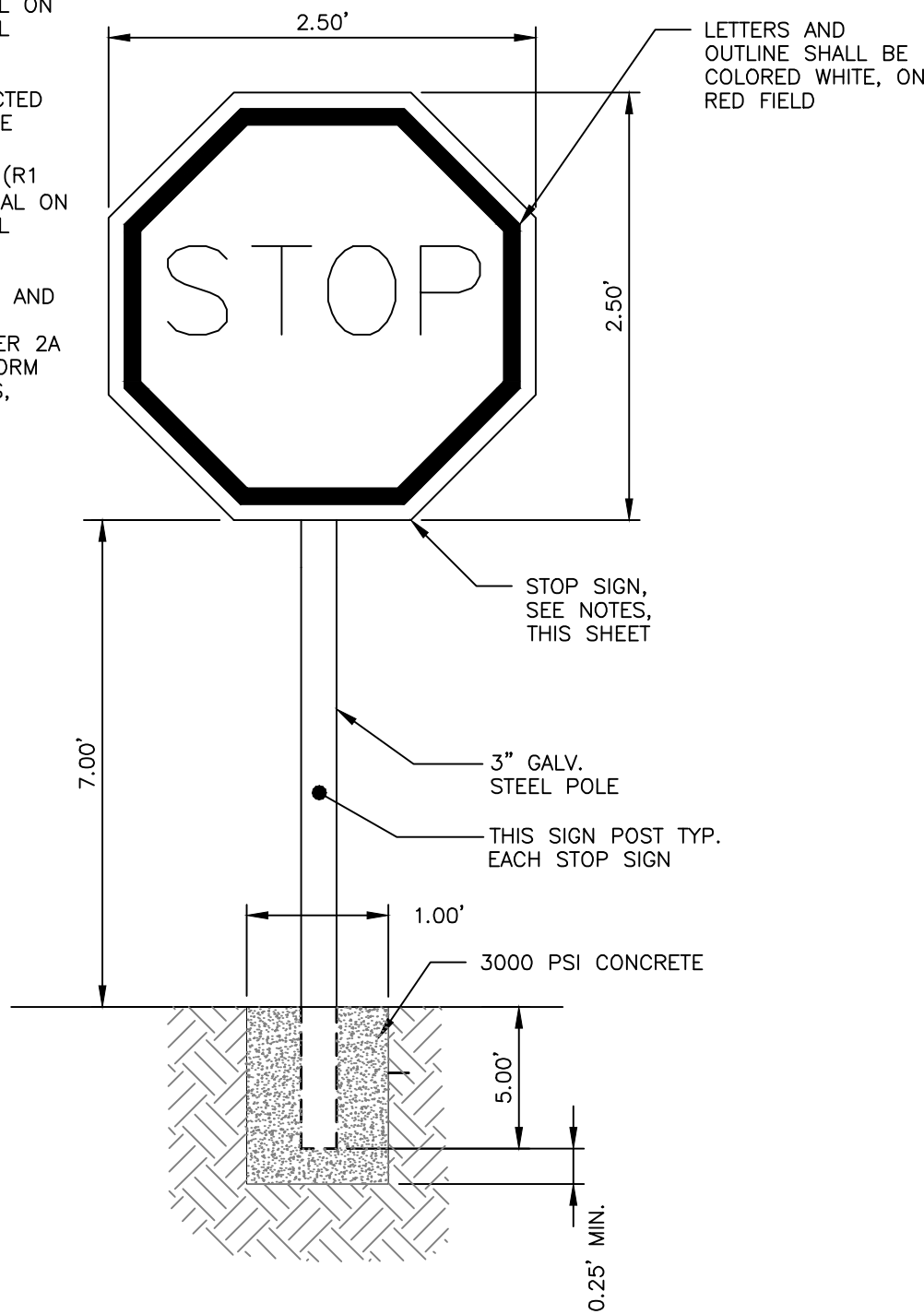
BUS SHELTER AND SHELTER SITING WITHOUT ESPLANADE
NOT TO SCALE



PLAN VIEW
TRASH ENCLOSURE DETAIL
NOT TO SCALE

NOTES:

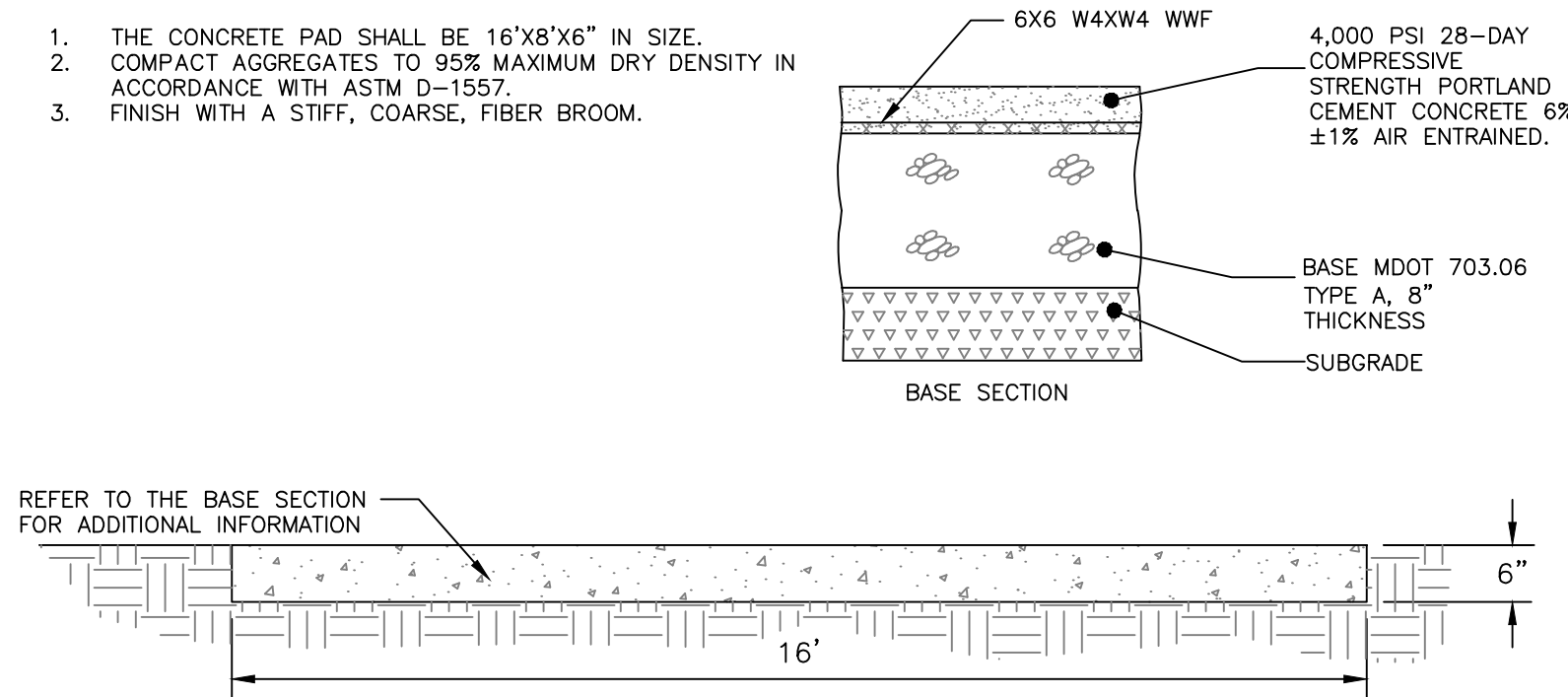
1. ALL ASPECTS OF STOP SIGN CONSTRUCTION SHALL BE IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 OR MOST RECENT EDITION.
2. SIGN SHALL BE CONSTRUCTED AS SIGN R1-1 UNDER THE "REGULATORY SIGNS, BARRICADES, AND GATES" (R1 SERIES) WITHIN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 OR MOST RECENT EDITION.
3. SIGN POST CONSTRUCTION AND MOUNTING SHALL BE IN ACCORDANCE WITH CHAPTER 2A OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 OR MOST RECENT EDITION.



TRAFFIC SIGN DETAIL
NOT TO SCALE

NOTES:

1. THE CONCRETE PAD SHALL BE 16'X8'X6" IN SIZE.
2. COMPACT AGGREGATES TO 95% MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557.
3. FINISH WITH A STIFF, COARSE, FIBER BROOM.



CONCRETE PAD DETAIL
NOT TO SCALE

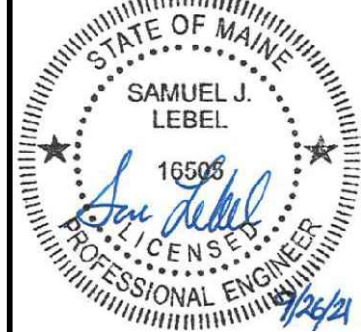
PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR	BY
SITE/SUB	DATE
COMMENT RESPONSE	SJL
	6/17/22
	9/28/22

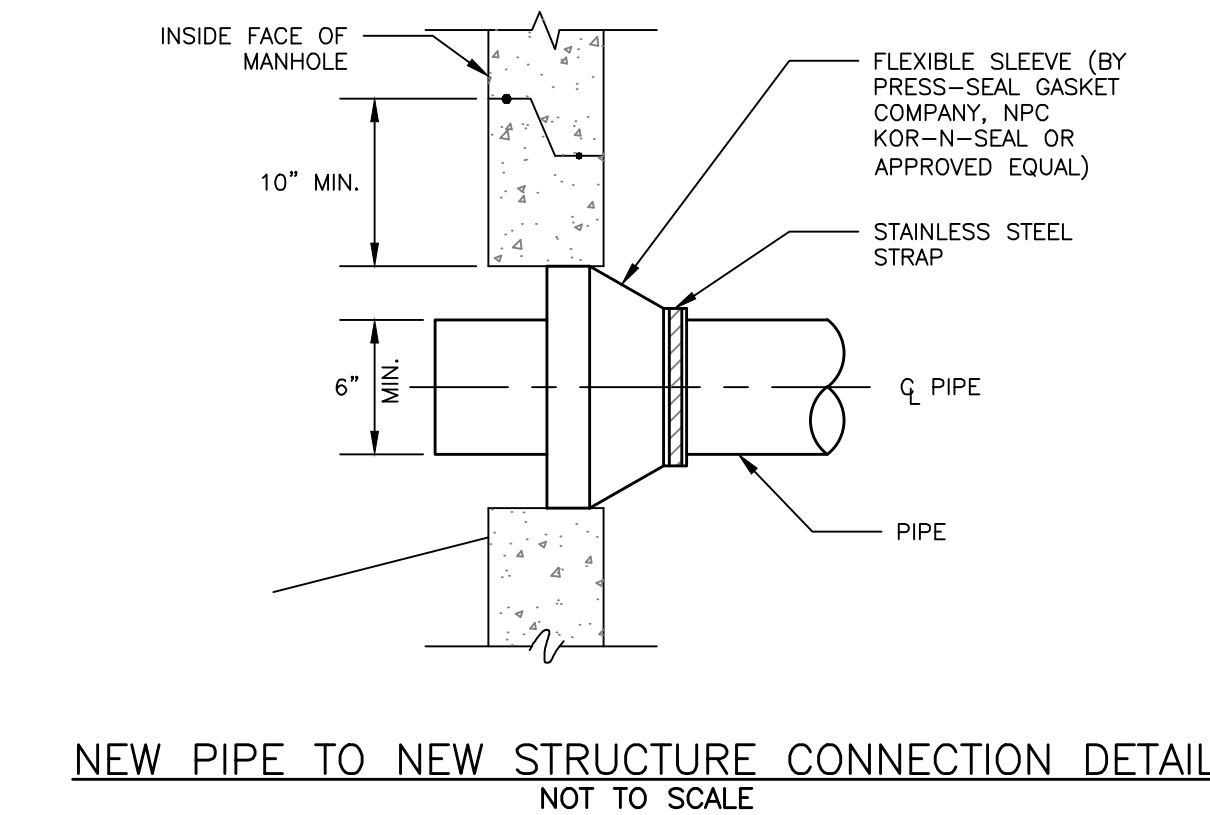
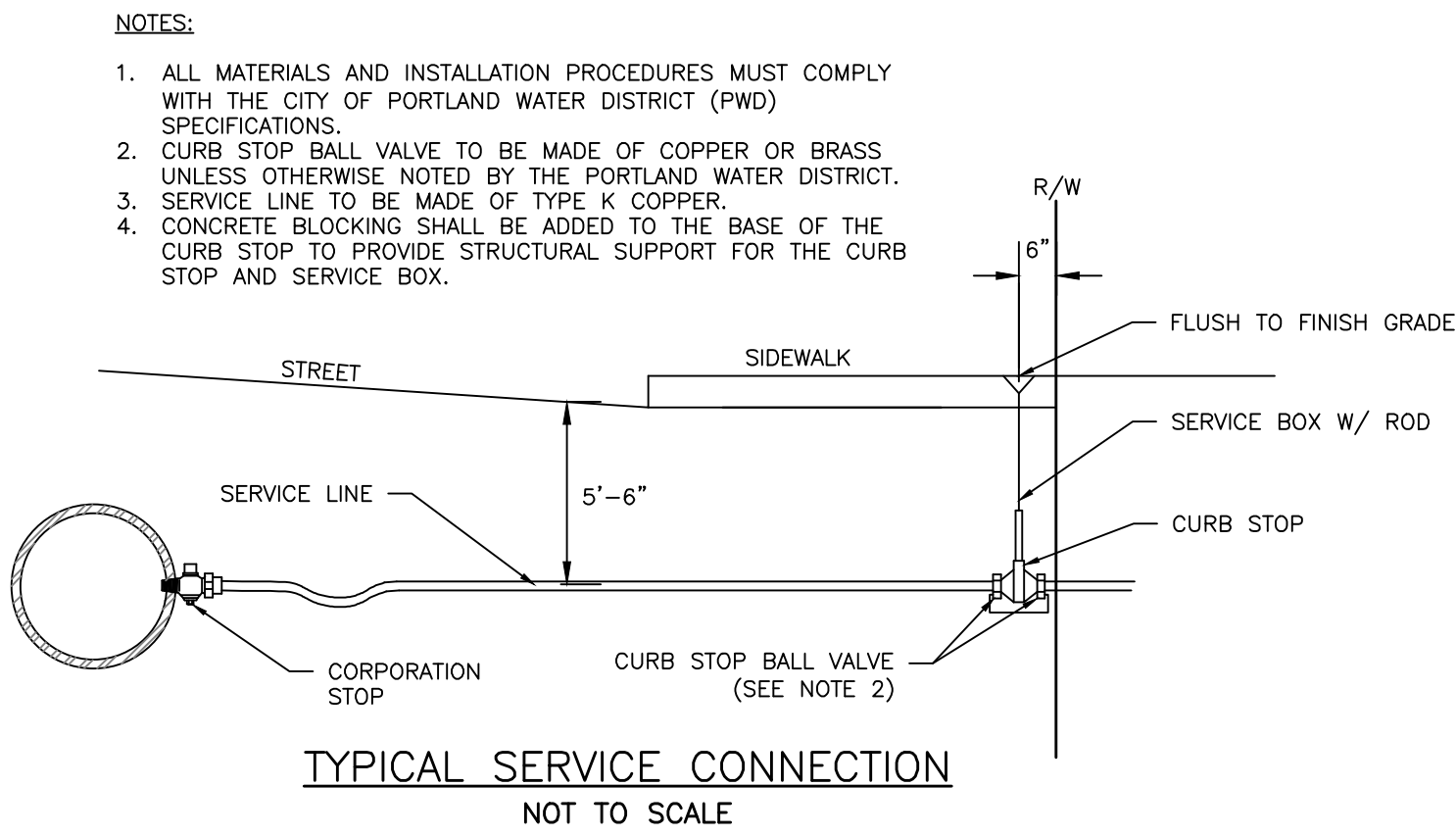
DRAWING NAME:	
SITE DETAILS - 2	
PROJECT NAME/ADDRESS:	165 LAMBERT ST CO-OP PORTLAND, MAINE 04103
CLIENT/OWNER OF RECORD:	MAINE COOPERATIVE DEVELOPMENT PARTNERS PORTLAND, MAINE

ACORN ENGINEERING, INC.	ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101	(207) 775-2885
THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM THE ENGINEER. ANY CHANGES SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO ACORN ENGINEERING, INC.	

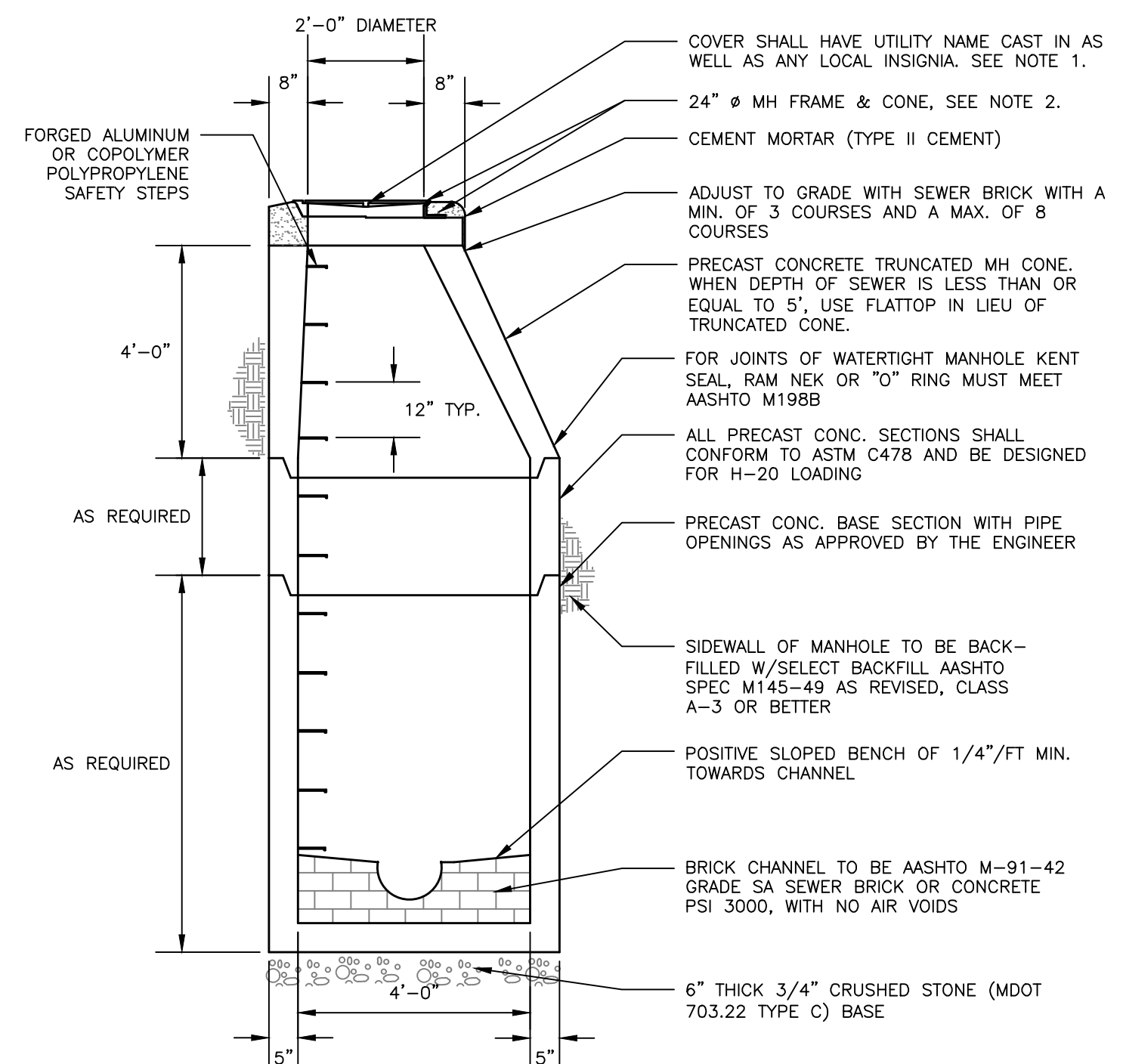
FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS



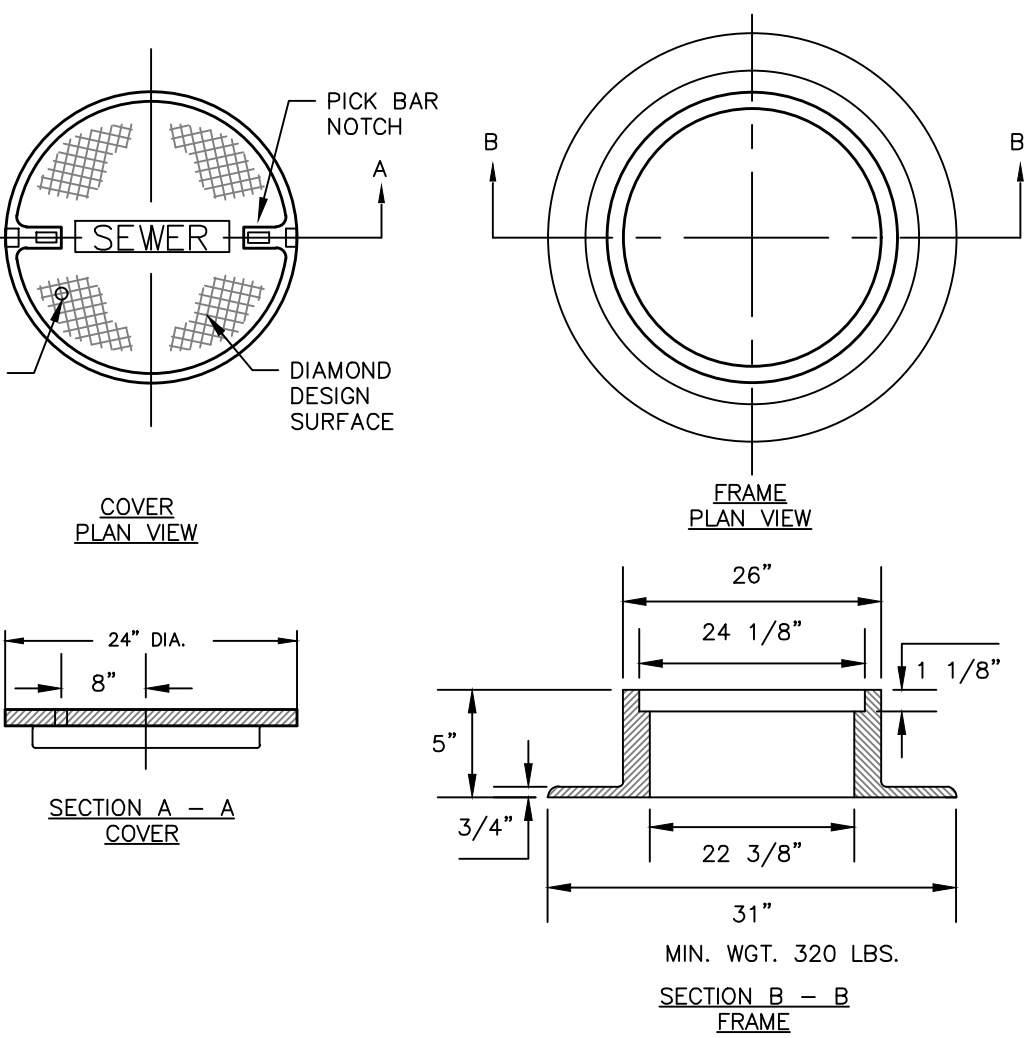
DRAWING NO.
C-41



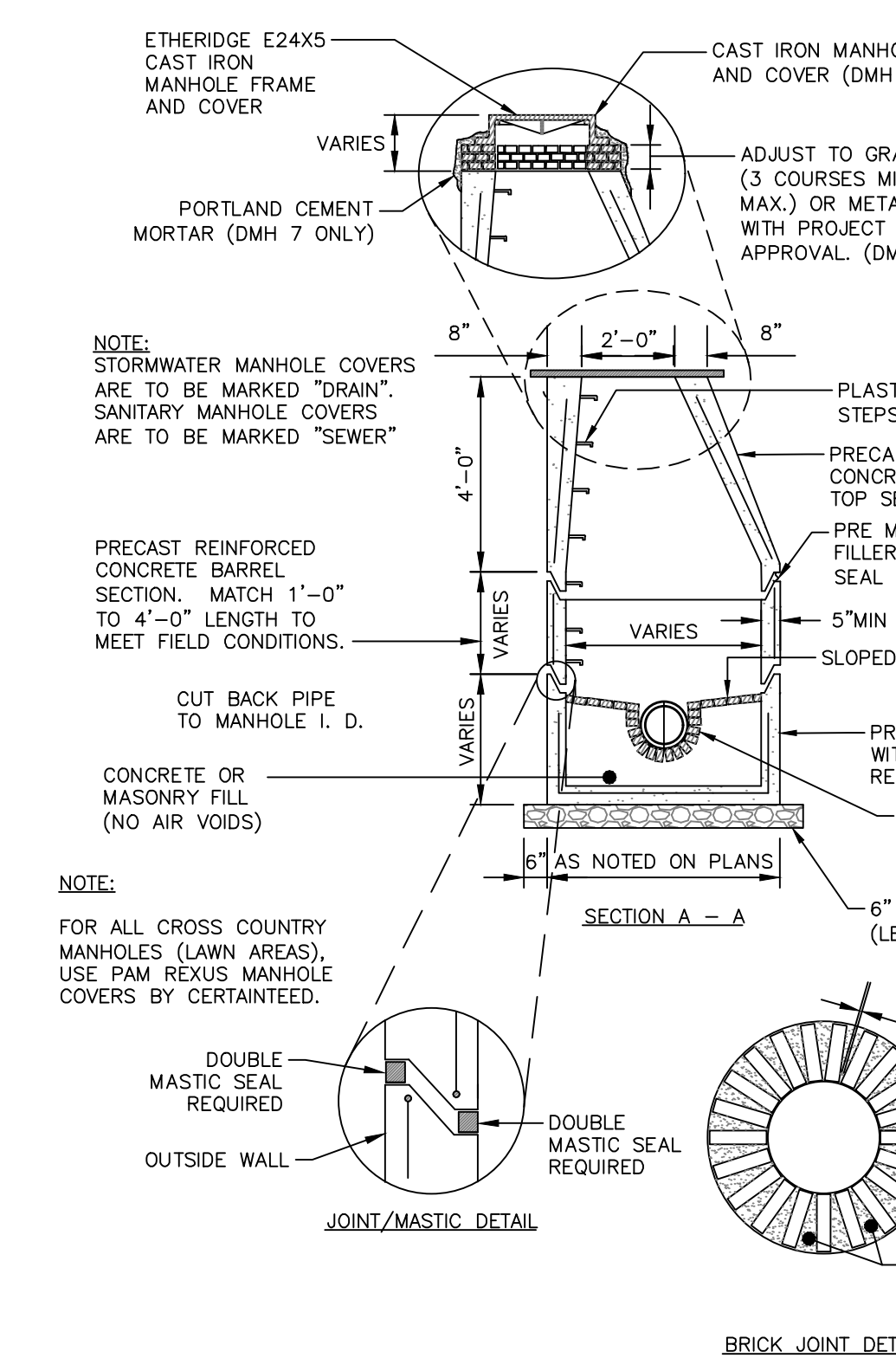
- NOTES:
1. MANHOLE COVER FOR SEWER MANHOLE SHALL BE ENGRAVED "SEWER", AND SHALL BE EITHER ITEM # 2160A AS MANUFACTURED BY EAST JORDAN CO. OR ITEM # 14960002 AS MANUFACTURED BY NEENAH FOUNDRY. MANHOLE COVER FOR STORM SEWER SHALL BE ENGRAVED "DRAIN", AND SHALL BE EITHER ITEM # 2160A AS MANUFACTURED BY EAST JORDAN CO. OR ITEM # 14960003 AS MANUFACTURED BY NEENAH FOUNDRY.
 2. MANHOLE FRAME SHALL BE EITHER ITEM # 14960001, AS MANUFACTURED BY NEENAH FOUNDRY, OR ITEM # 1960Z, AS MANUFACTURED BY EAST JORDAN CO.
 3. WITHIN CITY OF PORTLAND ROW, STORM DRAIN MANHOLE SHALL CONFORM WITH "STANDARD PRECAST SEWER MANHOLE DETAIL", WITH THE EXCEPTION THAT THE COVER SHALL BE MARKED AS "DRAIN". REFER TO CITY OF PORTLAND TECHNICAL MANUAL, SECTION 2 - SANITARY SEWER AND STORM DRAIN, FIGURE II-1
 4. SUBMITTAL REQUIRED FOR MANHOLES, MANHOLE FRAMES & MANHOLE COVERS



STANDARD PRECAST SEWER MANHOLE
NOT TO SCALE

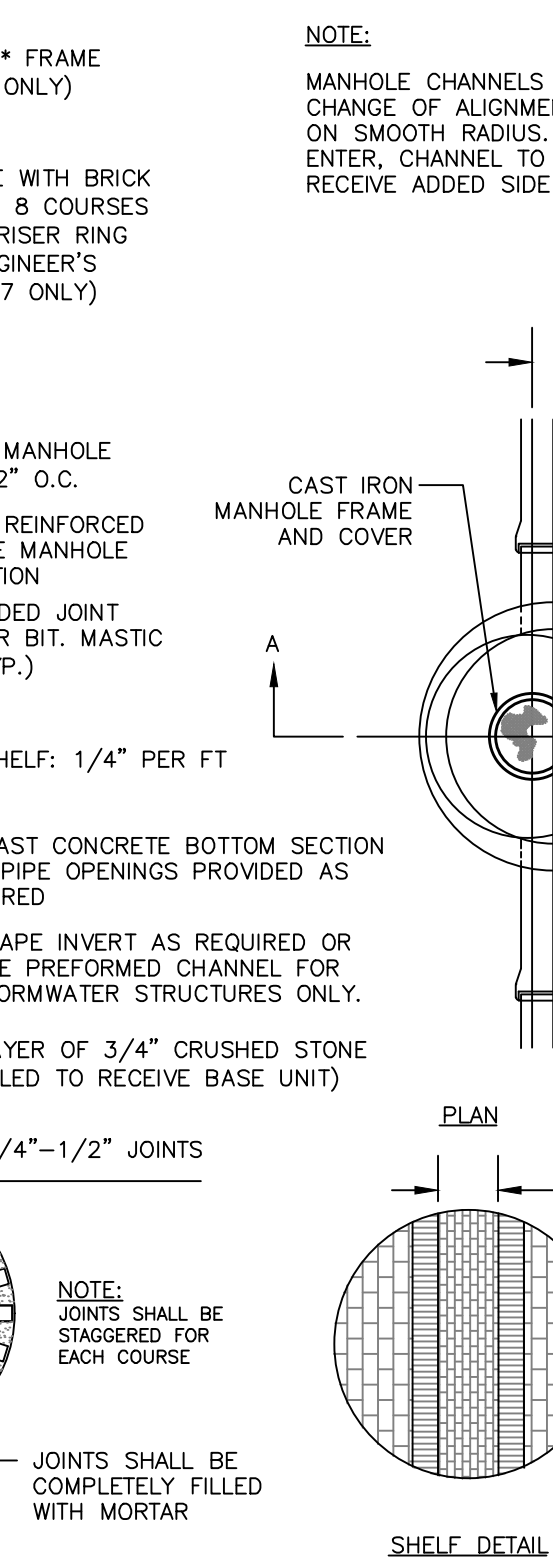


CAST IRON MANHOLE COVER AND FRAME
NOT TO SCALE

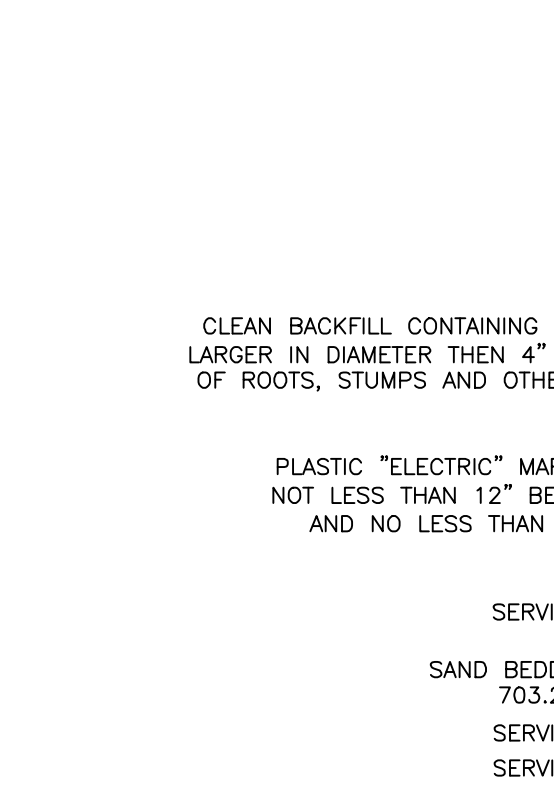


PRECAST CONCRETE MANHOLE
NOT TO SCALE

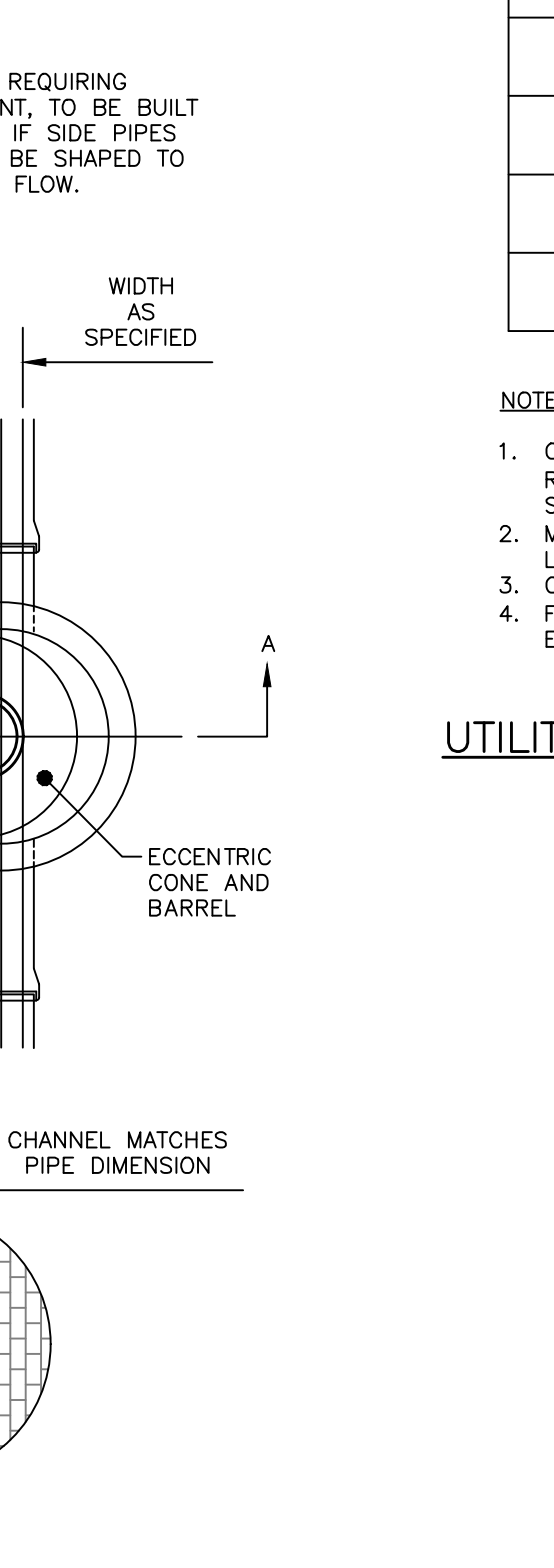
- NOTES:
1. ALL MANHOLE COVERS SHALL BE SOLID AND SHALL HAVE ONE 7/8" DIAMETER DRILLED PICK HOLE, LOCATED 8" FROM THE CENTER OF THE COVER
 2. ALL SANITARY AND STORMWATER/DRAIN MANHOLE COVERS SHALL BE 24" x 5".
 3. ALL SANITARY MANHOLE COVERS AND SHALL HAVE "SEWER" CAST INTO THE COVER.
 4. ALL STORMWATER/DRAIN MANHOLE COVERS SHALL HAVE "DRAIN" CAST INTO THE COVER.
 5. APPROVED MANHOLE FRAMES:
 - 5.1. EAST JORDAN = 1690Z
 - 5.2. NEENAH = R-1496
 - 5.3. OR APPROVED EQUAL
 6. APPROVED MANHOLE COVERS:
 - 6.1. EAST JORDAN = 2160A
 - 6.2. NEENAH = R-1496
 - 6.3. OR APPROVED EQUAL



UTILITY TRENCH - PRIMARY AND SECONDARY POWER, TELEPHONE, AND CABLE
NOT TO SCALE



INTERNAL STORM DRAIN AND SEWER TYPICAL TRENCH SECTION
NOT TO SCALE

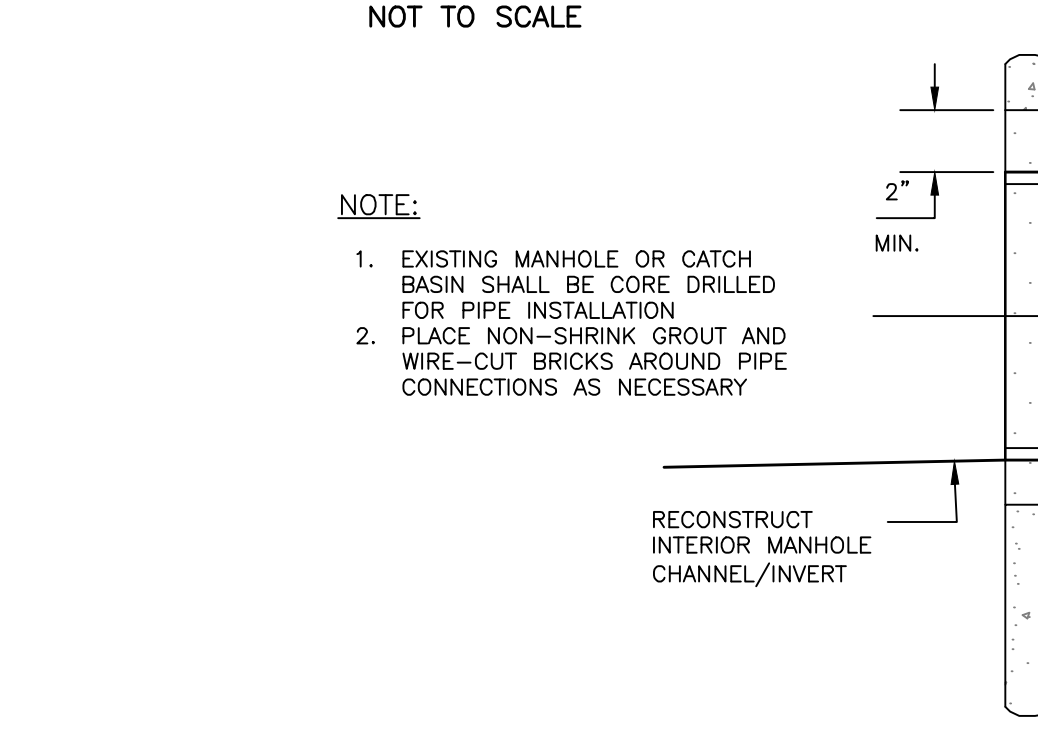


SECONDARY ELECTRICAL TRENCH
NOT TO SCALE

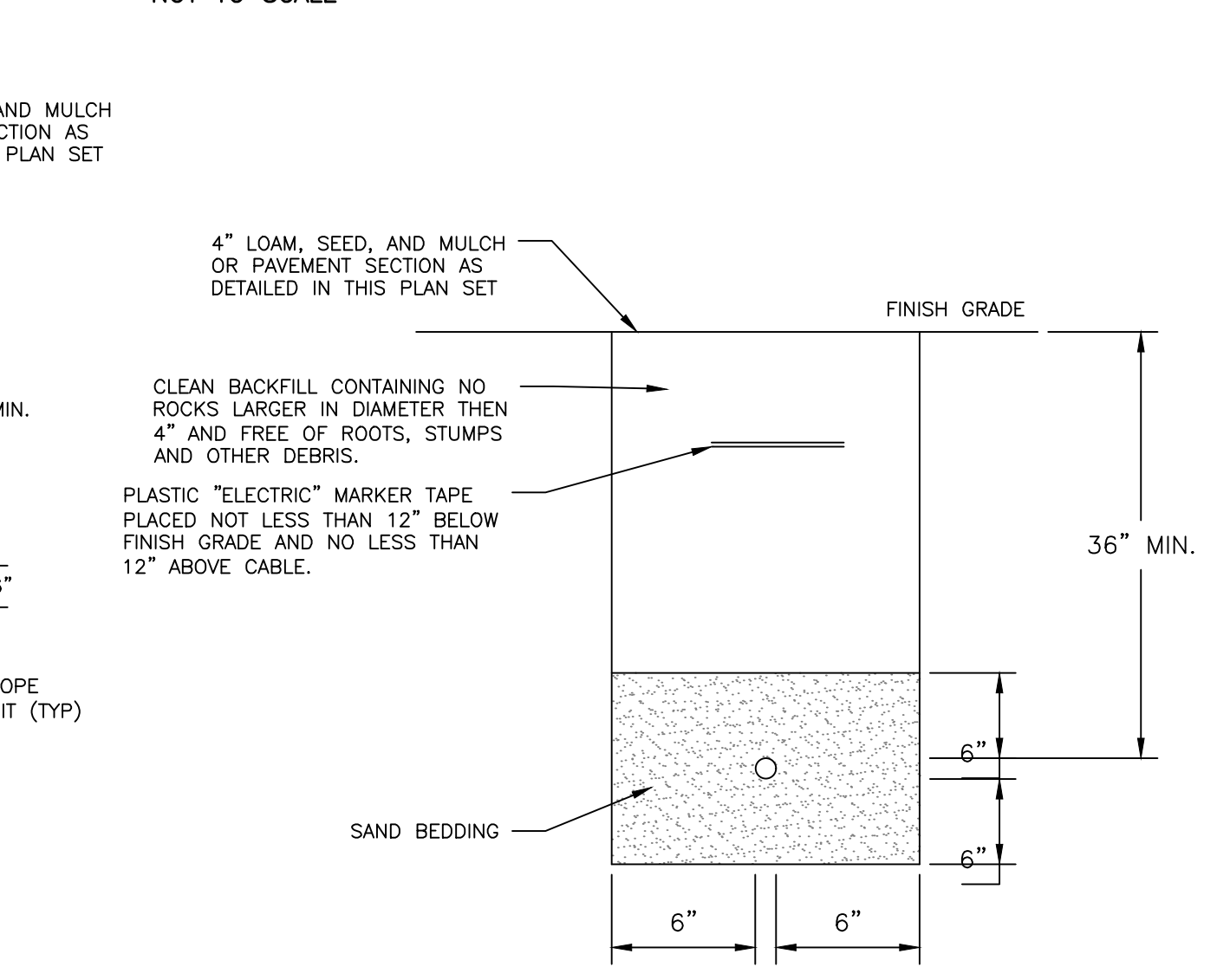
CONDUIT TYPE				
SERVICE	CONDUIT SIZE	GRASS AND PAVED AREAS	UTILITY	REMARKS
A	5"	SCHEDULE 40 PVC ELECTRICAL GRADE	PRIMARY POWER	SEE NOTE 1
B	5"	SCHEDULE 40 PVC ELECTRICAL GRADE	PRIMARY POWER	SEE NOTE 1
C	2-4"	SCHEDULE 40 PVC	COMMUNICATION	-
D	5"	SCHEDULE 40 PVC ELECTRICAL GRADE	SPARE	SEE NOTE 1
E	2-4"	SCHEDULE 40 PVC	CABLE	-

- NOTES:
1. ONE CONDUIT CAPPED FOR SPARE, PROVIDE GALVANIZED STEEL LONG SWEEP AT RISER POLE AND EXTEND GALVANIZED CONDUIT TO 10" ABOVE GRADE AT POLE WITH STAND-OFF BRACKETS.
 2. MINIMUM SEPARATION OF 24 INCHES BETWEEN PRIMARY CABLE/CONDUIT AND GAS LINES SHALL BE MAINTAINED.
 3. CONDUITS WITHIN THE CITY RIGHT-OF-WAY SHALL BE ENCASED IN CONCRETE.
 4. FINAL SIZE OF CONDUITS TO BE SPECIFIED BY MEP, ELECTRICIAN, OR DESIGN/BUILD ELECTRICAL CONTRACTOR.

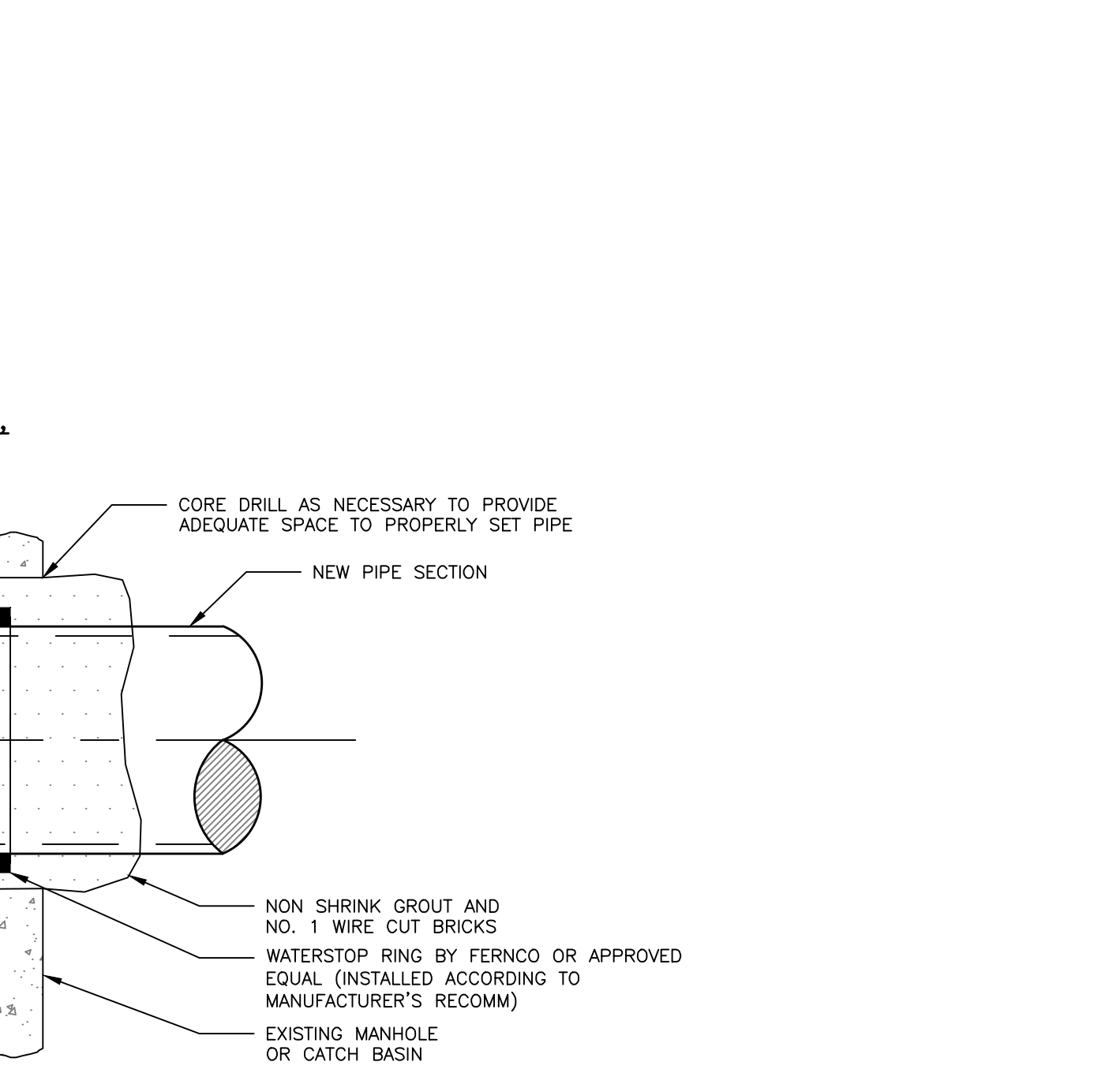
UTILITY TRENCH - PRIMARY AND SECONDARY POWER, TELEPHONE, AND CABLE
NOT TO SCALE



NEW PIPE TO EXISTING STRUCTURE CONNECTION DETAIL
NOT TO SCALE



TYPICAL SERVICE CONNECTION
NOT TO SCALE



NEW PIPE TO EXISTING STRUCTURE CONNECTION DETAIL
NOT TO SCALE

SCHEDULE OF MATERIALS		
TYPE OF PIPE	GRANULAR BEDDING	SELECT BACKFILL
CMP DUCTILE IRON RCP	MDOT 703.22 TYPE B UD BACKFILL	MDOT 703.22 TYPE B UD BACKFILL
PVC/HDPE	MDOT 703.22 TYPE C 3/4" CRUSHED STONE	MDOT 703.22 TYPE B UD BACKFILL
CMP	MDOT 703.22 TYPE C 3/4" CRUSHED STONE	MDOT 703.22 TYPE C 3/4" CRUSHED STONE

- NOTES:
1. BRACING AND SHEETING OR OTHER TRENCH PROTECTION TO BE PROVIDED TO MEET APPLICABLE STATE AND O.S.H.A. SAFETY STANDARDS. ALL SUCH TRENCH PROTECTION TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
 2. STORM DRAIN COVER BETWEEN 2' AND 3' SHALL INCLUDE 4" OF RIGID INSULATION, COVER BETWEEN 3' AND 4' SHALL INCLUDE 2" RIGID INSULATION. OTHER UTILITIES: ADD 2" OF RIGID INSULATION FOR EACH FOOT ABOVE MINIMUM DEPTH.
 3. INSTALL WARNING TAPE DIRECTLY ABOVE UTILITIES AT THE TOP OF SUBGRADE.
 4. MINIMUM COVER:
 - 4.1. 2'-0" - STORM DRAIN
 - 4.2. 5'-0" - SEWER
 5. NO TREES SHALL BE PLANTED WITHIN 5' OF A SEWER PIPE OR SERVICE.
 6. THICKNESS AS NOTED BY SURFACE DETAILS.
 7. CONTRACTOR TO COORDINATE WITH TOWN ENGINEER ON MATERIAL SPECIFICATIONS FOR INSTALLATION IN THE PUBLIC ROW.

ISSUED FOR

BY

DATE

SJL

6/17/22

6/17/22

COMMENT RESPONSE

SJL

9/28/22

UTILITY DETAILS - 1

165 LAMBERT ST CO-OP

PORTLAND, MAINE 04103

CLIENT/OWNER OF RECORD:

MAINE COOPERATIVE DEVELOPMENT PARTNERS

PORTLAND, MAINE

DRAWING NAME

PROJECT NAME/ADDRESS

CLIENT/OWNER OF RECORD

MAINE COOPERATIVE DEVELOPMENT PARTNERS

PORTLAND, MAINE

ACORN ENGINEERING, INC.

1145 CIVIL

1145

AS NOTED

DESIGNED BY:

SJL

DRAWN BY:

NPH

CHECKED BY:

WHS

STATE OF MAINE

16506

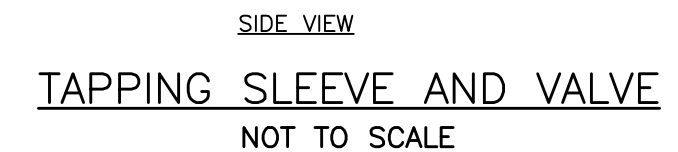
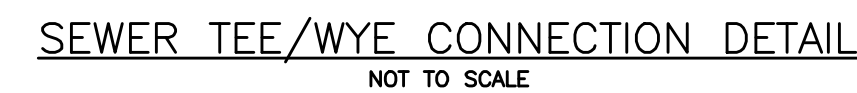
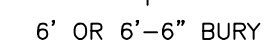
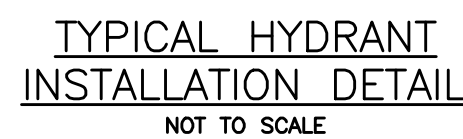
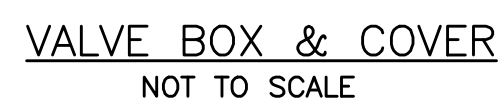
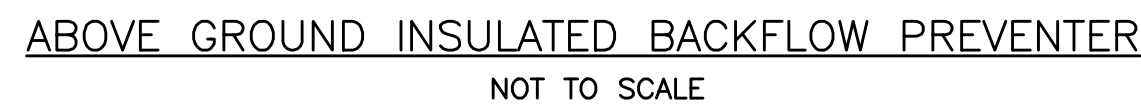
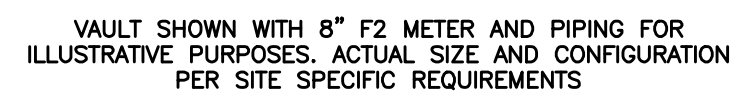
Samuel J. Lebel

PROFESSIONAL ENGINEER

1944

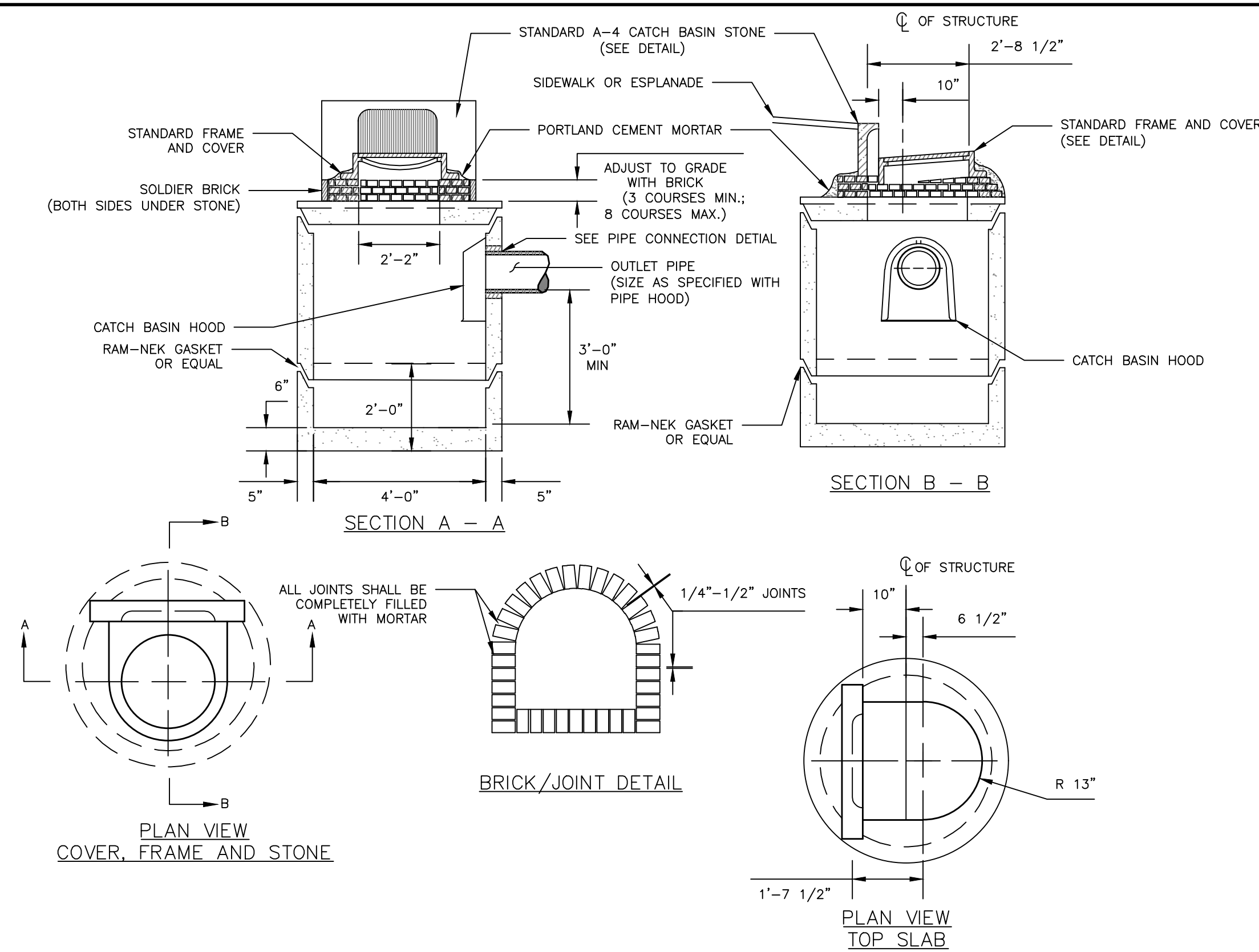
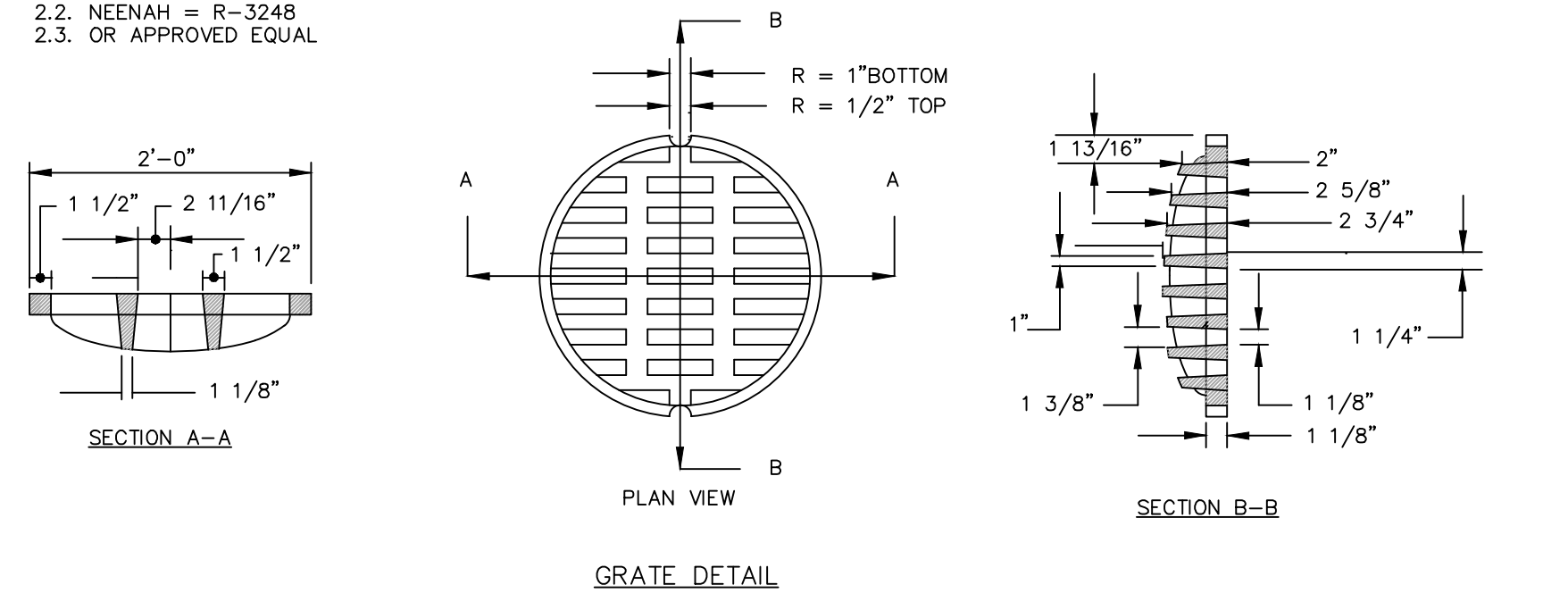
DRAWING NO.

C-43



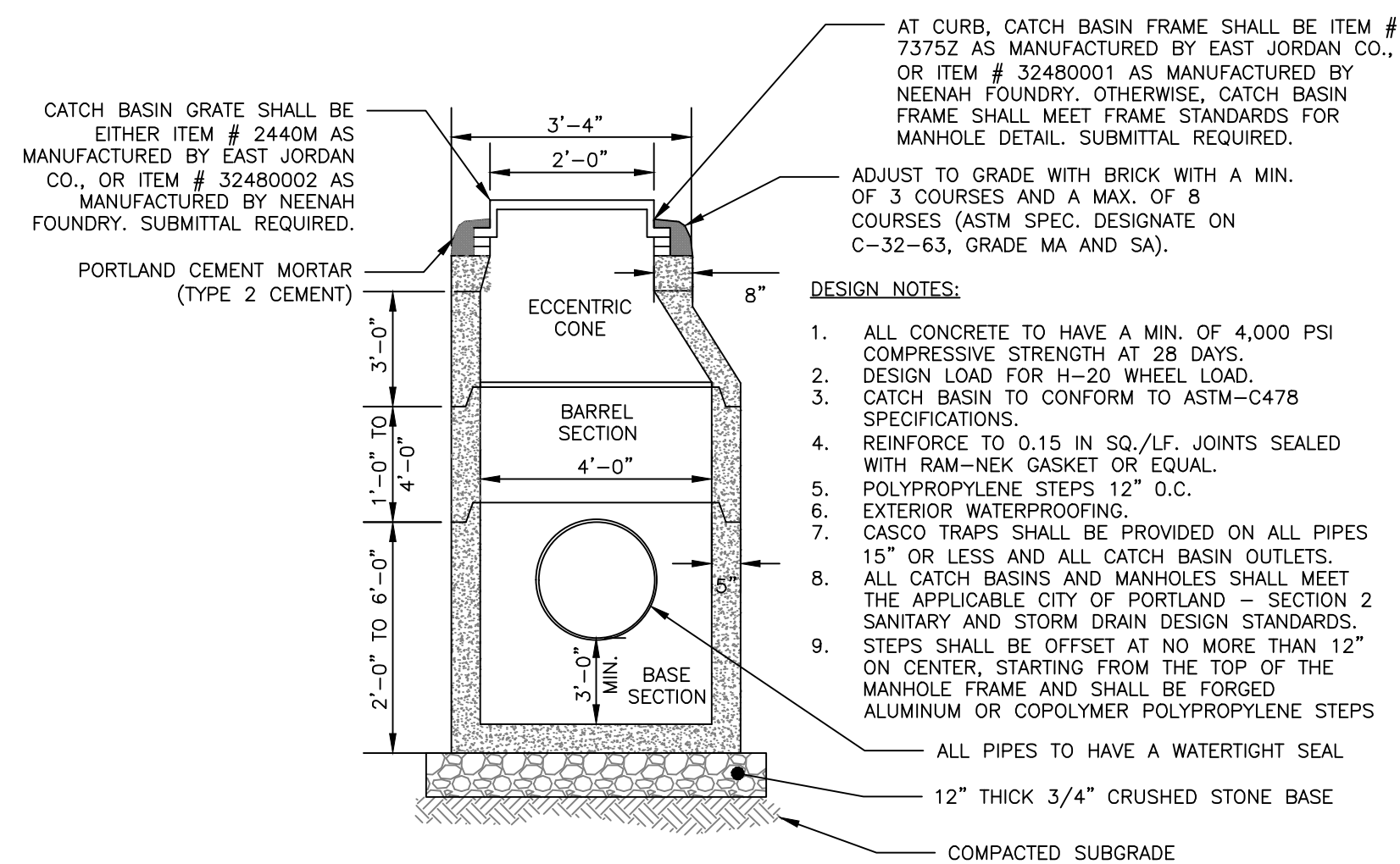
LIGHT POLE BASE
NOT TO SCALE

- NOTES:**
1. APPROVED CATCH BASIN FRAMES:
 - 1.1. EAST JORDAN = 7375Z
 - 1.2. NEENAH = R-3248
 - 1.3. OR APPROVED EQUAL
 2. APPROVED CATCH BASIN GRATES
 - 2.1. EAST JORDAN = 2440M
 - 2.2. NEENAH = R-3248
 - 2.3. OR APPROVED EQUAL



CITY OF PORTLAND PRECAST CONCRETE CATCH BASIN

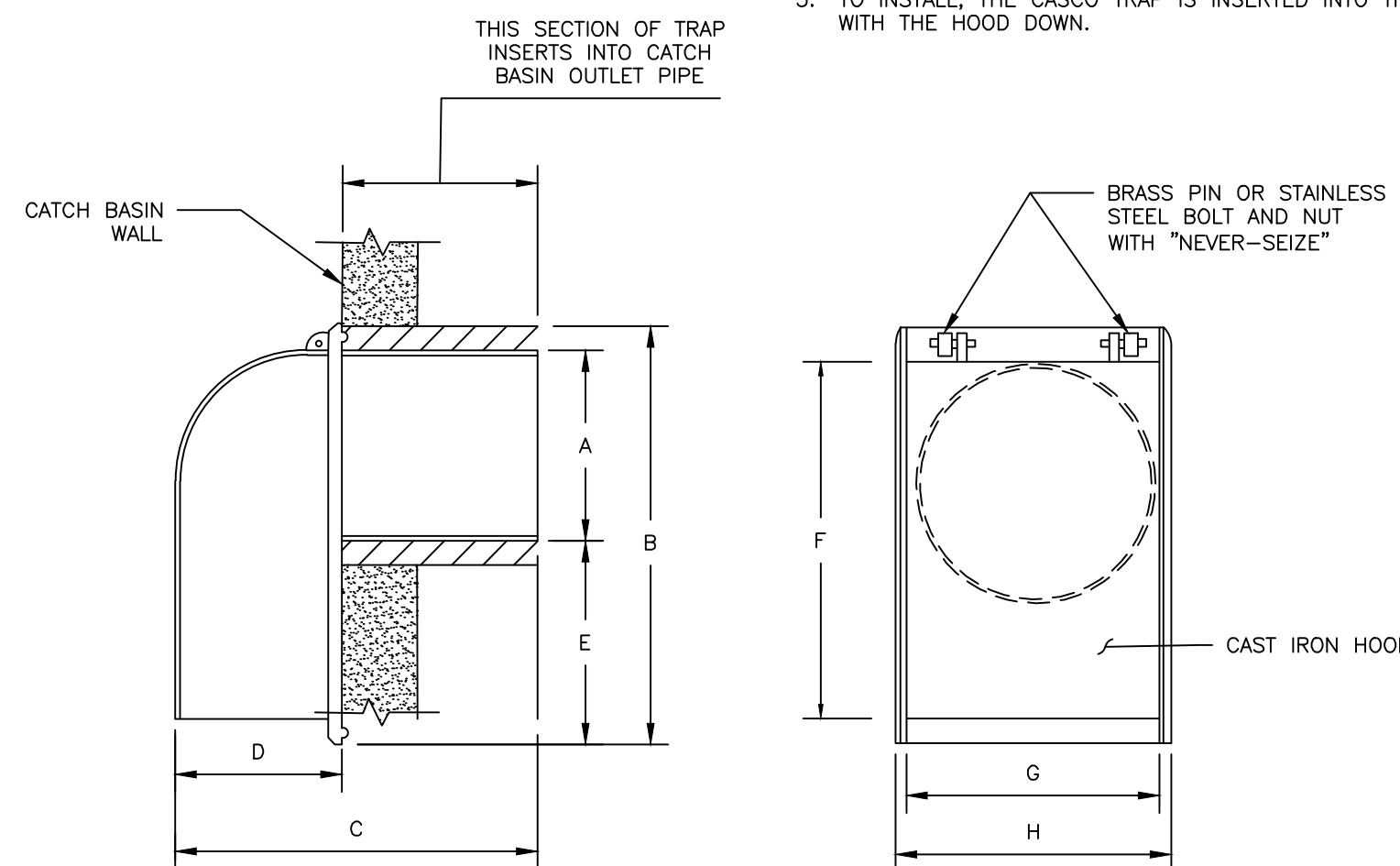
NOT TO SCALE



4'-0" DIAMETER PRECAST CATCH BASIN/MANHOLE
NOT TO SCALE

- NOTES:

1. INSTALL "CASCO TRAP" AS MANUFACTURED BY THE ETHERIDGE FOUNDRY, OR APPROVED EQUIVALENT AS SUPPLIED BY THE LEBARON FOUNDRY, MODEL #L 202 "STANDARD CATCH BASIN TRAP". INSTALL TRAP IN ALL CATCH BASINS WITH A 12" OR 15" OUTLET PIPE.
2. THE CASCO TRAP IS AN ETHERIDGE STYLE DESIGNED TO ELIMINATE CEMENTING OF THE TRAP.
3. TO INSTALL, THE CASCO TRAP IS INSERTED INTO THE SEWER PIPE WITH THE HOOD DOWN.

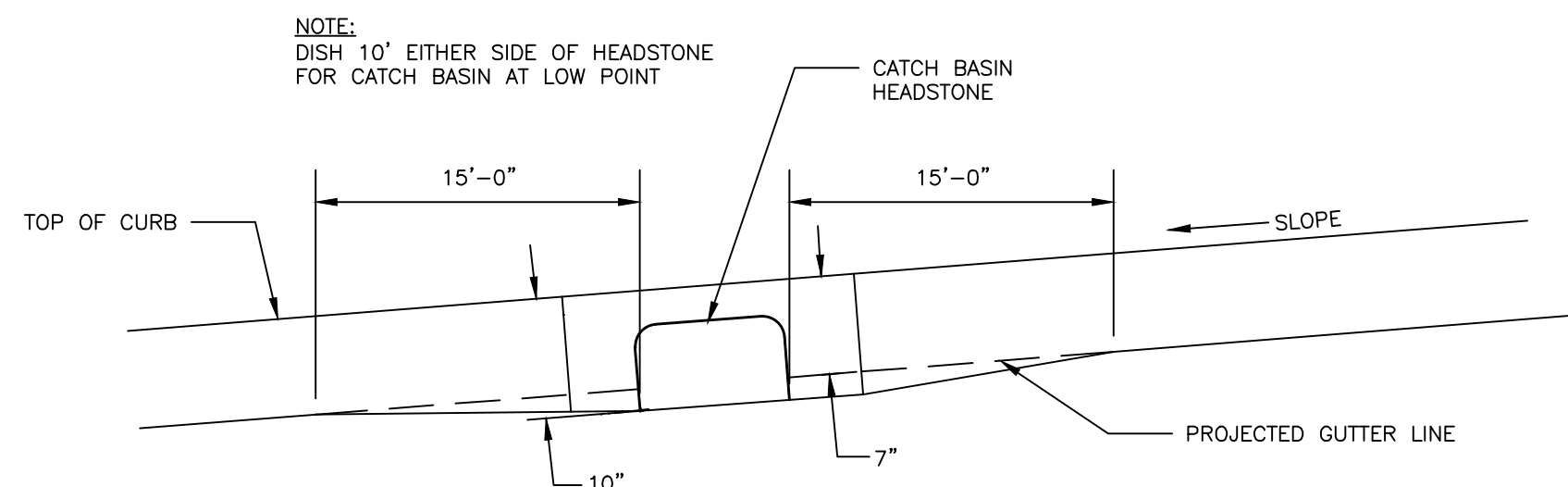


SIZE	A	B	C	D	E	F	G	H
6"	5 1/2	13 3/8	13 3/4	5 3/8	5 7/8	11 5/8	6 1/2	7 1/4
8"	7 1/2	15	15 3/8	5 1/2	5 3/8	13 3/4	8 3/4	9 3/8
10"	9 1/2	16	16 1/4	6	4 1/2	14 1/8	11 1/2	12 3/8
12"	11 1/2	17	22	8	3 1/2	17	12 1/2	13 3/8

(AS MANUFACTURED BY THE ETHERIDGE FOUNDRY IN PORTLAND, ME)

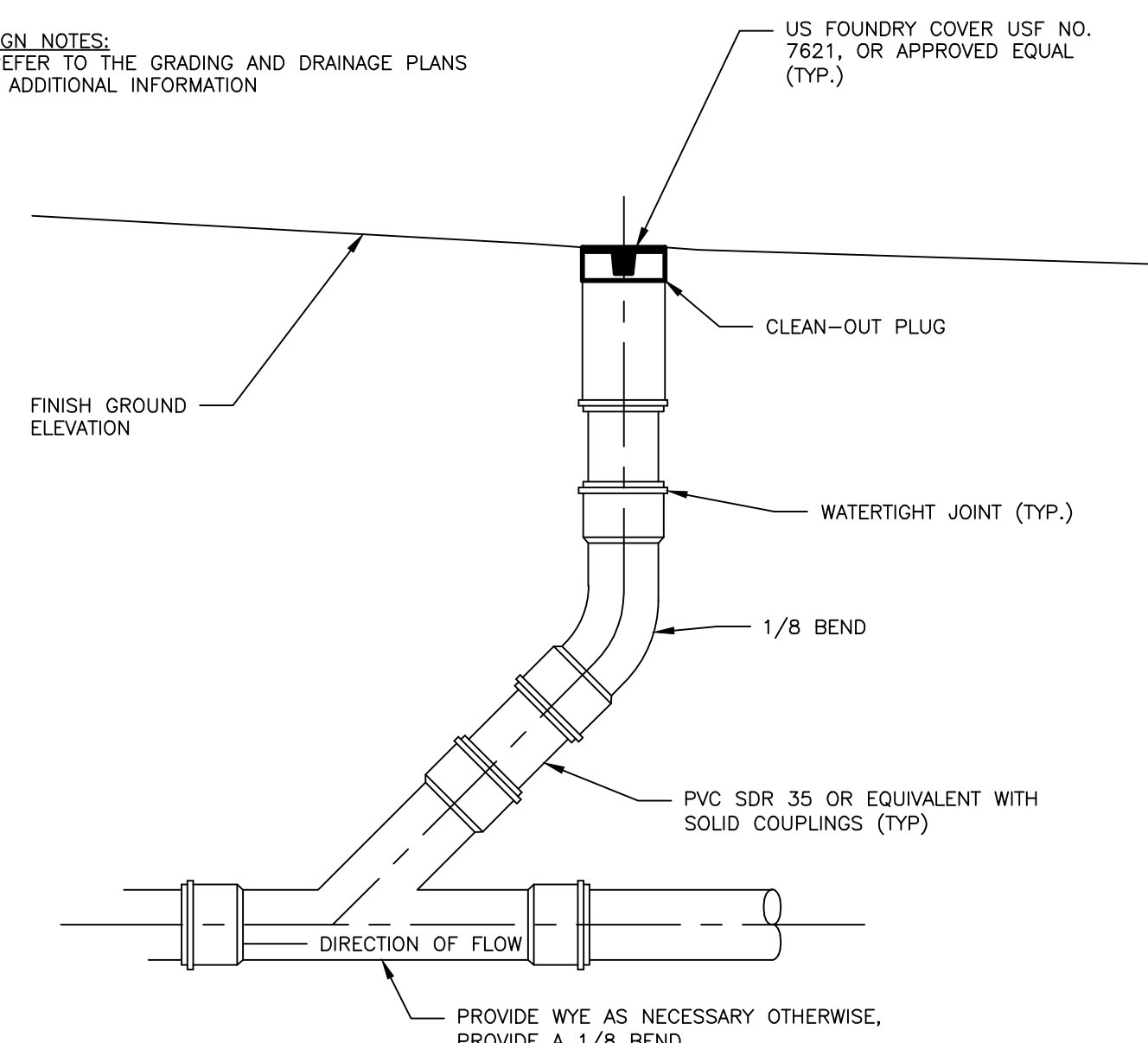
CASCO TRAP DETAIL

NOT TO SCALE

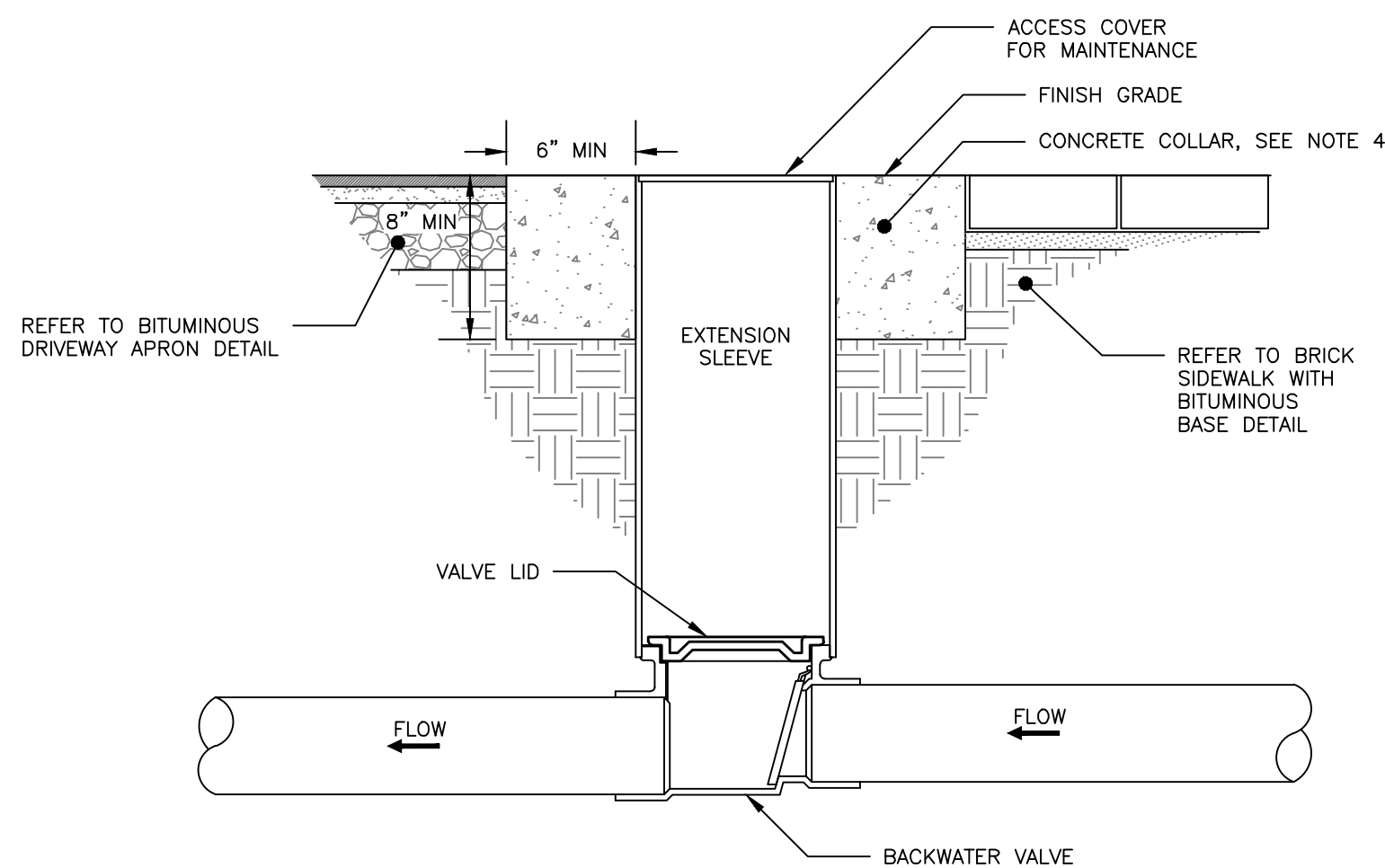


PAVEMENT GRADING ON SLOPES FOR CATCH BASIN AND INLET
NOT TO SCALE

- DESIGN NOTES:**
1. REFER TO THE GRADING AND DRAINAGE PLANS
FOR ADDITIONAL INFORMATION



CLEANOUT DETAIL
NOT TO SCALE



- NOTES:

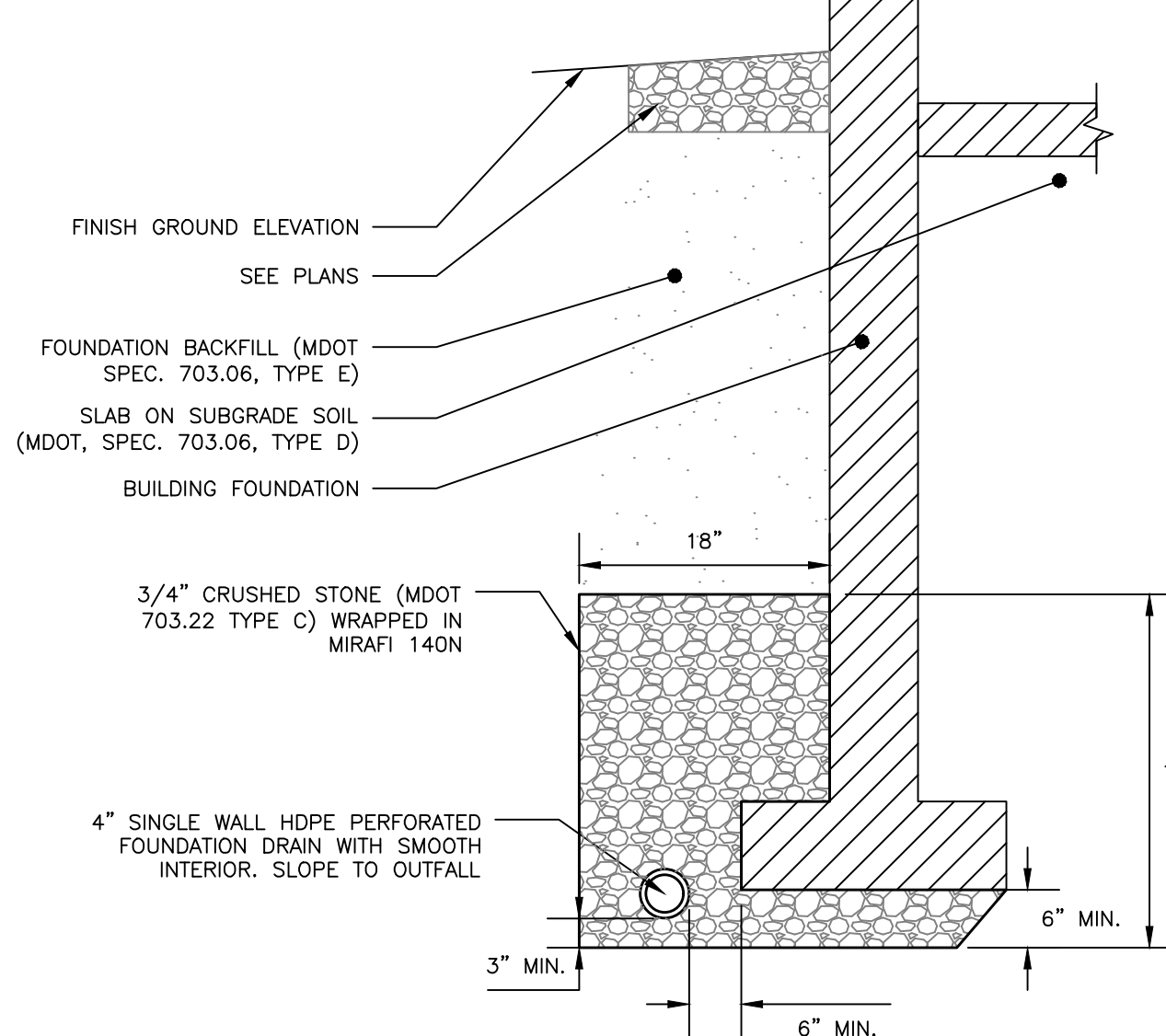
1. BACKFLOW VALVE TO BE PROVIDED BY AGRI DRAIN CORPORATION OR AN APPROVED EQUAL.
2. VALVE TO BE INSTALLED TO MANUFACTURER'S SPECIFICATIONS AND COMPLY WITH RULES AND REGULATIONS AS OUTLINED IN SECTION 2 OF THE CITY OF PORTLAND TECHNICAL MANUAL.
3. VALVE SHALL BE INSTALLED WITH A VALVE BOX AND COVER TO PROVIDE EASY ACCESS AND MAINTENANCE; VALVE COVER SHALL STATE "SEWER" ON LID FLUSH TO SURFACE. REFER TO VALVE & BOX COVER DETAIL FOR ADDITIONAL INFORMATION.
4. CONCRETE COLLAR AT A MINIMUM 24-HOUR COMPRESSIVE STRENGTH OF 3,000 PSI.
5. STRUCTURE TO BE APPLIED WITH DAMP PROOF COATING

BACKFLOW VALVE ASSEMBLY

NOT TO SCALE



1. REFER TO THE BUILDING ARCHITECTS PLANS FOR THE BUILDING FOUNDATION, BACKFILL, ROOF DRAIN, SIDEWALK AND OTHER DETAILS.
2. PERFORATIONS IN UNDERDRAIN PIPE SHALL BE ORIENTED DOWN.
3. INSTALL STONE DRAIN DEEP IN A LOCATIONS SUBJECT TO ROOF RUNOFF. WIDTH SHALL BE 12" MIN. AND THE PROTECTIVE COVER SHALL BE 12" MIN.
4. FOUNDATION WALL FOOTINGS SHALL BE CONSTRUCTED TO A MIN. DEPTH OF 4 FT BELOW ADJACENT FINISH GRADE. REFER TO STRUCTURAL ENGINEERS PLANS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
5. IF FOUNDATION DRAIN DRAINAGE, INSTALL DRAINAGE SOLUTIONS ANIMAL GUARD #4 EXTERNAL PVC OR CORRUGATED PLASTIC PIPE, OR INDUSTRY APPROVED EQUAL.



FOUNDATION DRAIN DETAIL

NOT TO SCALE

PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

[illegible]

DRAINAGE DETAILS - 1

165 LAMBERT ST CO-OP
PORTLAND, MAINE 04103

OWNER OF RECORD:
MAINE COOPERATIVE DEVELOPMENT PARTNERS
PORTLAND, MAINE

DRAWING NAME:

PROJECT NAME/ADDRESS:

CLIENT/OWNER OF RECORD:

PO BOX 3372, PORTLAND MAINE 04101
ACORN ENGINEERING, INC.
(207) 775-2655

FILE: 1145 CIVIL

JN: 1145

SCALE: AS NOTED

DESIGNED BY: SJL

DRAWN BY: NPH

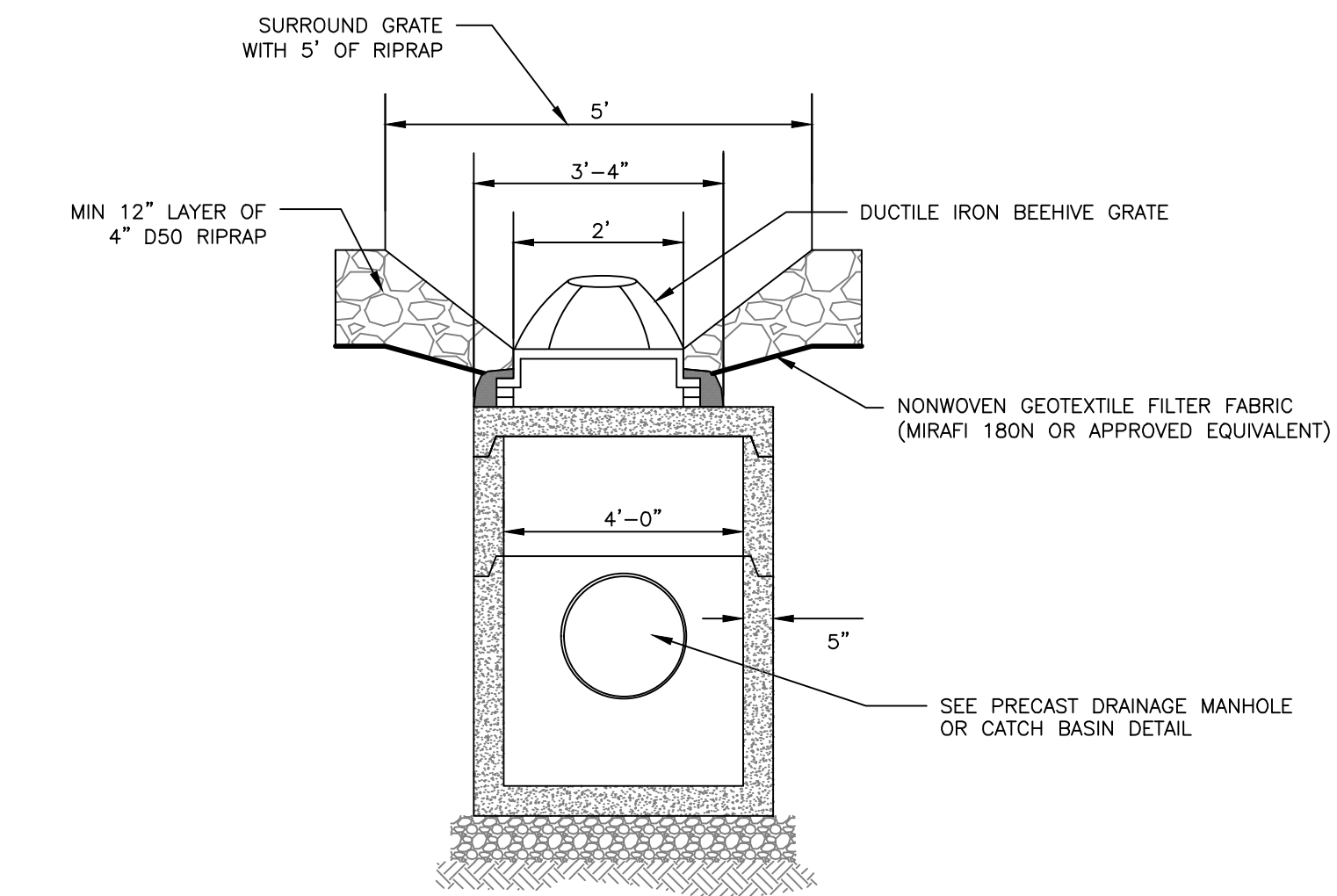
CHECKED BY: WHS

STATE OF MA



DRAWING NO.

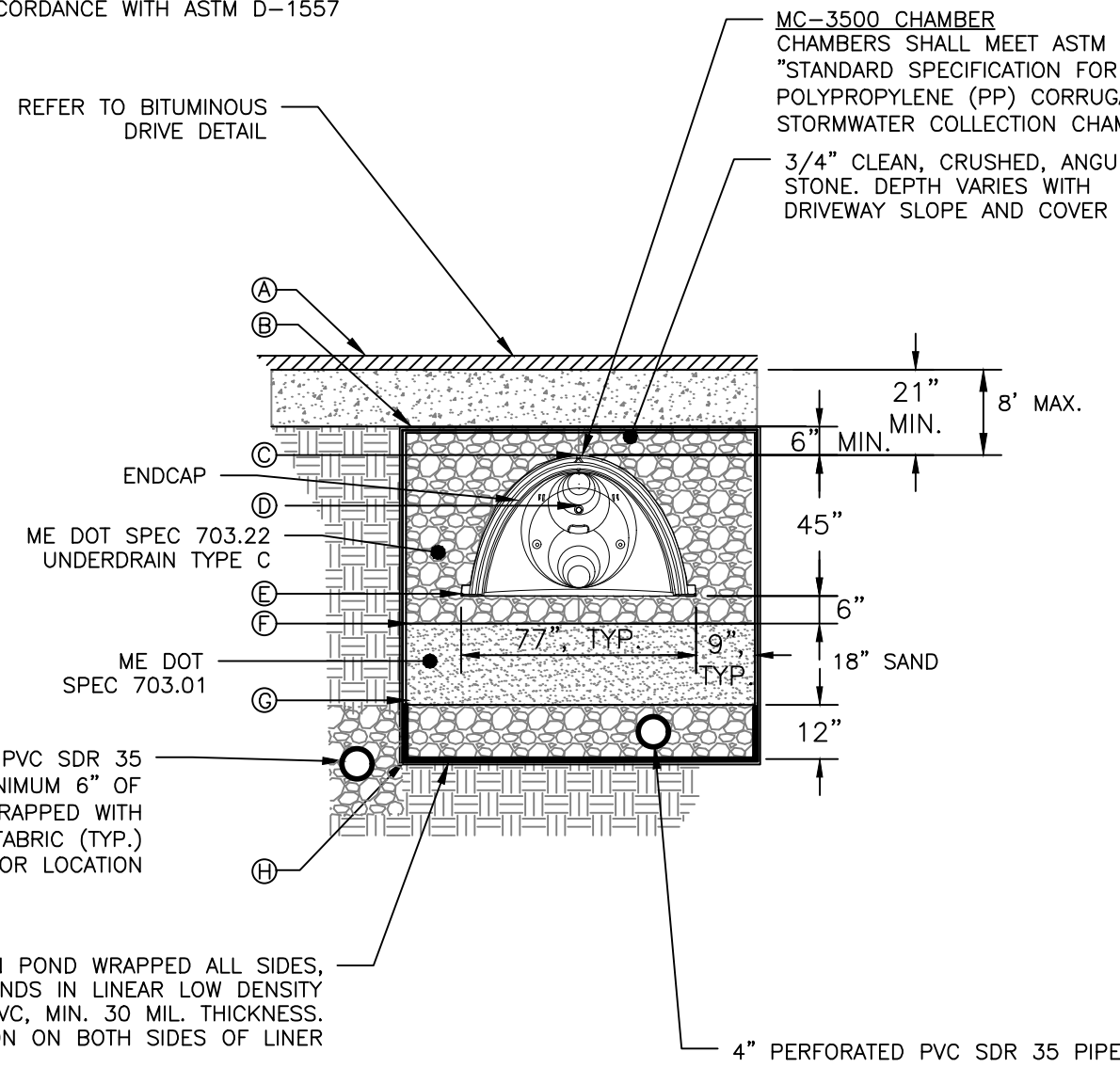
C-45



WASHINGTON AVE NORTHERN DITCH - TERMINAL CATCH BASIN DETAIL
NOT TO SCALE

NOTES:

1. REFER TO THE MAINE DEP TECHNICAL DESIGN MANUAL SECTION 7.3 FOR ADDITIONAL DESIGN DETAILS.
2. SAND LAYER COMPACT IN 6" LIFTS TO 92% MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557



UNDERDRAINED SUB-SURFACE SAND
FILTER TYPICAL CROSS SECTION
NOT TO SCALE

SCHEDULE		
ITEM	USSF 1	USSF 2
A FINISHED GRADE	PER C-30	PER C-30
B TOP OF CRUSHED STONE	109.75'	106.25'
C TOP OF CHAMBER	109.25'	105.75'
D OVERFLOW INV.	108.27'	104.77'
E BOTTOM OF CHAMBER	105.50'	102.00'
F TOP OF SAND	105.00'	101.50'
G BOTTOM OF SAND	103.50'	100.00'
H BOTTOM OF SYSTEM	102.50'	99.00'
ORIFICE DIAMETER *	1.2"	3"

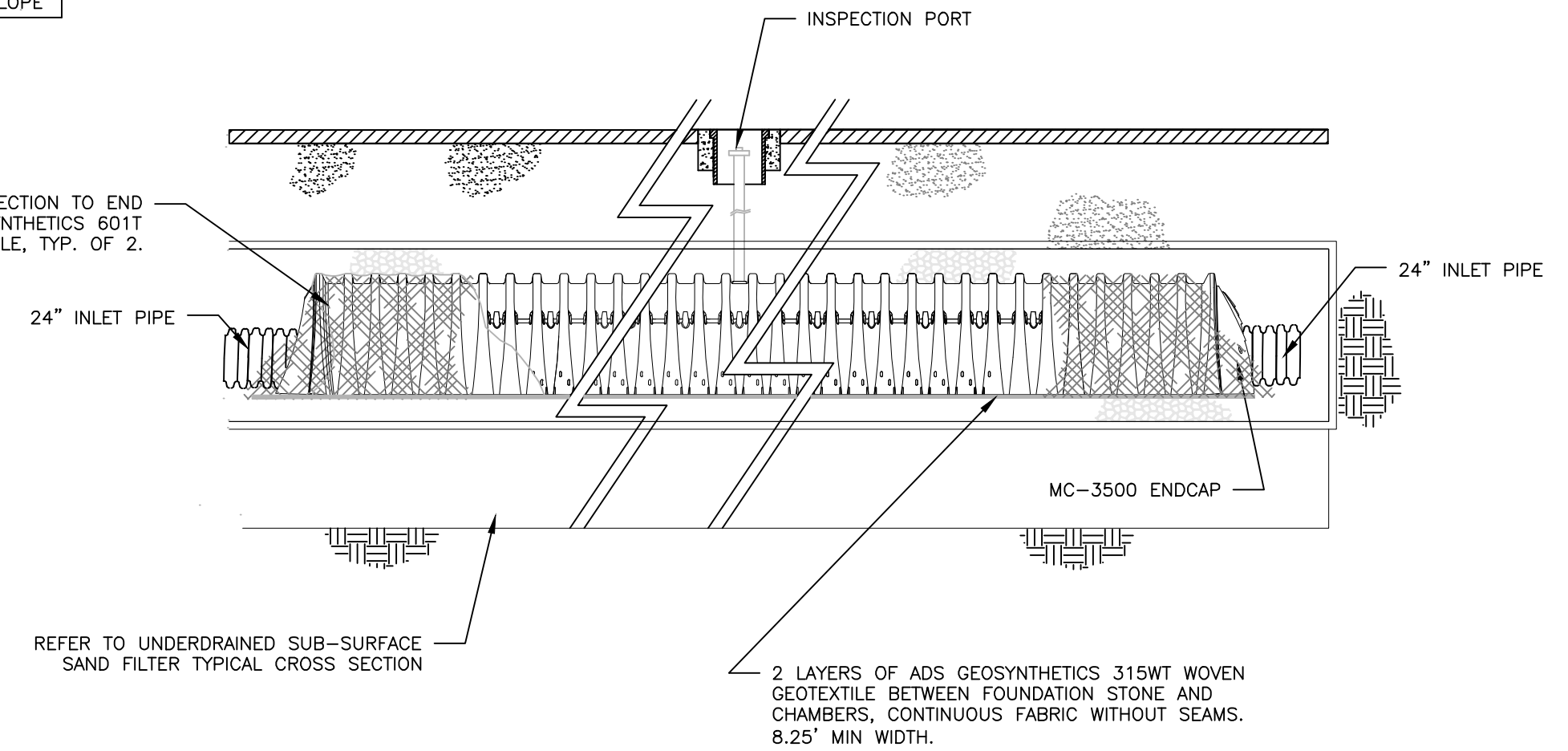
* PROVIDE CAP WITH DRILLED HOLE BONDED AT CONNECTION POINT TO DOWNSTREAM DMH. HOLE TO BE DRILLED AT BOTTOM OF PIPE TO MAINTAIN INVERT SLOPE

MANUFACTURER'S NOTES:

1. ALL DESIGN SPECIFICATIONS FOR STORMTECH MC-3500 CHAMBERS SHALL BE IN ACCORDANCE WITH THE STORMTECH DESIGN MANUAL.
2. THE INSTALLATION OF STORMTECH MC-3500 CHAMBERS SHALL BE IN ACCORDANCE WITH THE LATEST STORMTECH INSTALLATION INSTRUCTIONS.
3. THE CONTRACTOR IS ADVISED TO REVIEW AND UNDERSTAND THE INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING SYSTEM INSTALLATION. CALL 1-888-892-2694 OR VISIT WWW.STORMTECH.COM TO RECEIVE A COPY OF THE LATEST STORMTECH INSTALLATION INSTRUCTIONS.
4. CHAMBERS SHALL MEET THE DESIGN REQUIREMENTS AND LOAD FACTORS SPECIFIED IN SECTION 12.12 OF THE LATEST EDITION OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

ENGINEER'S NOTES:

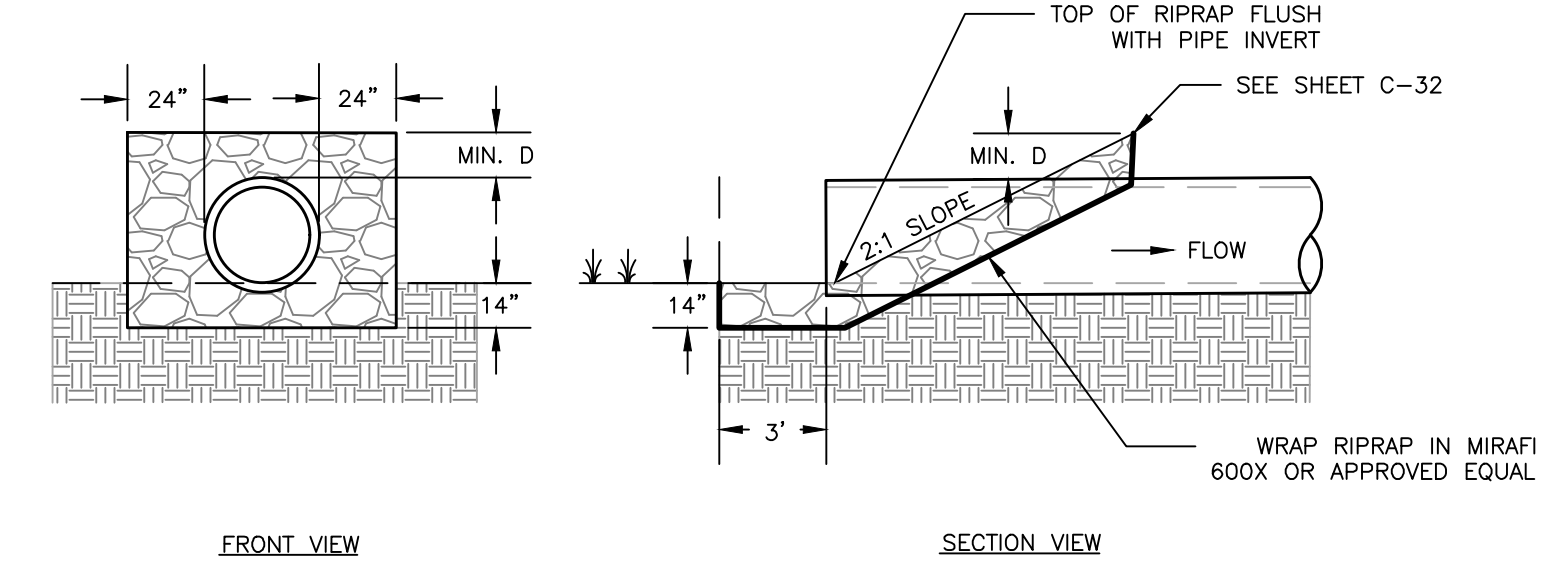
1. THE LAYOUT AND DIMENSION OF THE SUBSURFACE DETENTION MAY BE MODIFIED WITH AN ENGINEER APPROVED EQUIVALENT WHICH PROVIDES EQUAL DETENTION STORAGE AND WATER QUALITY TREATMENT.
2. PER CITY OF PORTLAND REQUIREMENT, THE SUBSURFACE DETENTION SHALL BE INSPECTED BY THE DESIGN ENGINEER AT THE FOLLOWING INTERVALS:
 - AFTER PRELIMINARY CONSTRUCTION OF THE SUBSURFACE DETENTION GRADES
 - ONE SITE VISIT DURING THE INSTALLATION OF THE IMPERVIOUS LINER
 - ONE SITE VISIT AFTER THE UNDERDRAINS ARE INSTALLED BUT BEFORE THEY ARE BACKFILLED
 - DURING THE CONSTRUCTION OF THE SAND FILTER LAYER
 - DURING THE INSTALLATION OF THE STORMTECH ISOLATOR ROW
 - BEFORE BACKFILLING THE STORMTECH UNITS
3. CONTRACTOR TO PROVIDE A MINIMUM 24 HOUR NOTICE BEFORE EACH MILESTONE INSPECTION LISTED UNDER NOTE 2.
4. THE FIRST YEAR OF MAINTENANCE SHALL BE PERFORMED BY THE MANUFACTURER TO ENSURE THAT THE SYSTEM IS OPERATING ACCORDING TO THE ESTABLISHED SPECIFICATIONS.
5. REFERENCE THE MANUFACTURER'S GUIDE FOR THE OPERATION AND MAINTENANCE PLAN.



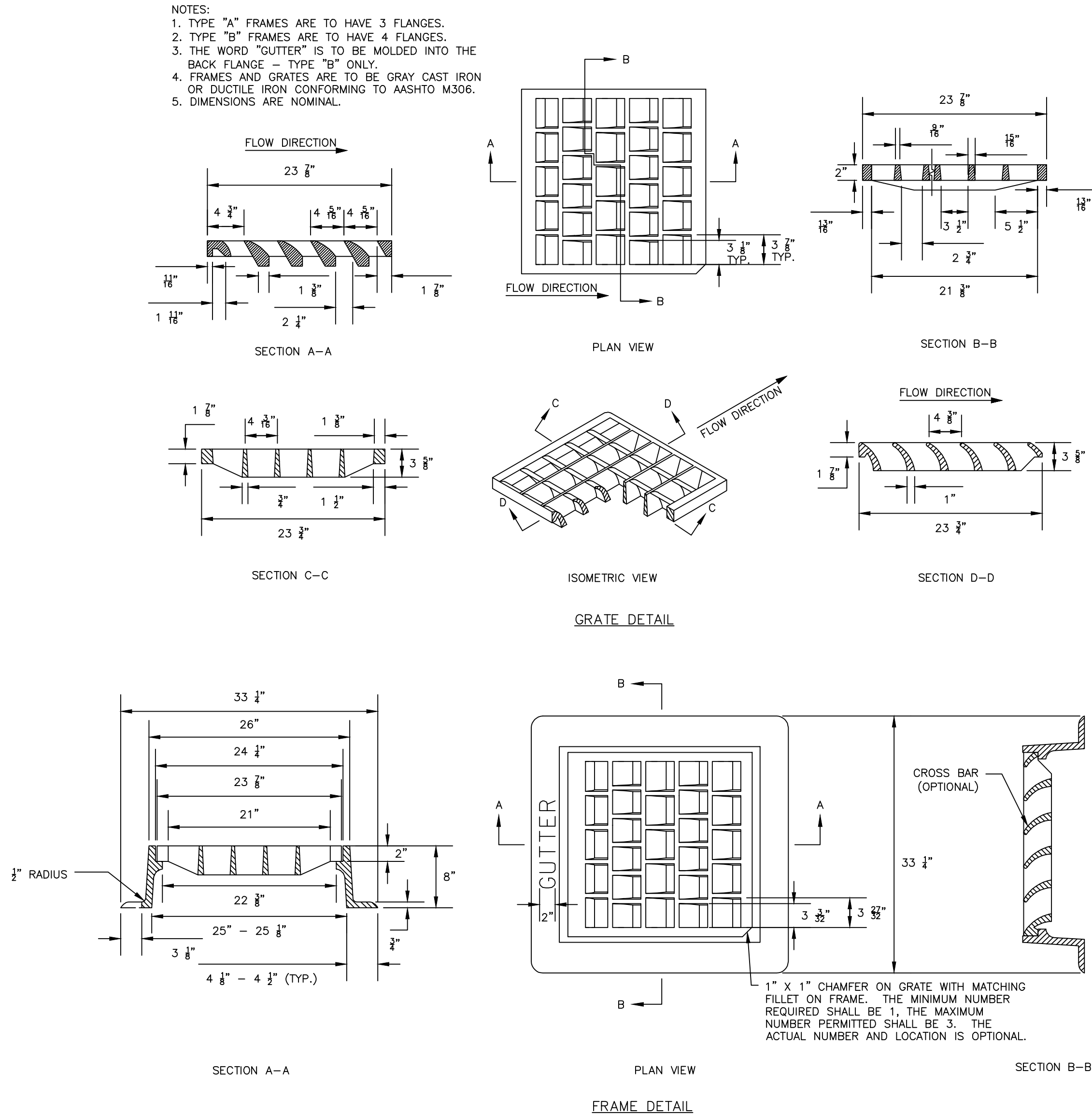
ISOLATOR ROW - PROFILE VIEW
NOT TO SCALE

NOTES:

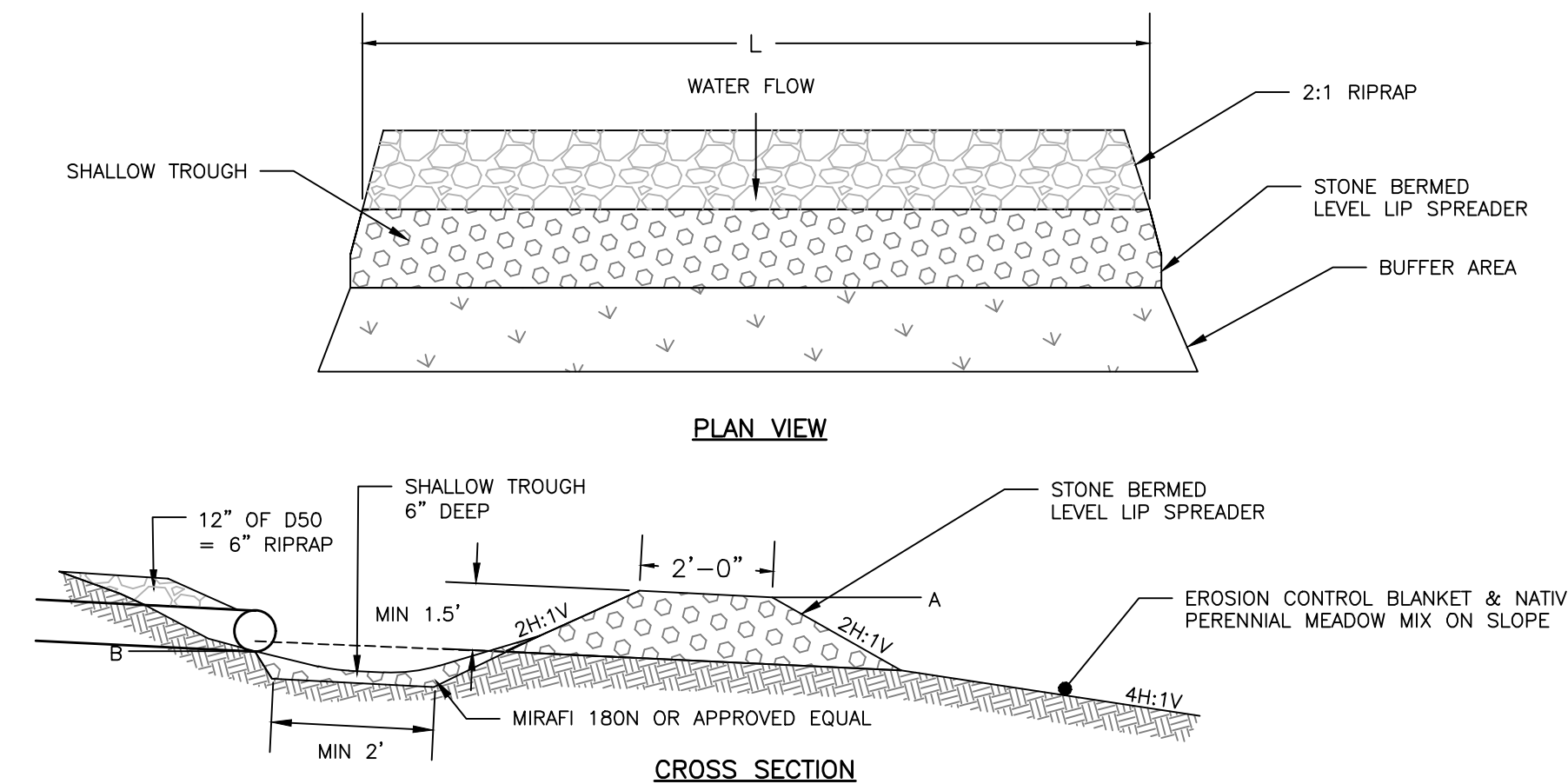
1. RIPRAP SHALL BE DESCRIBED BY M.D.O.T. 703.26 EXCEPT SIZE SHALL BE AS SHOWN.
2. REFERENCE FOR ADDITIONAL INFORMATION: BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL - CULVERT INLET/OUTLET PROTECTION.



RIPRAP INLET APRON DETAIL
NOT TO SCALE



CATCH BASIN FRAME & GRATE - SQUARE
NOT TO SCALE



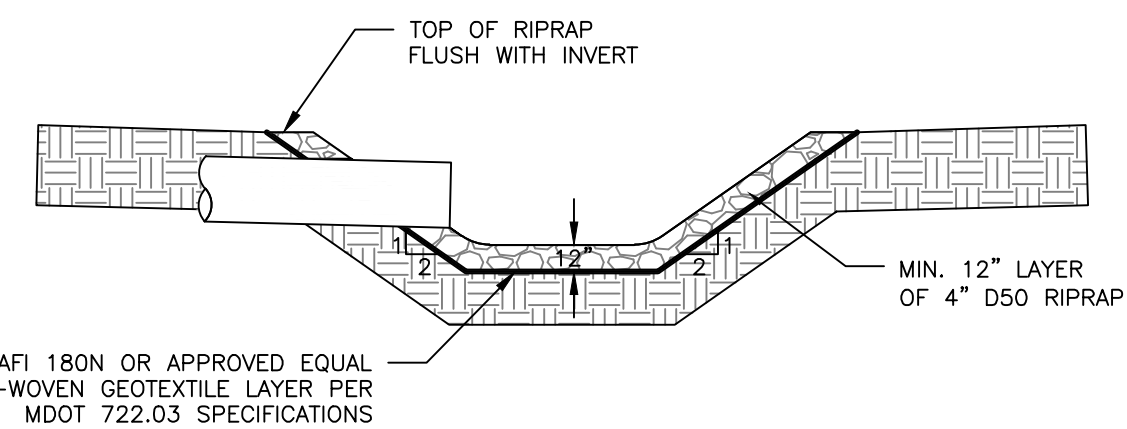
LEVEL LIP SPREADER DETAIL
NOT TO SCALE

BERM STONE SIZE	
SIEVE SIZE	% PASSING BY WEIGHT
12"	100
6"	84-100
3"	63-83
1"	42-55
#4	8-12

NOTES:

1. FIELDSTONE, ROUGH QUARRIED STONE, BLASTED LEDGE ROCK OR TAILINGS ARE ACCEPTABLE BERM MATERIALS.
2. MEDIAN STONE SIZE TO BE APPROX 3 INCHES AT A MAXIMUM SIZE OF 6 INCHES. SEE TABLE.

	LLS1	LLS2
A	104.00'	108.25'
B	102.50'	106.75'
LENGTH	25.00'	25.00'



NOTES:

1. RIPRAP AND NON-WOVEN GEOTEXTILE LAYER TO EXTEND AT LEAST 6" BEYOND CULVERT INVERT.
2. EMBANKMENT FOUNDATION AREA SHALL BE CLEARED OF STUMPS, ROOTS, BRUSH, ETC. TO PROVIDE GOOD CONTACT.

RIPRAP APRON AND PLUNGE POOL
NOT TO SCALE

PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

ISSUED FOR	BY
DATE	DATE

SITE/SUB	SJL
DATE	6/17/22
COMMENT RESPONSE	SJL
DATE	9/28/22

DRAINAGE DETAILS - 2	165 LAMBERT ST CO-OP	PORTLAND, MAINE 04103
DRAWING NAME	PROJECT NAME/ADDRESS	CLIENT/OWNER OF RECORD
PROJECT NAME/ADDRESS	165 LAMBERT ST CO-OP	PORTLAND, MAINE 04103
CLIENT/OWNER OF RECORD	MAINE COOPERATIVE DEVELOPMENT PARTNERS	PORTLAND, MAINE

ACORN ENGINEERING, INC.	ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101	(207) 775-2885

FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS

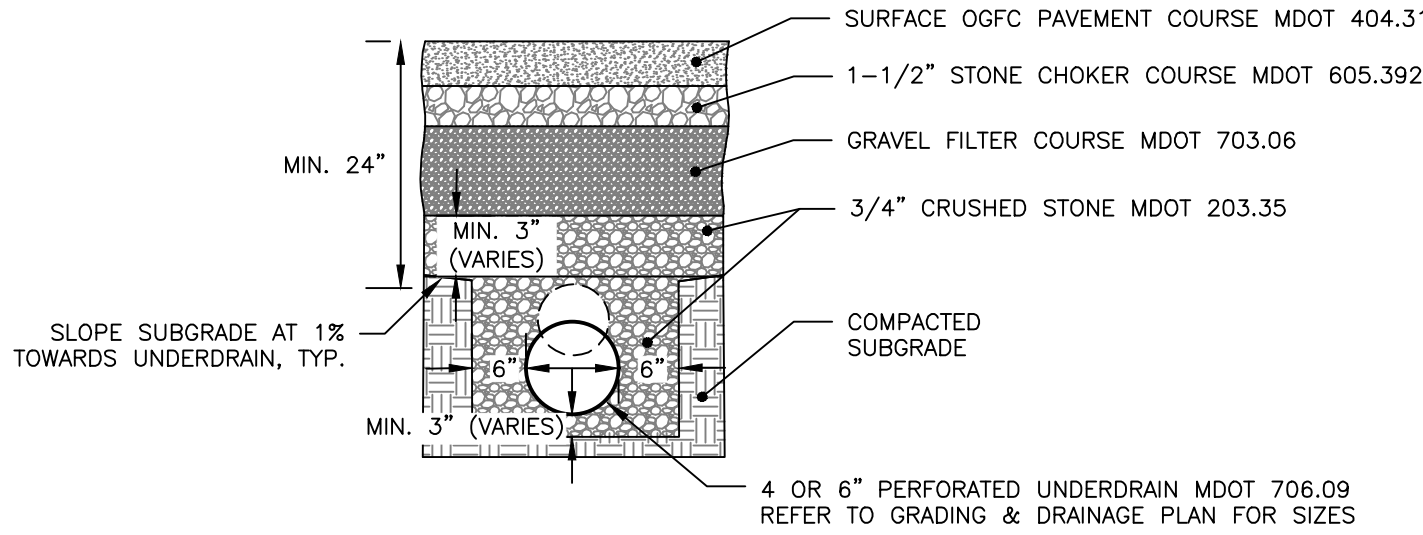
STATE OF MAINE	SAMUEL J. LEBEL
16506	PROFESSIONAL ENGINEER

DRAWING NO.

C-46

NOTES:

- DO NOT COMPACT SUBGRADE.
- COMPACT THE GRAVEL FILTER COURSE TO 95% MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557. DO NOT OVER-COMPACT.
- PAVING OPERATIONS SHALL BE SUBJECT TO THE MINIMUM REQUIREMENTS OF THE MAINE DOT SECTION 401.19 QUALITY CONTROL METHOD D, UNLESS WAIVED BY THE OWNER.
- THE ATMOSPHERIC TEMPERATURE MUST BE 60°F OR HIGHER FOR PLACEMENT OF OGFC.
- INSTALL TACK COAT OF PGAB 64-28 ON BASE OF PAVEMENT AND IN BETWEEN COLD JOINTS (AFTER SAWCUT) AT AN APPLICATION RATE OF .10 TO .14 GALLONS PER SQUARE YARD AT A SPRAYING TEMPERATURE OF 325° F.
- THE ACCEPTABLE TEMPERATURE RANGE FOR OGFC IS ±25 THE PGAB MANUFACTURER'S RECOMMENDED MIXING SAND COMPACTION TEMPERATURE. ANY OGFC TEMPERATURES OUTSIDE OF THIS RANGE SHALL NOT BE PLACED.
- MATERIALS SHALL MEET THE FOLLOWING REQUIREMENTS:
 - PERFORMANCE GRADED ASPHALT BINDER (PGAB) – MDOT 702.01
 - AGGREGATES FOR HMA PAVEMENT – MDOT 703.07 EXCEPT AS NOTED IN TABLE 1
- THE REQUIRED PGAB SHALL BE A STORAGE-STABLE, PRE-BLENDED, HOMOGENEOUS, SBS POLYMER MODIFIED ASPHALT BINDER THAT MEETS PG 70E-28 GRADING REQUIREMENTS IN AASHTO MP 19. THE USE OF RECYCLED ASPHALT PAVEMENT (RAP) WILL NOT BE PERMITTED IN MIXTURES UTILIZING MODIFIED PGAB'S.
- MINERAL FILLER SHALL CONSIST OF FINELY DIVIDED MINERAL MATTER SUCH AS ROCK OR LIMESTONE DUST OR OTHER SUITABLE MATERIAL. AT THE TIME OF USE IT SHALL BE SUFFICIENTLY DRY TO FLOW FREELY AND ESSENTIALLY FREE FROM AGGLOMERATIONS. FILLER SHALL BE FREE FROM ORGANIC IMPURITIES AND HAVE A PLASTICITY INDEX NOT GREATER THAN 4. FILLER MATERIAL FOR THE MIX SHALL MEET AASHTO M17, EXCEPT THAT THE GRADATION REQUIREMENTS OF M17 SHALL NOT APPLY.
- STABILIZING ADDITIVE SHALL CONSIST OF A FIBER STABILIZER, EITHER CELLULOSE OR MINERAL FIBER. THE DOSAGE RATE FOR CELLULOSE SHALL BE APPROXIMATELY 0.3 PERCENT BY TOTAL MIXTURE MASS AND SUFFICIENT TO PREVENT DRAINDOWN. CELLULOSE FIBERS SHALL CONFORM TO THE PROPERTIES OUTLINED IN TABLE 2. FOR MINERAL FIBERS, THE DOSAGE RATE SHALL BE APPROXIMATELY 0.4 PERCENT BY TOTAL MIXTURE MASS AND SUFFICIENT TO PREVENT DRAINDOWN. MINERAL FIBERS SHALL CONFORM TO THE PROPERTIES OF TABLE 3.
- COMPACTION OF THE OGFC SHALL INCLUDE A MINIMUM OF 3 PASSES OF A STEEL ROLLER OPERATED IN STATIC MODE. NO TRAFFIC SHALL BE ALLOWED ON THE PAVEMENT FOR A MINIMUM OF 24 HOURS AFTER COMPACTION.
- PAVERS SHALL BE TRACK MOUNTED.



THICKNESS OF LAYERS	
STANDARD	LAYERS
4"	OPEN-GRADED FRICTION COURSE MDOT 404.31
4"	1-1/2" STONE CHOKER COURSE MDOT 605.392
10"	GRAVEL FILTER COURSE MDOT 703.06 TYPE D (4-7% FINES)
VARIES – MIN. 6"	3/4" CRUSHED STONE MDOT 203.35

POROUS PAVEMENT DETAILS
NOT TO SCALE

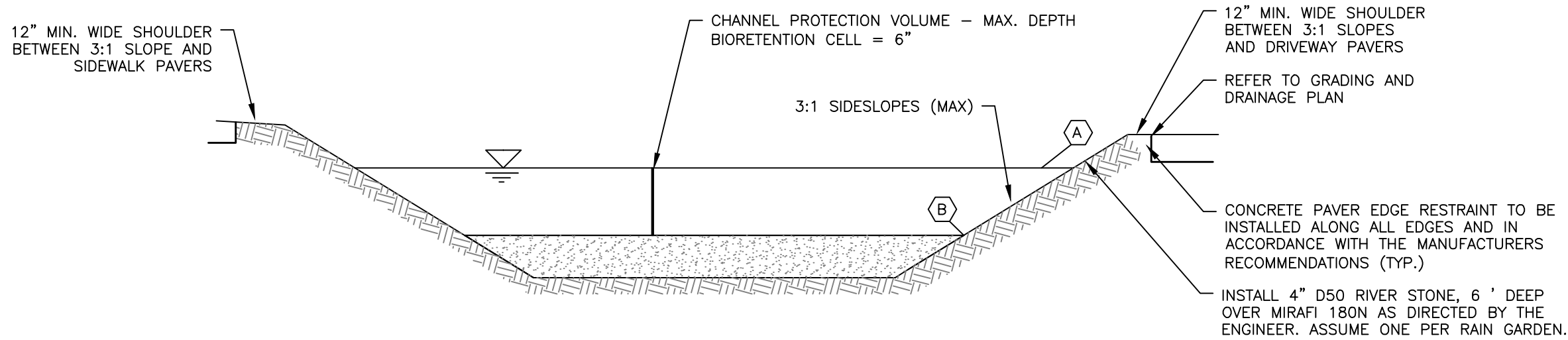
NOTES:

- THE SIDESLOPES SHALL BE STABILIZED WITH A MIN. OF 4" LOAM, EROSION CONTROL BLANKETS SC150BN BY NORTH AMERICAN GREEN OR APPROVED EQUAL AND A CONSERVATION SEED MIX.
- LIGHT COMPACTION SOIL FILTER AND PIPE BEDDING MATERIAL. (90 TO 92% STANDARD PROCTOR). TESTING SHALL BE PERFORMED BY A QUALIFIED MATERIAL TESTING FIRM.
- THE SOIL FILTER MEDIA SHALL NOT BE CONSTRUCTED UNTIL THE AREA DRAINING TO THE BASIN HAS BEEN PERMANENTLY STABILIZED.
- A LANDSCAPE DESIGNER OR ARCHITECT SHALL SELECT THE APPROPRIATE PLANTS FOR THE BIORETENTION CELL FOR THE SITE CONDITIONS. PLANTING PLAN BY OTHERS.
- MINIMUM UNDERDRAIN SLOPE 0.0025.
- TESTING: SIEVE ANALYSIS INCLUDING HYDROMETER TESTING FOR CLAY CONTENT FOR EACH LAYER SHALL BE PERFORMED BY A QUALIFIED SOIL TESTING LABORATORY AND SUBMITTED TO THE PROJECT ENGINEER FOR APPROVAL 2 WEEKS PRIOR TO CONSTRUCTION. ALL TESTING AND SUBMITTALS SHALL BE IN ACCORDANCE WITH THE MOST RECENT VERSION OF THE MAINE DEP – TECHNICAL DESIGN MANUAL SECTION 7.2.5 TESTING AND SUBMITTALS.
- ACORN ENGINEERING, INC., RECOMMENDS THE SOIL FILTER LAYER BE SUPPLIED BY JONES ASSOCIATES, INC., AUBURN, ME.

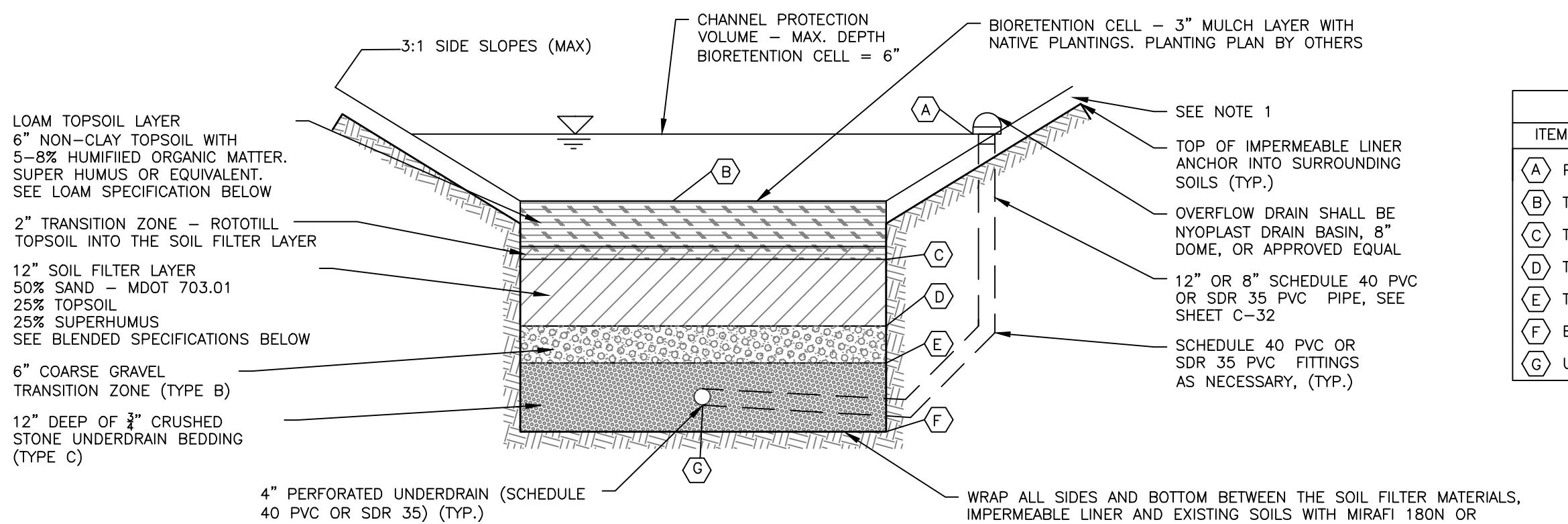
CONSTRUCTION OBSERVATION:

CONSTRUCTION OBSERVATION SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION BY ACORN ENGINEERING. THE CONTRACTOR OR OWNERS REPRESENTATIVE SHALL NOTIFY ACORN ENGINEERING A MINIMUM 48 HOURS OR 2 BUSINESS DAY WHICH EVER IS GREATER PRIOR TO ANY OF THE PHASES OF CONSTRUCTION LISTED BELOW SO THAT THE FOLLOWING SITE VISITS MAY BE SCHEDULED.

- ONE SITE VISIT AFTER PRELIMINARY CONSTRUCTION OF THE BIORETENTION CELL GRADES;
- ONE SITE VISIT DURING THE INSTALLATION OF THE IMPERVIOUS LINER.
- ONE SITE VISIT AFTER THE UNDER DRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED.
- ONE SITE VISIT DURING THE CONSTRUCTION OF THE SOIL FILTER LAYER.
- ONE SITE VISIT DURING THE CONSTRUCTION OF THE TOPSOIL LAYER.
- ONE SITE VISIT DURING THE FLOODING OF THE BIORETENTION CELL, IF REQUIRED.



SOIL FILTER CROSS SECTION



SOIL FILTER SIDE VIEW

RAIN GARDEN OR BIORETENTION
CELL DETAIL
NOT TO SCALE

TABLE 1 – AGGREGATE REQUIREMENTS

CRITERIA	TEST METHOD	SPECIFIED MINIMUM	SPECIFIED MAXIMUM
MICRO-DEVAL	AASHTO TP 58-99	–	18.0
FLAT & ELONGATED, %	3 TO 1		
	ASTM D4791	–	20
	ASTM D4791	–	5
FRACTURED FACES, %	ONE FACE	100	–
	TWO FACES	90	–
FRACTURED FACES, %	AASHTO T176	50	–
UNCOMPACTED VOID CONTENT OF FINE AGGREGATE	AASHTO T304	45	–

TABLE 2 – CELLULOSE FIBER

PROPERTY	REQUIREMENTS
METHOD A – ALPINE SIEVE ANALYSIS	
	6 MM (0.25") MAXIMUM
FIBER LENGTH	70 ± 10%
PASSING 0.150 MM (NO. 100) SIEVE	18 ± 5% NON-VOLATILES
ASH CONTENT	7.5 ± 1.0
PH	5.0 ± 1.0 (TIMES FIBER MASS)
OIL ABSORPTION	LESS THAN 5.0% (BY MASS)
MOISTURE CONTENT	

TABLE 3 – MINERAL FIBER

SIEVE ANALYSIS	
FIBER LENGTH	6 MM (0.25") MAXIMUM MEAN TEST VALUE
THICKNESS	0.050 MM (0.002") MAXIMUM MEAN TEST VALUE
SHOT CONTENT	
0.250 MM (NO. 60) SIEVE	90 ± 5% PASSING
0.060 MM (NO. 230) SIEVE	70 ± 10% PASSING

TABLE 4 – AGGREGATE GRADATION

SIEVE DESIGNATION	NOMINAL MAXIMUM AGGREGATE SIZE-CONTROL POINTS-PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVES (COMBINED AGGREGATE)
19 MM	100
12.5 MM	85-100
9.5 MM	55-75
4.75 MM	10-25
2.36 MM	5-10
0.075 MM	2.0-4.0

TABLE 5 – DESIGN CRITERIA

AIR VOIDS @ Ndesign	20.0 %
BINDER CONTENT	6.0 % MIN.
VCAmix	LESS THAN VCA _{IRC}
DRAINDOWN	0.3 % MAXIMUM (AASHTO T 305)
GYRATIONS @ Ndesign	50

OGFC MIX CRITERIA:

6" LOAM TOPSOIL LAYER SPECIFICATION	
SIEVE SIZE	% PASSING BY WEIGHT
#4	75-95
#10	60-90
#40	35-85
#200	20-70
1. CLAY FRACTION <10% PASSING THE #200 SIEVE.*	
2. LOAM SHALL BE LOOSE AND FRIABLE AND SHALL BE FREE FROM ADMIXTURE OF SUBSOIL, REFUSE, LARGE STONES, CLOUDS OR ROOTS OR RHIZOMES OR "WITCH GRASS" OR OTHER UNDESIRABLE GRASSES.	

*<10% CLAY PASSING THE #200 SIEVE ALLOWED PER EMAIL FROM MARIANNE HUBERT – MDEP TO WILL SAVAGE DATED 9/20/13

SOIL FILTER BED – SUPERHUMUS OR EQUIV. SPECIFICATION	
SIEVE SIZE	% PASSING BY WEIGHT
1"	100
#200	0-5
MINIMAL CLAY CONTENT, NO MORE THAN 3-5% PASSING #200 SIEVE	

12" SOIL FILTER BED – BLENDED SAND, LOAM, SUPERHUMUS SIEVE ANALYSIS	
SIEVE SIZE	% PASSING BY WEIGHT
#10	85-100
#20	70-100
#60	15-40
#200	8-15
1. CLAY FRACTION <2% PASSING THE #200 SIEVE.	
2. SUPERHUMUS OR EQUIVALENT	

SOIL FILTER BED – TRANSITION ZONE (TYPE B)	
SIEVE SIZE	% PASSING BY WEIGHT
1"	90-100
1/2"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5

SOIL FILTER BED – UNDERDRAIN BEDDING (TYPE C)	
SIEVE SIZE	% PASSING BY WEIGHT
1"	100
3/4"	90-100
3/8"	0-75
#4	0-25
#10	0-5

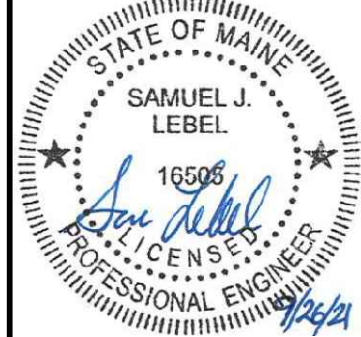
SCHEDULE		
ITEM	BIOCELL 1	BIOCELL 2
(A) PROPOSED OVERFLOW RIM	109.75'	103.00'
(B) TOP OF LOAM TOPSOIL LAYER	108.00'	103.00'
(C) TOP OF SOIL FILTER	107.50'	102.50'
(D) TOP OF GRAVEL	106.50'	101.50'
(E) TOP OF STONE	106.00'	101.00'
(F) BOTTOM OF STONE	105.00'	100.00'
(G) UNDERDRAIN INVERT	105.50'	100.25'

ISSUED FOR	BY DATE
SITE/SUB	SJL 6/17/22
COMMENT RESPONSE	SJL 9/28/22

DRAINAGE DETAILS – 3	165 LAMBERT ST CO-OP PORTLAND, MAINE 04103	MAINE COOPERATIVE DEVELOPMENT PARTNERS PORTLAND, MAINE
DRAWING NAME:	PROJECT NAME/ADDRESS:	CLIENT/OWNER OF RECORD:

ACORN ENGINEERING, INC.	ENGINEERING, INC.
PO BOX 3372, PORTLAND MAINE 04101	(207) 775-2885
THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM ACORN ENGINEERING, INC. OR OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO ACORN ENGINEERING, INC.	

FILE:	1145_CIVIL
JN:	1145
SCALE:	AS NOTED
DESIGNED BY:	SJL
DRAWN BY:	NPH
CHECKED BY:	WHS



DRAWING NO.

C-47

PERMIT LEVEL
NOT ISSUED FOR
CONSTRUCTION

To: Chair Stanley and Members of the Portland Planning Board
From: Zach Powell, Senior Planner
Date: October 7, 2022
Re: Institutional Overlay Zone, Map and Text Amendment: Roux Institute/IDEALS
Applicant: IDEALS/Roux Institute
Project ID: ZN-001934-2022
Meeting Date: October 11, 2022

I. INTRODUCTION

The Initiative for Digital Engineering and Life Sciences (IDEALS) has submitted a zoning map and text amendment application on behalf of The Roux Institute at Northeastern University to amend the existing Institutional Overlay Zone (IOZ) regulations to permit The Roux Institute at Northeastern University to pursue an IOZ as an identified major



Figure 1: Artist rendering of Campus. View from I-295 NB

City institution, change the underlying zoning of the site from I-M to B-5, and adopt a new IOZ for this property. The requested actions would facilitate the future development of a mixed-use campus for The Roux Institute, including academic buildings, office, lab, and incubator space, retail, hotel, and housing as well as publicly accessible open space.

The process for designation of an IOZ requires the institution to prepare an Institutional Development Plan (IDP), which is a proactive planning document for identifying and addressing anticipated change and growth by an institution. The IOZ also requires that a Regulatory Framework be submitted, to be included in the Land Use Code, which identifies the land area to be included on the zoning map as the Institutional Overlay Zone along with associated use, dimensional and design requirements. The Planning Board reviews and recommends to City Council the Regulatory Framework and the IOZ boundaries.

In addition to the IOZ, the applicant has requested that the subject property be rezoned from Moderate Impact Industrial (I-M) and Residential (R-3) to Urban Commercial (B-5) mixed-use zone. The purpose of the B-5 is:

“To provide for areas of the peninsula near the downtown where a mixture of uses, including marine, industrial, commercial, and residential uses are encouraged. The B-5 and B-5b is typically characterized by larger underdeveloped lots with potential for denser, clustered, urban mixed-use development and more efficient use of existing land and building. It is anticipated that the dense, mixed-uses of the B-5 will rely on a shared infrastructure system, including service alleys, parking lots, public transportation facilities, stormwater management, and driveways.”

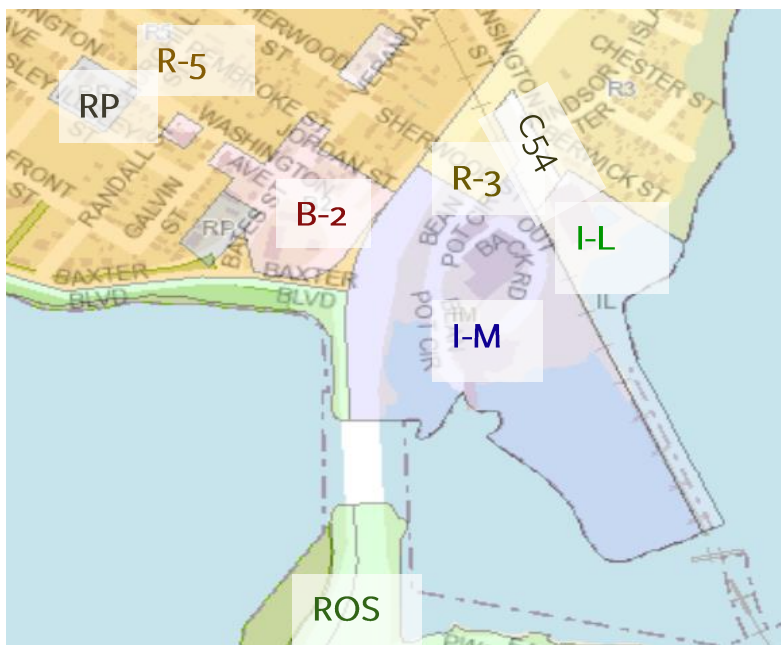


Figure 2: Map of the current zoning

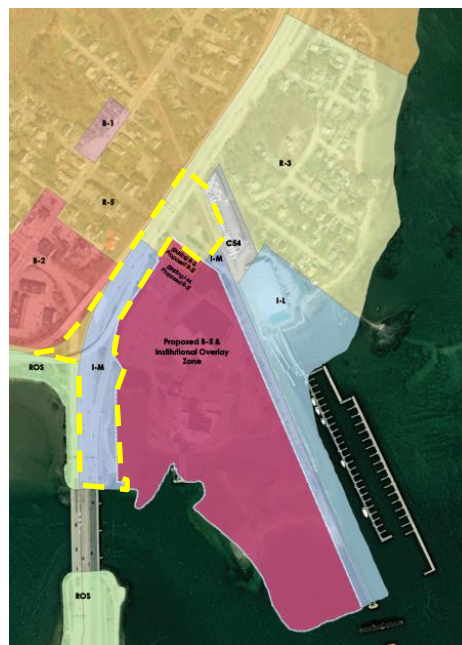


Figure 3: Map of proposed zoning with areas for potential B-5 inclusion outlined in yellow.

The proposed campus aligns with the B-5 purpose statement by redeveloping a currently vacant lot to provide mixed-use development that relies on a shared infrastructure system and provides opportunities for job generating uses. As discussed in prior staff reports, the rezoning to B-5 also provides greater alignment to the proposed programming of the site and facilitates mixed-use development with the ability for increased open space through the dimensional standards and the provision of both residential, commercial, and low-impact industrial uses. This memorandum will continue that discussion by discussing the anticipated transportation impacts of development in the Long Term (~20 years) between the current zoning at maximum build out vs. the proposed B-5 zoning & IDP. Further discussion on the B-5 rezoning will continue at the October 25, 2022 workshop to recap how the proposed development aligns with the B-5 zoning and identify opportunities for the inclusion of adjacent parcels in the B-5 rezoning, specifically DOT right of way and the parcel outlined in yellow in Figure 3.

Review of the IOZ has spanned across a number of Planning Board Workshops, with the first two workshops (June 14 and August 9, 2022) serving as an opportunity to provide a comprehensive overview of the project, phasing and design. This third workshop will focus on transportation. Future workshop topics on October 25th will include:

- Community engagement
- Infrastructure
- Proposed rezoning of the base zones to B-5
- A summary of revisions informed from previous workshop appearances

For a comprehensive overview of the project, please refer to the memorandum prepared for the first workshop at the following link: <https://portlandme.civicclerk.com/Web/GenFile.aspx?ar=2161>

For an overview of the design elements of the project, please refer to the memorandum prepared for the second workshop at the following link: <https://portlandme.civicclerk.com/Web/Player.aspx?id=2769&key=-1&mod=-1&mk=-1&nov=0>

The subsequent memorandum is primarily focused on the major transportation elements of the proposal that should be addressed prior to individual site plan submissions. These include:

- An assessment of the existing transportation system;
- An analysis of the projected changes in capacity of motorized & non-motorized routes and parking, and
- A transportation, access, and circulation plan that compiles and synthesizes transportation analyses to identify potential improvements, mitigation measures, and major milestones for future review phases (e.g. Traffic Movement Permit, Transportation Demand Management Plan).

The Planning and Urban Development Department mailed 153 notices advertising this meeting to property owners within 500 feet of the site. A legal advertisement ran in the October 1, 2022 edition of the *Portland Press Herald*.

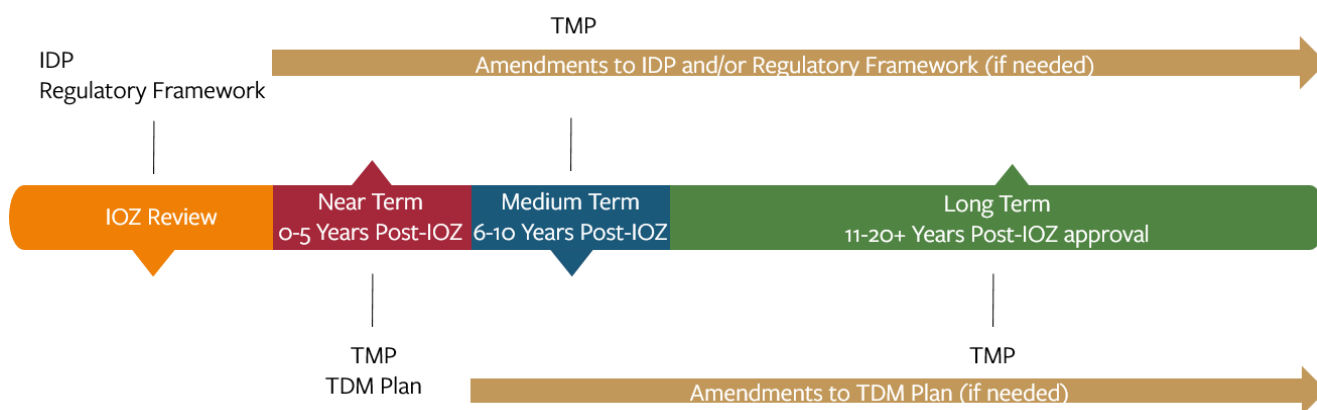


Figure 4: Timeline of Transportation Review Processes illustrating the proposed phases of the IOZ and the relevant transportation review types. Please note for the anticipated completion of the Medium Term Phase is 10 years after IOZ approval and the anticipated completion of the Long Term Phase is 20+ after IOZ approval.

II. OVERVIEW OF TRANSPORTATION REVIEW PROCESSES

The development of an Institutional Overlay Zone (IOZ) is a comprehensive planning process that identifies current trends, anticipated growth, and proposed design & mitigation measures that will ensure the success of the site. A significant component of an IOZ review is assessing the proposed transportation impacts and improvements in and around the site. Along with the IOZ review, there are a number of additional reviews that would be required to take place post-IOZ approval to meet the goals of the IOZ and ensure a successful transition & integration of the proposed uses and improvements.

The following list has been compiled to help identify the applicable major transportation review types, when they will take place, and the purpose of each review type. Additional City, State & Federal reviews may be required based on changes to transportation systems and the impacts of related infrastructure improvements.

A timeline has also been provided above in Figure 4 to outline transportation milestones referenced in the list on the following page:

- **Institutional Development Plan (IDP):** §8.5.4.C. of the Land Use Code identifies the required content to be included as part of the IDP. Overall, the Plan must include baseline information about current facilities, infrastructure, and patterns, outline the proposed number of trips and mode share to the site, and identify what mitigation and design measures will be used to ensure that the project will not result in negative impacts on the site and the surrounding area. Compliance with each of the required

elements of the IDP can be found in **Section VII** of this memorandum. The IDP is reviewed and approved by the Planning Board prior to site plan reviews, with minor and major amendments to the IDP being reviewed by the Planning Board.

- **Regulatory Framework:** §8.5.5.D. of the Land Use Code identifies the required content to be included as part of the Regulatory Framework. Overall, the Regulatory Framework is required to include broader parameters to identify objectives for multi-modal access and safety, thresholds for improvements and mitigation measures, and TDM & parking strategies. Compliance with each of the required elements of the document can be found in **Section VIII** of this memorandum. The IDP is reviewed by the Planning Board and approved by the City Council, with amendments following a similar review by the Planning Board and adoption by the City Council.
- **Traffic Movement Permit (TMP):** As defined under Maine state statute 704—A, a traffic movement permit is required of any project that generates 100 or more passenger car equivalents at peak hour. Any project surpassing this threshold is required to make adequate provision for traffic movement of all types into and out of the project area such that any traffic increase that is attributable to the project will not result in unreasonable congestion or unsafe conditions within the vicinity of the development. TMP applicants for multi-phased projects have the option to submit one overarching TMP for all phases or submit individual TMPs for each phase. At this time, the Applicant has indicated the intent to submit individual TMPs for each phase. This approach has been viewed favorably by Consulting Traffic Engineer Tom Errico since it provides the reviewing entity an opportunity to use site-specific data in the short-term to influence modifications in the review of later phases that better assess and mitigate negative impacts.
- **Transportation Demand Management (TDM) Plan:** New commercial development exceeding 50,000 square feet of floor area is required to provide a transportation demand management plan, a document that outlines goals, strategies and monitoring provisions for reducing the number of peak hour vehicle trips and encouraging alternative modes of transportation. In the submitted Regulatory Framework, the Applicant has stated that a campus-wide TDM plan will be submitted with the first site plan submission and may include phasing to align with short-, mid-, and long-term phases of development.

While not a complete plan, the Applicant has indicated in the IDP a target of reducing automobile trips by 37% and on-site parking by 20% from the Institute of Transportation Engineers (ITE) trip & parking generation standards, respectively. As part of meeting these goals, the Applicant intends to:

- Hire a campus-wide transportation coordinator
- Partner with METRO to subsidize service and provide shorter headways (i.e., more frequent service)
- Support connections for carpools and prioritize automobile parking spots for carpoolers
- Not include restrictions on parking spaces by different uses on the site
- Invest in infrastructure for bicycle and water travel.

III. SEPTEMBER 9 TRANSPORTATION MEMORANDUM

Throughout 2022, members of the Applicant team have met with staff from the City, Maine DOT, and METRO to discuss the proposed plan and ensure that feedback & coordination occurred early on in the review process. While this process has clarified a number of questions and concerns from reviewers, City Staff wanted to resolve some outstanding questions & issues not currently answered by the IDP and Regulatory Framework.

To supplement the transportation-related information submitted as part of the IDP and Regulatory Framework, City Staff submitted a request to the Applicant on August 19, 2022 for a supplemental document that provided the following information:

1. *Updated Trip Generation for each phase with backup methodology. This includes an updated Excel spreadsheet with backup information from ITE for each land use category and documentation that the data is appropriate for this site. As an example, LUC 550 University/College appears to be for large campuses and how it is well suited for the Roux Institute project should be explained. This should also include back up information with and without mode share assumptions.*
2. *Methods for trip assignment and considering use of existing student data, as requested previously, should be provided. Graphics that depict trip assignment during peak hours should be provided.*
3. *A summary of existing traffic volumes assembled and collected for the project should be provided and include graphics depicting turning movements during peak hours.*
4. *Level of service and delay output summaries, including existing model outputs and vehicle queues, from the Synchro/SimTraffic model at study area intersections should be provided for the No-Build and Build peak hours for each project phase. The model files shall be provided for review.*
5. *Plans for the I-295 off-ramp into the site should be provided. This should include supporting analysis (at both ends of the ramp), as appropriate.*
6. *Updated parking generation analysis and backup information shall be provided.*
7. *A summary of High Crash Locations and possible mitigation strategies.*
8. *A conceptual plan for the network of pedestrian and bicycle infrastructure facilities on-site and in the vicinity of the project to provide the level of accessibility to achieve bicycle-pedestrian mode split goals.*
9. *Suggested off-site roadway mitigation or other strategies, such as Transportation Demand Management, for each project phase to address mobility and safety deficiencies. This should include:*
 - a. *Before and after level of service/delay information, and*
 - b. *A narrative description or concept plan of proposed phased off-site improvements.*

On September 9, 2022, the Applicant submitted a memorandum (Attachment A) and corresponding Appendix (Attachment B) as a response to the August 19th request for additional information. The following section summarizes the information provided in the September 9th memorandum.

A. Introduction & Trip Generation of IDP Full Development Build Out

The memorandum begins by stating that the maximum buildout and most impactful use permitted under the current zoning would be 1,100,000 square feet of office space. In comparison, the completed Long Term phase under the B-5 base zoning with the IOZ overlay would encompass 1,315,000 square feet of development, with a breakdown by use included below:

- The Roux Institute (Higher Education Institution) – 400,000 square feet
- Multi-Family Housing- 650 units (Submitted IDP estimates 450,000-550,000 square feet)
- Office (General Office) – 200,000 square feet
- Research and Development (Laboratory) – 50,000 square feet
- Hotel – 125 rooms (Submitted IDP estimates 90,000 square feet)
- Retail – 10,000 square feet
- Restaurant – 15,000 square feet

Based on dialogue with City Staff and Maine DOT with the Applicant, questions were raised on how internal trips are being presented, and if the ITE classification (*LUC 550 University/College*) is the appropriate classification for the site since the classification is used for larger, undergraduate campuses, which contrast to the smaller proposed campus that will provide graduate programs and certifications for working professionals.

In the memorandum, the Applicant clarified that internal trips have been separated from trip estimates, where internal trips will account for $\pm 28\%$ of trips in the AM peak hour and $\pm 22\%$ in the PM peak hour. Responding to the concern about the use of the ITE LUC 550 classification, the Applicant identified the anticipated types of trips for the Roux

Institute based on the proposed programming, provided a comparison between ITE estimates and projected programming for the Roux Institute for Long Term Build Out, which is shown in the table below.

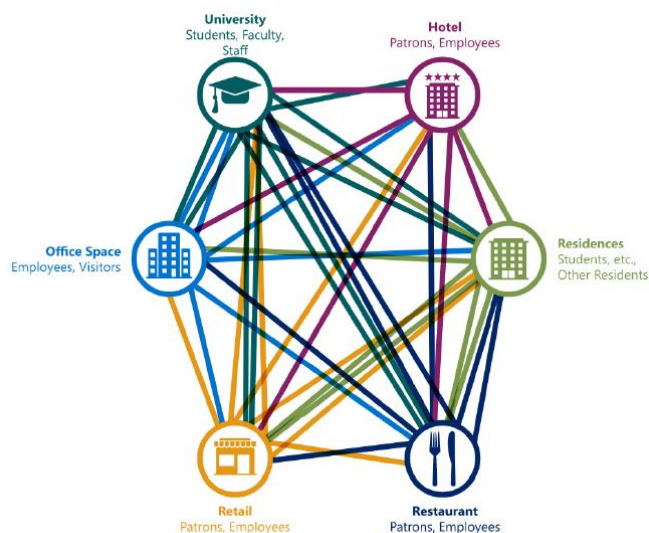


Figure 5: Graphic showing examples of origin & destination combinations for internal trips, along with the types of travelers by use.

Types of Trips	ITE LUC 550 Classification	Roux Programming Estimates
AM In	527	288 (-239)
AM Out	149	26 (-123)
Total AM	676	314 (-362)
PM In	216	138 (-78)
PM Out	459	425 (-34)
Total PM	675	562 (-113)

The programming estimates indicate reductions in the AM and PM peak hours, with more significant reductions seen in the AM peak hour. While not specifically addressed in the memorandum, the Applicant has provided estimated trip generation by hour in the Appendix which shows that more trips will occur after the peak hour (8 AM) between 9-11 AM.

As part of developing trip generation estimates for all of the proposed uses on the site, the Applicant also provided mode share by use (Figure 6), a comparison to mode share identified in Portland's Plan 2030 and the Portland USM campus (Figure 7), as well as the estimated total number of external trips by land use for the long-term build out (Figure 8).

Land Use	% Transit	% Ped/Bike	% Vehicle	% Carpool
<i>University</i>	10%	20%	65%	5%
<i>Residential</i>	10%	20%	65%	5%
<i>Office</i>	10%	10%	75%	5%
<i>Hotel</i>	10%	10%	75%	5%
<i>Retail</i>	10%	50%	40%	0%
<i>Restaurant</i>	10%	50%	40%	0%
Overall Site Mode Shares	10%	18/19%	67/66%	5%

Figure 6: Table of Anticipated Mode Share by Proposed Land Use

Mode	AM	PM	Portland Plan City Wide	Portland Based Campus
<i>Drove Alone</i>	67%	66%	68%	71%
<i>Transit</i>	10%	10%	3%	18%
<i>Non-Motorized</i>	18%	19%	14%	5%
<i>Carpool</i>	5%	5%	8%	6%
<i>Telework/Other</i>	0%	0%	7%	%

Figure 7: Table of Mode Share for the Proposed Roux Campus as compared to the City and Portland Based (USM) Campus

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
<i>University</i>	145	22	45	11	320	49	98	25
<i>Residential</i>	131	20	40	10	123	19	38	9
<i>Office</i>	229	31	31	15	218	29	29	15
<i>Hotel</i>	33	4	4	2	45	6	6	3
<i>Retail</i>	2	0	2	0	7	2	8	0
<i>Restaurant</i>	24	6	31	0	25	6	31	0
Total Trips	568	85	154	39	739	111	212	52

Figure 8: Table of Anticipated Trip Generation by Use and Mode in the AM and PM peak hours.

Overall, the majority of trips to the site are anticipated to be made by single-occupancy vehicles (SOVs) (66%; 568 in AM and 739 in PM), with the next largest category of trips to be made by non-motorized (i.e., Pedestrians & Cyclists) modes (19%; 154 in AM and 212 in PM). The estimated percentage of non-motorized trips is more than three times greater than the Portland Based Campus and slightly above the mode share identified for the City in Portland's Plan 2030.

The higher anticipated number of non-motorized trips is attributed to the proposed implementation of a TDM plan, on-site shared use paths that connect to City & regional trails via Tukey's Bridge, and complete streets improvements proposed as mitigation measures on Sherwood and Veranda Streets.

B. Trip Generation of As of Right or Zone Change Developments

As part of the comparative analysis for the proposed zoning map amendment, the memorandum reviewed the trip generation at full build out under the current zoning, I-M Industrial Moderate Impact, as compared to full build-out under the proposed base B-5 zoning and IDP. As shown in the table below, the proposed IDP full build-out would create 55% fewer trips (1,254 vs. 565) in the AM peak hour and 37% fewer trips (1188 vs 737) in the PM peak hour. In short, the proposed IDP full build-out would result in fewer trips as compared to full build-out as developed by the applicant under the current I-M zoning.

Peak Period	Existing Zoning Full Build with only 50% building coverage¹	Proposed IDP Full Build Program²	Net Total from Existing Zoning to Proposed IDP Buildout	Percentage Change from Existing Zoning to Proposed IDP Buildout
AM Peak Hour				
Enter	1104	424	-680	
Exit	150	141	-9	
Total	1254	565	-689	-55%
PM Peak Hour				
Enter	202	217	15	
Exit	986	520	-466	
Total	1188	737	-451	-37%
% Auto Usage	75%	varies by use overall 67%		

1. Assumes 50% of lot coverage under existing zoning resulting in 1.1 million sf ITE LUC 710 Office

2. Based on Proposed IDP Full Buildout Program.

Figure 9: Table from September 9, 2022 Transportation Memorandum which compares full build-out trip generation under current zoning as compared to full build-out under the proposed IDP.

C. Trip Assignment

Building from conversations with City and Maine DOT staff and data collected on the distribution of trip assignments for the current Roux campus, the Applicant provided a table and graphic of trip distribution. The majority of trips (50%) will be coming from/going to I-295 from the South, with the next largest route will come from/going to I-295 North (15%). Compared to the trip assignment distribution at the current Roux campus, the proposed IDP does not result in significant differences in trip assignment.



Figure 10: Graphic of Trip Distribution (by percentage) under the proposed IDP. Please note that the graphic has combined the distributions for ME 26/100 points North/West, 302 points North/West, and I-95 points North into one percentage (19%).

D. Existing Traffic Volume Summary

In 2021, the project consultant (VHB) collected counts in the AM and PM along Washington Avenue, at the intersections of Veranda Street & Sherwood Street, and Baxter Boulevard & Bates Street. These counts were compared and adjusted based on traffic count data collected by Maine DOT and the City of Portland in 2017 and included data at Washington Avenue & Presumpscot Street to create existing conditions traffic volumes, shown in Figure 11.

While not included in the memorandum, the Applicant assessed and included traffic volume estimates for traffic five, ten, and twenty years from current existing conditions and provided the information in an

Appendix (Attachment B). Calculations took into consideration the trip generation for each of the proposed phases, considerations for proximate residential projects recently approved (95 Front Street Housing & Winchester Woods), and applied a .5% per year growth rate. Based on these calculations, the Applicant projected level of service (LOS) and delays for these intersections in the following section.

E. Level of Service and Delay Output Summary

The submitted memorandum provides a table comparing the overall level of service (LOS) for automobile



Figure 11: Graphic depicting existing traffic volumes at Washington Avenue & Veranda Street, Sherwood & Veranda Streets, Washington Avenue & Presumpscot Street, and Baxter Boulevard & Bates Street. Traffic volumes were established based on traffic counts completed in 2017 and 2021.

traffic at the intersections shown in Figure 11 at the Long Term No Build, IDP Full Build, IDP Full Build with Mitigation, and the Long Term Existing Zoning (The maximum build-out under current zoning with 1.1 million square feet of office space referenced in Section A of this memorandum). Additional charts and LOS data was submitted in an Appendix corresponding with the September 9, 2022 memorandum. The following tables have compiled the tables from the Appendix to compare the LOS for different phases under the IDP, whether the mitigation measures further discussed in Section F of this memorandum were implemented, and how the existing no build compares to the Long Term No Build, Long Term Zoning with and without mitigation, and the IDP Full Build with and without mitigation. Please note that:

- Improvements in LOS will be shown in **green** and deterioration in LOS will be shown in **red**, and
- LOS for the AM and PM will be shown in the following format: AM (PM).

Table 2: Comparison of LOS for Short Term No Build and Short Term IDP (Please note that LOS for Short Term Build under Existing Zoning was not provided)		
Intersections	Short Term No Build	Short Term IDP
Veranda Street and Washington Avenue	C(D)	C(D)
Veranda & Sherwood Streets	A(A)	A(A)
Baxter Boulevard & Bates Street	A(A)	A(A)
Washington Avenue & Presumpscot Street	E(F)	F(F)

As shown in Table 2, the sole change between the LOS in the Short Term No Build and Short Term IDP is that the AM LOS at Washington Avenue & Presumpscot Street worsens from E to F. Tables in the Appendix attribute this deterioration in LOS for southbound traffic and for the northbound left turn lane. Overall, the Washington Avenue & Veranda Street intersection operates at an acceptable LOS, but individual movements operate poorly, such as the eastbound travel lane.

Table 3: Comparison of LOS for Short Term No Build with Medium Term No Build and Medium Term IDP with and without mitigation (Please note that LOS for Medium Term Build under Existing Zoning was not provided)				
Intersections	Short Term No Build	Medium Term No Build	Medium Term without IDP	Medium Term IDP with Mitigation
Veranda Street and Washington Avenue	C(D)	D(D)	D(E)	D(D)
Veranda & Sherwood Streets	A(A)	A(A)	A(D)	B(B)
Baxter Boulevard & Bates Street	A(A)	A(A)	A(A)	B(B)
Washington Avenue & Presumpscot Street	E(F)	F(F)	F(F)	F(F)

Table 3 shows the change in the LOS from Short Term No Build to Medium Term in No Build, and IDP with and without mitigation. Changes between the Short Term and Medium Term indicate decreases in the LOS quality in the AM peak hours on Washington Avenue with the intersections of Veranda and Presumpscot Street, regardless of whether construction takes place.

Overall, the Medium Term IDP with mitigation provides a similar level of service to the Medium Term No Build, with less significant decreases in LOS for Veranda & Sherwood Streets and Baxter Boulevard & Bates Street in the AM and PM Peak Hours.

The most significant change noted in Table 3 is the changes in LOS at Veranda & Sherwood Streets in the PM Peak Hour between the Short Term No Build and Medium Term IDP without mitigation from A to D, which can be attributed to the increased delays (13.9 seconds to 77.2 seconds) for left turns onto Veranda towards Washington Avenue. The cause for these delays are not clearly identified in the memorandum or supporting appendix.

Table 4: Comparison of LOS for Short Term No Build with Long Term No Build, Long Term Maximum Buildout under Existing Zoning with and without Mitigation, and Long Term IDP with and without mitigation						
Intersections	Short Term No Build	Long Term No Build	Long Term Existing Zoning Buildout without Mitigation	Long Term Existing Zoning Buildout with Mitigation	Long Term IDP	Long Term IDP with Mitigation
Veranda Street and Washington Avenue	C(D)	D(D)	F(F)	D(E)	E(E)	D(D)
Veranda & Sherwood Streets	A(A)	A(A)	F(F)	C(D)	A(F)	B(C)
Baxter Boulevard & Bates Street	A(A)	A(A)	A(A)	B(B)	A(A)	B(B)
Washington Avenue & Presumpscot Street	E(F)	F(F)	F(F)	D(D)	F(F)	F(F)

Table 4 compiles LOS data from the corresponding Appendix where the Short Term No Build is compared with Long Term scenarios with and without construction & mitigation measures. Building from Table 3, no changes to the LOS are anticipated between the Medium Term and Long Term No Build. Except for Baxter Boulevard & Bates Street, both the Long Term Existing Zoning and Long Term IDP with Mitigation result in improvements for LOS, as compared to no mitigation.

Overall, the Long Term IDP with Mitigation provides a better LOS as compared to the Long Term Existing Zoning with Mitigation, except for Washington Avenue & Presumpscot Street (which was the sole scenario depicting an improvement from the Short Term No Build).

As part of justifying the anticipated LOS changes with mitigation, Sections F and G of this memorandum describe the proposed mitigation measures.

F. Transportation Mitigation Required under Each Full Build Scenario

Table 5 summarizes all of the proposed mitigation under each phase of the IDP, along with two additional mitigation measures that would be required to construct the maximum build out under the existing zoning. Further review with City and Maine DOT staff would be required to ensure that the proposed mitigation measures meet applicable City and Maine DOT technical and design standards.

Table 5: List of Proposed Mitigation Measures by Phase for Proposed IDP and Full Build Out under Existing Zoning					
Phase	Improvement	Description of Improvement	Difference in LOS between Build with and without mitigation (if applicable)	IDP?	Existing Zoning Full Build?
Short Term	Back Cove Trail Connection	Shared Use Path Connection from Site to Back Cove Trail and Shared Use Facilities on Tukey's Bridge	None	✓	✓
Short to Medium Term	Sherwood Street	Short Term: Installation of bicycle and pedestrian facilities Mid Term: Creation of Separate Left and Right Turn Lanes at Veranda Street Intersection	Short Term: None Medium Term: Deterioration in the AM and Improvement in the PM with mitigation	✓	✓
Medium Term	Veranda Street	Reconfigure to provide bicycle lanes on both sides and a two-way left turn lane north of Pembroke Street	Unclear	✓	✓
Medium to Long Term	Washington Avenue & Veranda Street	Either: - Installation of Northbound Off-Ramp from I-295 to Sherwood Street, or - Addition of an Eastbound right turn lane from Bates Street and a Northbound right turn lane at the existing I-295 off-ramp	Medium Term: No Change in Overall LOS with improvements in some Northbound and Southbound movements with mitigation Long Term: Improvement in overall LOS for IDP and Existing Zoning with mitigation	✓	✓
Long Term	Veranda & Sherwood Streets	Installation of a traffic signal with a Northbound left turn lane.	IDP: Deterioration in the AM and Improvements in the PM with mitigation Existing Zoning: Improvements in Overall LOS in the AM & PM with mitigation	✓	✓
	Baxter Boulevard & Bates Street	Installation of an all-way stop.	IDP & Existing Zoning: Deterioration in overall LOS from A to B, with improvements for Southbound Left Turn during AM & PM	✓	✓
	Washington Avenue & Presumpscot Street	- Consider Prohibition of Northbound Left Turns - Addition of Second Southbound Thru Lane - Remove Southbound Left Advance Phase	IDP: No Difference in Overall LOS with slight improvement for the Northbound Right Lane in the AM from B to A Existing Zoning: Improvements in Overall LOS from F to D in the AM and PM	✓	✓
Long Term under Existing Zoning Full Build	Veranda Street & I-295 On-Ramp	Addition of a second left turn lane to access I-295 Southbound on-ramp.	Improvement in the AM and PM from F to D & E, respectively		✓
	Veranda & Sherwood Streets	Building from Long Term improvement mentioned above, add an additional left turn lane.	Improvement in the AM and PM from F to C & D		✓

G. I-295 Off-Ramp

As one of the listed mitigation strategies, the I-295 off-ramp would be located at Exit 8 and continue to an all-way stop at Sherwood Street. The proposed intersection would operate with a LOS of A in the AM peak hour and C to A in the PM peak hour, with the LOS C for those exiting the site. Additional analysis under future site plans would provide clarification on what threshold would trigger the construction of this ramp to offset any potential impacts.

H. Parking Analysis

The memorandum indicates that the peak demand for parking will occur at 4:00 PM and at the completion of the long term buildout up to 1,630 vehicles could be parking at the site, with parking improvements being reviewed under each future site plan application. All parking on the site would be communal (i.e., no restrictions) and would be paid parking, that would be handled by a parking office. IDEALS has expressed interest in other transportation demand management (TDM) strategies, such as a car share program, to also reduce the number of vehicles parked on-site.

I. High Crash Location Summary

Figure 12 was included in the September 9 memorandum and identifies high crash road segments and intersections based on Maine DOT data from 2019 to 2021. Two intersections and two road segments were classified as high crash locations. Table 6 summarizes the issues and suggested improvements for each of these locations:



Figure 12: Map of High Crash Intersections (Shown with Yellow Circles) and High Crash Road Segments (Shown with Yellow Lines) in the Vicinity of the Project Site.

Table 6: High Crash Location Issues and Suggested Improvements

High Crash Location	# of Crashes	Primary Cause	Suggested Improvements
Veranda & Wordsworth Streets	14	Limited Visibility	Recent Veranda Street Upgrades Appear to Address Issue
Washington Avenue & Randall Street	8	Failure to Yield	Eliminate Left Turning Movements In and Out of Randall Street
I-295 Northbound Exit 8	12	High Speeds	Additional Signage Related to Curve in Road. Optimized Signal Timing May Provide Minimal Improvements
Washington Avenue from Galvin to Bates	11	Not Clear	No Suggested Improvements

J. Pedestrian and Bicycle Infrastructure Conceptual Plan & Conclusion

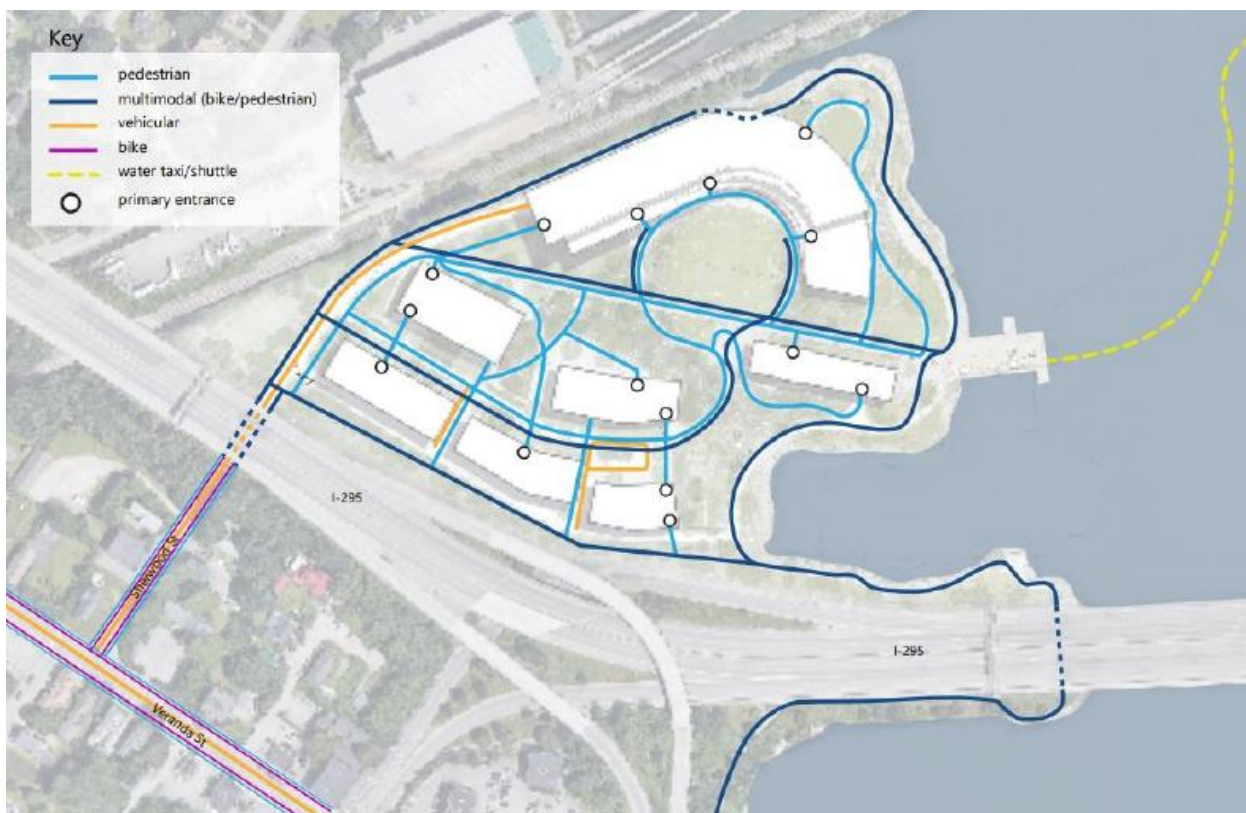


Figure 13: Pedestrian and Bicycle Infrastructure Conceptual Plan from September 9, 2022 memorandum.

Building from the IDP submitted on August 4, 2022, the Conceptual Plan (Figure 13) identifies entrances and multi-modal connections in and around the site, along with references to provisions for bicycle parking and the importance of connectivity for cyclists and pedestrians to and from the site.

Building from the trip generation estimates, trip distribution, proposed mitigation measures, and traffic crash data, the Applicant concludes that the full development program under the IDP would result in less intensive negative impacts in terms of trip generation, traffic delays, and required mitigation measures as compared to the maximum permitted development under current zoning.

IV. CITY STAFF SEPTEMBER REVIEW

The September 9 memorandum was reviewed by Consulting Traffic Engineer Tom Errico and City Transportation Program Manager Bruce Hyman (Attachments 1 & 2). The following items and clarification were requested on September 16, 2022 by Tom Errico (in black), Applicant responses are shown in red, and additional requested materials and clarifications from Tom Errico are noted in blue:

- Existing Turning Movement volumes (It is unclear what Figure 3 represents) **Yes, attached.**
- The memo notes three build horizons (2026, 2031, 2041). Provide turning movement volumes for all. **Yes, attached.**
- Provide Roux trip assignment graphics for all build scenarios. **The Roux trip generation volumes by intersection and movement are represented in the graphics attached.**

- The LOS table notes results for No-Build, Full Build and Full Build with mitigation. It's confusing when as noted above you were doing 5-, 10- and 20-year forecast. Please correct/clarify. **As indicated, the memorandum included the full build conditions as a comparison against the full build conditions allowed under existing zoning as this was the focus of the zone change. Each of the interim year LOS tables were provided in the appendix and are provided attached to this email. When you revise the report please include. It is not easy pulling information from the appendix.**
- Table 8 notes LOS conclusions for one time period. Why not summarize conditions for both AM and PM? I'd like to see both. **As indicated above, all LOS tables (both peaks, each time horizon) were provided in the appendix. They are also attached here. When you revised the report please update Table 8 to include AM.**
- The Synchro model assumes Sherwood Street approaches are aligned directly opposite each other. They are offset and I believe need split phasing. Please edit the model. **This was an error and will be revised and resent.**
- Please provide SimTraffic output reports. **The queuing and blocking reports from simtraffic were also provided in the appendix and are provided attached. I'm looking for the SimTraffic LOS/Delay conclusions and Table 8 should reflect SimTraffic and not Synchro.**
- Please extend the Washington Avenue link in Synchro and include the off ramp into the site. Also, please confirm the analysis assumed this connection (the trip assignment in the appendix notes 170 AM peak hour trips making the right onto Veranda – which would imply it's not included) **As outlined in the memo, the improvements that would be required at Washington and Veranda were determined in the event that the ramp were not to be present. A separate analysis was conducted to review the ramp operations, should that ramp be put in place. That should be included and the implication of avoiding intersection widening at Wash/Veranda should be documented.**
- Provide back up information on the time-of-day pattern for Roux. **The information regarding when particular populations are on site was provided in the appendix and attached and was based on interviews with Chris Mallett of the Roux Institute. The hour to hour percentages for arriving and departing were developed with my judgment and included little peak spreading in order to analyze a conservative condition. I saw the breakdown in the appendix and wanted to see specific back up. I want to understand the potential for overlapping peaks. Maybe Chris can provide more detail.**

Transportation Program Manager Bruce Hyman also submitted the following comments (Attachment 2) on September 21, 2022:

I've reviewed (along with other members of the city's transportation team) the mode share targets and proposed multimodal transportation program and component projects provided in the September 9, 2022 memorandum in support of the upcoming transportation workshop for the re-zoning. I wanted to provide these in advance of tomorrow morning's meeting.

We fully support the setting of aggressive mode share targets for bicycling-transit-walking but we don't find that the program/project components for those modes (in addition to the TDM program suggested) are robust enough to support meeting those targets. I alluded to this in our last call.

Some combination of additional multimodal-TDM program/project components should be considered and assessed for potential inclusion in your site planning in addition to those included in the memorandum. (This is not to suggest that Roux/IDEALS would be the sole funder or planner/designer for all or part of the capital projects listed but how they would or would not factor into achieving the stated targets?) These include:

TRANSIT (to support the 10% target and the 85AM/111PM number of trips)

- identifying the likely transit service frequency needed versus the existing
- identifying the key transit route characteristics versus the existing
- specifying the transit rider subsidy (full/free out of pocket to the rider?, partial?)
- potential capital/operating contributions to METRO

BICYCLING AND WALKING (to support the 18%-19% target and the 154 AM/212PM number of trips)*Bicycling*

- the Casco Bay Trail/Pathway (SLA corridor) with and without the trestle bridge reconnection to the Eastern Promenade Trail shared use pathway
- the Martin's Point Bridge Pathway
- Phase II Bates-Veranda Streets bikeway (enhancing the city's intended short term buffered bike lane improvements from Baxter Blvd to Bates and Veranda Streets)
- widening the approaches to the existing pathway on the north side of Tukey's Bridge (currently ~8' in width)
- reconfiguring the NB Washington Avenue on-ramp to I-295 to access the site in possible combination with the motor vehicle off-ramp being considered for later development phases

Walking

- the shared use pathway projects noted above under 'Bicycling'
- the direct connection from Veranda Street along the Howie's building frontage to the Roux site

PARKING SUPPLY AND PRICING - some detail that describes the parking supply proposed for the various phases and pricing to incentivize multimodal access as part of a TDM program.

ADDITIONAL COMMENTS - In addition to the above, we'd like to get larger size drawings than those provided in the memo of some of the sketches so we can check dimensions and details of the conceptual reconfigurations shown on 1) the Veranda Street approach to Washington Avenue and 2) Sherwood Street. The Sherwood Street drawing does not show the proposed street configuration (travel/turn lanes, bikeway configuration, parking, e.g.) on Veranda Street whereas the Veranda St approach to Washington Ave shows a transition to a two-way center turn lane (is this proposed to carry to Sherwood Street?).

V. SEPTEMBER 27 TECHNICAL MEMORANDUM

On September 27, 2022, the Applicant submitted an updated technical memorandum to address the comments from City Staff referenced above. The following section is a summary of the updates from the September 9 memorandum:

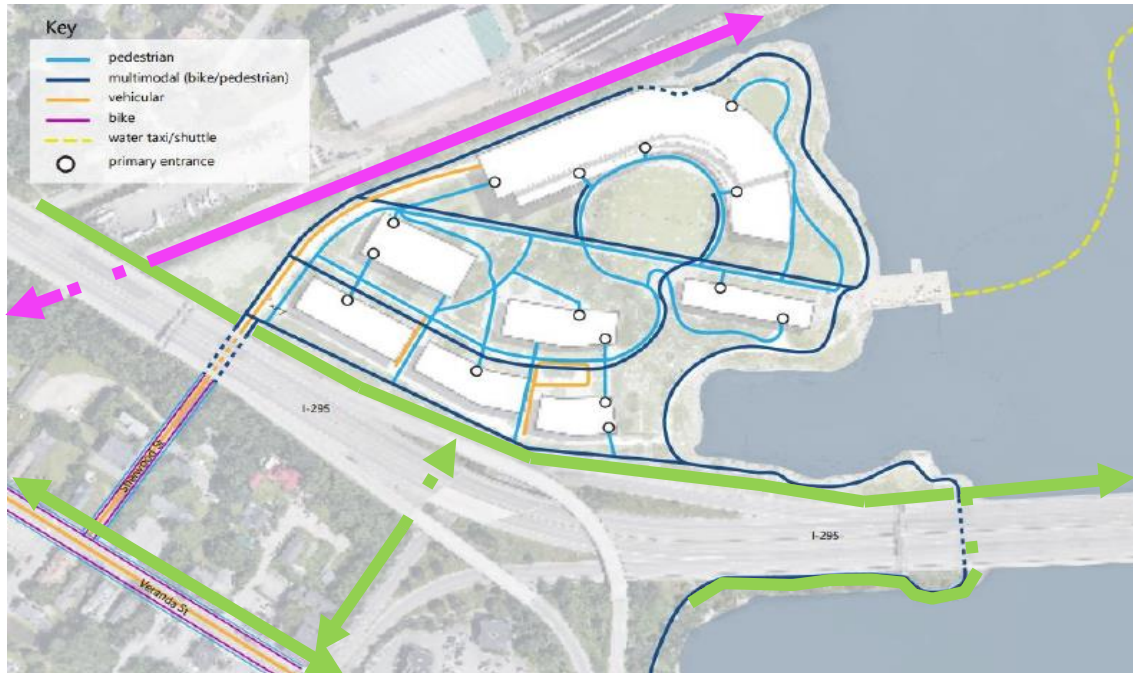


Figure 14: Pedestrian and Bicycle Infrastructure Conceptual Plan overlaid with recommended shared use on- and off-road facility alignments from the [Martin's Point Shared Use Path Feasibility Study](#) (shown in green) and the [Casco Bay Trail](#) (shown in magenta).

- **Pages 4-5:** Expanded narrative on mode share assumptions that further discusses anticipated service improvements to and around the site with METRO, as well as referencing additional local & regional bicycle & pedestrian feasibility studies and the feasibility of those improvements (Figure 14) but provides no further commitment to these bicycle-pedestrian projects beyond design of the under Tukey's bridge connection.
- **Pages 9-11:** Inclusion of graphics for the Short, Medium, and Long Term IDP Build Out Trip Generation in the AM and PM peak hours
- **Page 12:** Updated graphic for existing traffic volumes in the AM and PM peak hours
- **Pages 13-15:** Inclusion of No Build traffic volume graphics for 2026, 2031, and 2041 to serve as comparisons to the approximate forecast years for the Short, Medium, and Long Term IDP completion dates.
- **Pages 16-19:** Inclusion of Graphics with traffic volumes in the AM and PM peak hours for the Short, Medium, and Long Term IDP Buildouts, as well as the Maximum Build Out Under Existing Zoning

- **Pages 20-21:** Inclusion of Delay Summary Tables for the AM and PM peak hours
- **Pages 22-23:** Expansion of LOS Summary Tables for the AM and PM peak hours that includes Short, Medium, and Long Term Build and No Build scenarios for the IDP and Maximum Build Out Under Current Zoning (With and Without Mitigation)
- **Pages 24-25:** Inclusion of a Queuing Summary in feet for the AM and PM peak hours
- **Page 27:** Improvement in anticipated LOS from D to C in the AM peak hour with proposed improvements at Washington Avenue & Veranda Street
- **Page 28-29:** Eliminated Medium Build proposal on Veranda Street for two-way left turn lane between Pembroke & Sherwood Streets
- **Page 29:** Improvement in anticipated LOS from D to C in the AM peak hour with signalized control and separate northbound left turn lane at Veranda & Sherwood Streets.
- **Page 29:** Improvements in anticipated LOS at Baxter Boulevard & Bates Street for the Long Term Build without Mitigation (LOS D(F) to LOS B(B)) and Long Term Build with Mitigation (LOS B to LOS A) for the southbound left turn and increased delay for Eastbound and Westbound approaches from 13 to 19 seconds.
- **Pages 30-32:** Anticipated LOS deteriorated in the PM peak hour from previous assumptions for Proposed I-295 Off-Ramp & Sherwood Street intersection from A/A/C to A/B/E (Graphic of Intersection included in Figure 15).
- **Page 36:** Acknowledgement that additional bicycle and pedestrian infrastructure may be needed to reach the alternative mode share percentage outlined in the Full Build IDP development program or the Maximum Build Out Under Current Zoning.

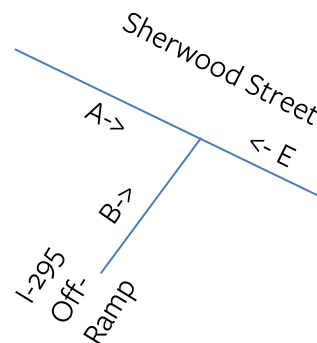


Figure 15: Diagram of anticipated LOS for the proposed I-295 Ramp Intersection with Sherwood Street in the PM Peak Hour.

VI. SEPTEMBER 27, 2022 UPDATED INSTITUTIONAL DEVELOPMENT PLAN & REGULATORY FRAMEWORK

Along with the transportation memorandum, updates to the IDP and Regulatory Framework were also submitted on September 27, 2022. The following list summarizes the transportation-specific changes to the IDP and Regulatory Framework, with other updates to be discussed at the October 25, 2022 workshop:

IDP

- Under Design Guidelines, updated design guideline based on discussions at the August 9th Design Workshop stating that, “*Open space & public realm shall be available to all members of the public, through inclusive, safe, and barrier free design as well as support purposeful connections and transitions.*”
- Under Transportation and Trip Generation, updated data and graphics from the transportation memorandum included on crash data and trip generation
- Under Managing Transportation Demand, replacement of references to IDEALS with Northeastern University

Regulatory Framework

- Under Design, updated design guideline based on discussions at the August 9th Design Workshop stating that, “Open space & public realm shall be available to all members of the public, through inclusive, safe, and barrier free design as well as support purposeful connections and transitions.”
- Under Neighborhood Engagement, establishment of a Stakeholder Advisory that will advise on project development and include stakeholders in fields of recreation, parks and trails, rail, bicycle & pedestrian advocacy, and the East Deering Neighborhood.
- Under Neighborhood Engagement, state that Northeastern University will allow neighbors to park on the site during Snow Parking Bans.

VII. CITY STAFF OCTOBER REVIEW

The September 27 memorandum was reviewed by Consulting Traffic Engineer Tom Errico and City Transportation Manager Bruce Hyman and provided the following comments:

Comments without Requests for Additional Materials

1. *For IDP purposes, I find the ITE Trip Generation estimate to be reasonable.*
2. *For IDP purposes, the internal capture assumptions seem reasonable.*
3. *The report seems to dismiss Howie’s Sidewalk. I don’t agree with the challenges noted and additional review is requested.*
4. *The trip assignment seems reasonable for the IDP process.*
5. *The existing volumes used in the analysis is reasonable for IDP purposes. For the TMP, more current counts will be required. Volumes do not balance well on EB Veranda between Washington and Sherwood in the PM and the applicant shall investigate this issue.*
6. *If the ramp into the site is built, traffic exiting the site at the ramp intersection with Sherwood will have LOS E conditions and the queue will be 600 feet from site. Long delays from the site may encourage alternative modes. Veranda/Sherwood also sees declining LOS. They did assume some cut-through traffic. And Washington/Presumpscot seemed to get better and only the turn prohibition was modeled.*

Comments with Requests for Additional Materials

7. *Mode share assumptions are aggressive, and the TDM programs need to be updated to reflect this.*
8. *The report on Page 5 notes a commitment to designing the shared use path connection onto Tukey’s bridge, but not implementation. Clarification should be provided on the anticipated role of the Applicant in implementing/funding the implementation of the connection.*
9. *I would like to see the trip assignment graphics to be expanded to include the Exit 9 ramps.*
10. *Confirm whether the base model was field calibrated. For example the I-295 Ramp approaching Veranda Street experiences unequal vehicle lane utilization.*
11. *Submit additional clarification on the concepts for mitigation at the following intersections:*
 - a. *Washington/Veranda*
 - b. *Washington/Presumpscot*
 - c. *Baxter/Bates*
 - d. *Veranda Corridor Bicycle Lanes*
12. *As presented, the Veranda/Sherwood LOS between Build and Build w/Mitigation indicates declining LOS. Please clarify.*
13. *The LOS for Washington/Presumpscot is still poor with mitigation. Provide an explanation on why the proposed mitigation will not improve the LOS, along with identification of additional mitigation measures that would improve the LOS for the intersection.*

14. When viewing the SimTraffic Long Term model, traffic will back up on Veranda from Washington to Sherwood. Update the memorandum to include a discussion of this queuing and identify potential mitigation measures to reduce negative queuing impacts.
15. An analysis of the ramp into the site was provided, but also included widening the Veranda EB approach to Washington. I'd like to see it without any improvements.
16. Add Build without Mitigation to Table 14.
17. The parking analysis does not look like it included the same modal reductions as the trip generation. It also assumes a parking rate of 1.31 per DU. No Mode split reduction but a 50% internal capture reduction. Parking for Roux was reduced by 20% for mode share. The parking analysis should be updated to reflect a 30% reduction.
18. For Roux trip generation, they did a time of day allocation of certain groups. If the time of day assumption is off slightly, traffic impacts could be greater. As an example, for Graduate Learners they assumed 64 leave during the PM peak hour at 5PM. But at 6pm the number increases to 192 students. Monitoring will be very critical and considerations for restrictions on schedules may be warranted so that the peak hours have less impact.
19. Page 33 notes the support for a residential parking permit program that would not prevent campus users from parking off site, when it should be to prevent.

VIII. REVIEW OF INSTITUTIONAL DEVELOPMENT PLAN

The table below provides a summary view of IDEALS' IDP content review, with the 'Requirements' column, simplified and consolidated to include one or more sub-requirements of the IOZ ordinance. For a complete list of IOZ content requirements, please see Section 8.5.4.C in the Land Use Code.

Table 7: Required Content of the IDP (8.3.4.C)		
Requirements	Provided	Notes
Mission Statement	Yes	The IDP states that the campus is an opportunity to establish a people-friendly campus that is supported through landscaping improvements and multi-modal programs that provide incentives for alternative transportation options.
Baseline Institutional Data	Yes	All required baseline data is provided in detail.
Institutional Characteristics	Yes	Updated data on student mode share and trip assignment at the current Roux Campus has been provided to support more appropriate trip generation estimates. As discussed later on, references to previous feasibility studies for bicycle & pedestrian improvements would assist in establishing the context of the site.
Summary of Public Involvement	Partial	Staff requests that meeting minutes be provided for all required neighborhood meetings and additional 'Roux Roundtable' meetings to be included in the public record.
Identify Institutional Needs	Partial	Throughout the IDP, the Applicant has demonstrated the transportation benefits to the campus being mixed-use in reducing the number of external trips. Some, but not all, of the mitigation measures referenced in the transportation memorandum have been referenced in the IDP to address institutional needs and physical improvements. While not tying or committing the site to implementation of all of

		these mitigation measures, reference of these mitigation measures and analysis of the anticipated benefits of these mitigation measures should be included, with the understanding that further refinement or identification of additional mitigation measures will take place during the TMP reviews.
Transportation & Access	Partial	The IDP includes future projections on trip generation and parking demand based upon the program of new uses being introduced to the site, however there is limited information regarding thresholds that would trigger improvements to existing roadways, expansion of off-road shared use paths, and increases in on-site parking. Similar questions are still outstanding related to the impact of proposed improvements to meet the mode share targets for the site from the Short Term to the Long Term. Staff and the Board will need to confirm whether this level of detail is appropriate for the IDP as opposed to future TMP and Site Plan applications.
Environmental Impacts	Yes	The target mode shares for the site aim to reduce a number of negative environmental impacts on air quality and inducement of automobile travel. As the Applicant continues to assess mitigation measures related to anticipated negative transportation impacts, impacts to coastal and natural resources should be taken into consideration as part of the feasibility and alignment with the mission of the Roux Institute.
Infrastructure	Partial	As mentioned in previous sections, an assessment ensuring that the site will have sufficient transportation infrastructure to support the site for the volumes and anticipated mode shares will need to be ensured.
Design	Partial	Building from the Design Workshop and discussions with City Staff, the Applicant has developed a proposed Site Layout and Circulation Plan that demonstrates the implementation of design guidelines for campus circulation, parking, and overall promoting a pedestrian-centric campus. As part of the IDP, guidelines for streetscape improvements are required to be included as well. While the site only bounds Sherwood Street, including the Concept drawing for Sherwood Street improvements into the IDP and developing design guidelines based on those would satisfy this requirement.
Neighborhood Engagement	Yes	The Applicant is intending to submit an updated Neighborhood Engagement section of the IDP. As shown in updates to the Regulatory Framework, a Stakeholder Advisory Group will be created and be composed of stakeholders in transportation advocacy to advise on project development. Given the number of listed mitigation measures in the Transportation Memorandum, the engagement through this group can serve as a mechanism to promote collaborative problem solving and provide more transparency.

A. Institutional Development Plan Review Standards

The IDP is subject to 13 separate review standards, each of which are intended to ensure first that the IDP contains sufficient information to provide a reasonable, well-calculated depiction of what campus growth will look like in the subsequent 20-year period, providing a strong foundation and basis for the Regulatory Framework. The second principal element of the IDP is to accurately project impacts before development occurs, so as to facilitate timely and strategic improvements to minimize or mitigate those impacts.

As referenced above under the content section, the emphasis of this workshop is primarily to focus on the transportation elements of the IDP and Regulatory Framework. Noting this, the discussion of standards below is limited, and intended only to focus future transportation discussions with the Board and City review team.

1. ***Address all content requirements, unless explicitly modified by the planning authority or planning board.***

Staff Comment: The IDP will need to be revised to incorporate staff's feedback listed under the preceding 'Content' section of this memorandum, and as needed to address future Board and staff comments.

2. ***Reflect the issues/topics identified in the required public process.***

Staff Comment: At this point in the review process, the majority of comments related to transportation have focused on the limited number of access points to the site, anticipated negative impacts on traffic, and opportunities for additional shared use path connections. Information provided in the September 27 memorandum have helped address some of these questions. The Applicant is currently in the process of developing updates on Community Engagement and Benefits to the IDP in preparation for the October 25, 2022 Planning Board Workshop. Incorporation from feedback at the October 11, 2022 Planning Board Workshop will help assist better reflect public comments.

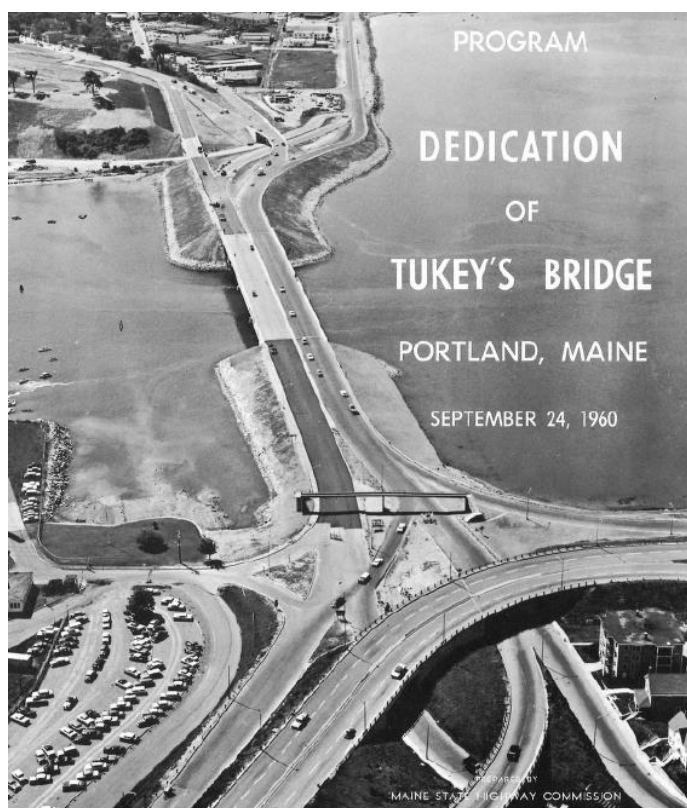


Figure 16: Cover Page of Tukey's Bridge Dedication Ceremony Booklet in 1960 showing previous direct access to and from the B&M Factory Site. Source: Maine State Library

3. ***Demonstrate consistency with the city's comprehensive plan and the purpose of this ordinance.***

Staff Comment: The IDP clearly identifies where this development proposal supports and furthers particular goals of Portland's Plan 2030. While all of the previously approved IOZs were established for sites with more expansive and active uses on site, the proposed project aims to proactively plan for the future of the site and eventually develop a mixed-use, multi-modal site. Additional information continues to be provided in the IDP and can be carried over from the September 27 transportation memorandum to better assess the potential impacts and needs for phasing to meet the purpose of the IDP section.

4. *Demonstrate how the property ownership, proposed growth, and requested regulatory framework relate to the institution's mission.*

Staff Comment: The IDP establishes a clear mission for both Northeastern University and the Roux Institute, which together serve to create a collaborative, mutually supportive space for both their private, public, and non-profit partners and the Roux Institute to further the fields of artificial intelligence, computer and data sciences, digital engineering, advanced life sciences, and medicine, fill existing talent gaps within these areas, and support Maine's economy. As part of this campus, the IDP stresses the people-centric design that will result in a 37% reduced parking demand and high non-motorized mode shares making external trips to the site. Feedback from the previous Design Workshop has instilled design elements that will result in successful connections between buildings and the shared use paths on-site. Based on feedback from Staff, additional information should be included to demonstrate how an additional shared use path connection(s) will align with the proposed growth in student enrollment and residential & commercial uses on-site.

5. *Demonstrate that traffic and parking impacts have been anticipated and that the proposed parking provision is justified as based on an assessment of options for reducing traffic and parking demands.*

Staff Comment: The Applicant has provided additional information on how trip generation and mode share for the site is calculated, mode splits by use, and anticipated mitigation measures for anticipated declines in LOS. Questions still remain on how the Applicant anticipates the target mode share will be achieved for non-motorized modes with the proposed connections and what thresholds will dictate increases in the amount of surface parking provided on-site. While the IDP does not need to finalize all of this information, additional assessment of particular bicycle & pedestrian improvements on mode share and metrics that could inform future needs to expand automobile & bicycle parking. Feedback from the Board on the specificity of the document relating to these factors will be instructive for future revisions.

6. *Outline an approach to open space, natural, and historic resources that supports preservation and enhancement*

Staff Comment: The IDP includes design guidelines that stress the importance of wayfinding, shared use paths connections to the Bean Building and Waterfront, and ensuring barrier free access to all members of the public. Overall, the inclusion of these principles will lead to more successful outcomes for open space & enjoyment of natural & historic resources.

7. *Demonstrate that potential cumulative environmental impacts have been anticipated and can be minimized or satisfactorily mitigated.*

Staff Comment: Through the use of sustainable design, removal of impervious surfaces, raising of on-site grades, restoration of the shoreline, and introduction of low impact development techniques, the net change in environmental impact from its current state to proposed condition will likely be very positive. Additional review will be needed to determine how transportation impacts in the short-, mid-, and long-term will be minimized and satisfactorily mitigated.

8. *Demonstrate that utility impacts have been anticipated and can be minimized or satisfactorily mitigated.*

Staff Comment: The IDP identifies existing utility infrastructure that serviced the B&M Baked Beans Facility, which given its industrial nature, required significant utility capacity. Noting this, the IDP states that no upgrades to capacity are required. Further, the IDP details strategies to minimize energy usage, such as through the use of geothermal heating and cooling, photovoltaic panels, high performance building envelopes with triple glazing, green roofs and blue roofs among other strategies. Any additional impacts from transportation infrastructure improvements are anticipated to be addressed at the October 25 workshop, which will include infrastructure as a major discussion topic.



Figure 17: Image of former pedestrian bridge spanning over I-295 from the B&M Factory Site to the Southbound I-295 on-ramp at Washington Avenue. Source: MaineDOT

9. *Reflect a comprehensive design approach that ensures appropriate transitions with the existing or future scale and character of the neighboring urban fabric.*

Staff Comment: Language related to circulation and building design have also taken steps to improve connections between buildings and the public realm, recognized differing needs for pedestrian-oriented design based on the proximity to automobile access on the perimeter of the site, and how functions of the site will differ based on the anticipated site users (e.g., public vs. semi-public, waterfront vs. Roux Institute facilities). As mentioned earlier in this memorandum, additional assessment of how seamless non-motorized transitions to and from the site will factor into how successfully the site integrates with the East Deering Neighborhood and how the pedestrian-centric ethic of the site is implemented throughout all phases of development.

10. *Promote compatibility with existing or future uses in adjacent neighborhoods, maintain housing, and support local amenities.*

Staff Comment: With the separation from adjacent neighborhoods by DOT ROWs and the waterfront, the site has unique considerations in providing compatible uses. As compared to other IOZs, there is physical separation that reduces the impact of the more institutional uses being located near residential zones. The scale of the institutional uses will increase the amount of traffic in the surrounding area, but it is not immediately clear whether particular uses are more or less likely to experience negative impacts from this increase.

IDEALS has indicated that they'd like to foster a close relationship with the neighborhood and are strengthening physical connections with the surrounding neighborhoods, through extension of the Back Cove Trail, potential improvements to Sherwood Street, and the potential for connections for rail or rail trail along the existing rail right-of-way. The site will be open to the public and will feature new public open space, including areas along the waterfront. Additionally, a Stakeholder Advisory Group will be established that features a number of transportation advocacy stakeholders to inform future development.

The proposed development does not eliminate any existing housing and includes the construction of up to 650 units at the completion of the long-term phase. With an expected enrollment of $\pm$ 4,500 students, the site is expected to include amenities and services (restaurants, small grocery retail, improved waterfront and trail connections) that are anticipated to reduce the number of trips off-site and can connect to existing trail networks. With the anticipated increase in usage of shared use facilities, assessments may be warranted on not only if new connections should be established, but if existing shared use facilities may need to be modified or expanded to meet capacity.

11. Anticipate future off-site improvements that would support the integration of the institution into the community and citywide infrastructure.

Staff Comment: The submitted transportation memorandum identifies the anticipated improvements that will need to be made at each phase to improve the LOS for automobiles, along with some related bicycle & pedestrian improvements. Additionally, the Stakeholder Advisory Group that will be established can help ensure that the proposed improvements can successfully integrate into the East Deering Neighborhood.

As mentioned elsewhere in this report, more information on the impact of potential bicycle & pedestrian improvements is warranted, especially for transitions to and from the site. While the IDP does not need to commit or identify every detail of these improvements, a more comprehensive review will happen as part of the future Traffic Movement Permits (TMPs) for the project.

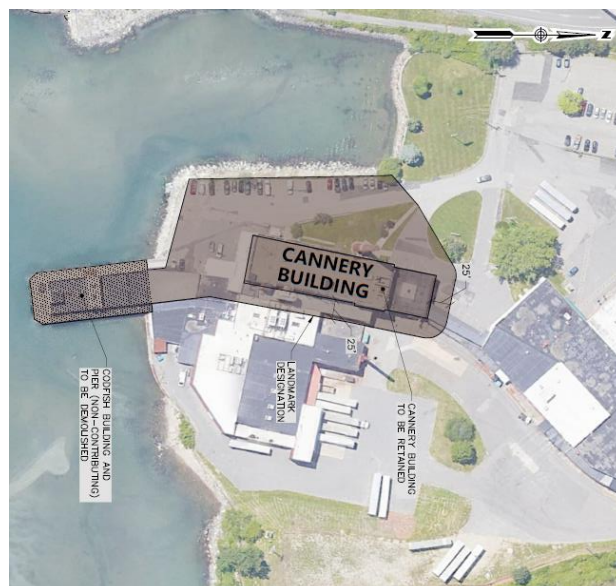


Figure 18: Designation boundaries for the Cannery Building and area immediately surrounding the Building.

12. Conform with the standards of Article 17 for designated landmarks or for properties within designated historic districts or designated historic landscapes, if applicable. When proposed adjacent to or within 100 feet of designated landmarks, historic districts, or historic landscapes, the IDP shall be generally compatible with the major character-defining elements of the landmark or portion of the district in the immediate vicinity.

Staff Comment: The applicant is pursuing designation of the Cannery Building as a local historic landmark. If this designation occurs, future phases of development will be subject to HP review within the designated area, in the case of work proposed on the Cannery Building itself. The local landmark designation recommended by the Historic Preservation Board includes language that limits Historic Preservation review to only the portions of the site designated as a local landmark, without 100 foot advisory review. The IDP identifies that the Cannery Building will be prominently featured on the site, with other development set back and limited in height within close proximity of the Cannery Building. Any new transportation improvements within the designation boundaries shown in Figure 18 will need to comply with Article 17 of the Land Use Code.

13. Incorporate strategies to support clear communication and ongoing public engagement between institutions and nearby neighbors.

Staff Comment: IDEALS has developed a variety of strategies to engage members of the community in on-going planning work. This includes semi-regularly scheduled ‘Roux Campus Roundtable’ meetings, which are to be periodically scheduled during active phases of the project development cycle. In addition, IDEALS maintains a website, www.rouxcampusportland.org, where relevant project information is regularly updated, with opportunities to take surveys, provide feedback, or contact a representative to ask questions. Additionally, IDEALS has designated a community contact who serves as direct liaison between IDEALS and members of the public. As mentioned and going forward, the Stakeholder Advisory Group will assist in providing additional opportunities for communication and transparency in future development and transportation-related mitigation measures.

IX. REVIEW OF REGULATORY FRAMEWORK

Table 2 includes a summary of the required content for the regulatory framework, along with the current compliance with those submittal standards:

Table 8: Required Content of the Regulatory Framework (8.5.5.D.)		
Requirements	Provided	Notes
Zoning boundary of the IOZ	Yes	The zoning boundary is clearly defined in a map on the first page.
Phasing and schedules	Yes	Details relating to amendment thresholds and provisions for open space & ensuring a pleasant pedestrian experience have been provided to address staff comments. Coordination between the monitoring reports and the TDM plan reports may want to be considered to inform mitigation measures, discussed in a later section of the Regulatory Framework.
Uses	Yes	Expansion of permitted uses has been provided and takes into consideration the relationship between multi-modal connections and proposed uses.
Dimensional requirements	Partial	The Applicant has provided a height map that has been refined based on feedback from the Board, Members of the Public, and City Staff. Additional identification of transition areas on the height map should be added to the Regulatory Framework. While not required to be in the Regulatory Framework, a separate submission overlaying the height map onto the Pedestrian and Bicycle Infrastructural Plan would be useful in explaining the methodology for the design of the site and demonstrating compliance with the IDP and Regulatory Framework requirements.
Transportation	Partial	The Transportation section has been expanded to include considerations related to the design for proposed bicycle and pedestrian networks, which will help promote pedestrian-scale design. Additional information is still needed for parking ratios, as well as thresholds for access improvements.

Environment	Yes	The Regulatory Framework provides clarification on how and when open space will be provided during the first phase of construction. Additionally, more specificity has been provided on how the development intends to be constructed using sustainable and resilient building practices.
Mitigation measures	Partial	The Regulatory Framework does include a broad approach on identifying mitigation measures. Additional information on thresholds to address deficiencies and goals for preservation/protection still need to be included and may be informed by other larger review topics presented at the October 25 workshop.
Design	Yes	The submitted design section provides design guidelines that more clearly translate the design principles into enforceable standards. As mentioned in the review of dimensional requirements, additional information on treatments for transition zones will help support the justification for the context of the site.
Neighborhood integration	Partial	The Regulatory Framework has begun to discuss outreach strategies as part of neighborhood integration, with the creation of a Stakeholder Advisory Group consisting of community stakeholders, as well as a community liaison. Additionally, the phasing section of the Regulatory Framework states that pedestrian linkages and safety will be addressed during the first site plan review, and includes requirements for a pleasant pedestrian experience during construction phases. Additional discussions at the October 11 workshop & October 25 workshop on Community Engagement and Benefits will help finalize any additional strategies and requirements to address community concerns.
Monitoring	Yes	The Regulatory Framework has identified a schedule for monitoring and report submittal timeframe. The Applicant may want to consider how monitoring activities can be integrated or connected to better assess/inform mitigation measures.

B. Regulatory Framework Review Standards

The Regulatory Framework is subject to 4 separate review standards, each of which are intended to ensure, consistent, and measurable zoning implementation that aligns with the goals of the Comprehensive Plan. These standards of the Regulatory Framework are anticipated to include parameters that guide the growth and change of the institution, as well as broad strategies to address potential impacts, with plans and details to be developed under site plan review.

As referenced above under the content section, the emphasis of this workshop is primarily to discuss the transportation elements of the project. Noting this, the discussion of standards below is limited to a discussion on transportation.

1. *Be consistent with the Comprehensive Plan and the Institutional Development Plan*

Staff Comment: The submitted Regulatory Framework is consistent with the Comprehensive Plan. Overall, the connections between the transportation elements in the IDP and the guidelines in the Regulatory Framework are strong. City Staff has recommended some additional information related to mitigation measures and mode share that may dictate future modifications. Additional modifications may arise based on feedback from the Board, members of the public, and City Staff and future workshops on major project elements.

2. *Provide a clear zoning framework, using graphics and tables as appropriate, to apply to future site plan reviews.*

Staff Comment: Based on previous edits made during the discussion of design elements on the project, the Regulatory Framework has been updated to provide more detailed guidance to thoughtfully plan the site based on access, different modes of transportation, and wayfinding/transitions in and off the site. Additional discussion will take place at the October 25 workshop related to the proposed rezoning of the base zone to B-5 to ensure alignment with the purpose of the zone and the documents related to the IOZ.

3. *Provide specific regulatory statements as appropriate that respond to concerns raised during the required public involvement.*

Staff Comment: Based on comments received during the Roux Roundtable discussion and Planning Board public comments, the Applicant has included the provision for a Stakeholder Advisory Group, allowance for snow ban parking on the site for neighboring residents, and developed design elements that will promote more thoughtful transitions in and around the site. As the discussion continues on Community Engagement at the October 25 workshop, additional revisions may be necessary to address new areas of concern.

4. *Outline measurable goals and thresholds for improvements or other actions identified in the IDP to be advanced in subsequent site plan applications.*

Staff Comment: As mentioned in previous sections of this memorandum, measurable goals and thresholds for transportation improvements have not been provided and present additional questions related to the target mode shares included in the IDP. City Staff is requesting feedback from the Board on the necessary level of specificity to help inform future revisions that would be presented at the October 25 workshop which will summarize the updates made to the IDP and Regulatory Framework.

X. NEXT STEPS

At the October 11 workshop, staff will seek feedback from the Planning Board on any additional content or specificity of content that needs to be provided in the IDP, Regulatory Framework, and/or supporting documentation. Based on the conversation at the October 11 workshop, additional discussion on transportation-related items may be warranted as part of the October 25 workshop.

The Applicant is currently in the process of making updates to the IDP and Regulatory Framework on other topic areas. Feedback from the Board, Members of the Public, and City Staff will help inform the comprehensive updates to the IDP and Regulatory Framework at the October 25 workshop.

XI. ATTACHMENTS

Staff Attachments

1. September 16, 2022 Comments from Consulting Traffic Engineer Tom Errico
2. September 21, 2022 Comments from City Transportation Program Manager Bruce Hyman

Applicants Submittal

- A. September 9 Transportation Memorandum
- B. September 9 Transportation Memorandum Appendix
- C. September 27 Transportation Memorandum & Appendix
- D. September 27 Institutional Development Plan
- E. September 27 Regulatory Framework

Public Comment

- a. PC1: Michael Hale
- b. PC2: Nan Cumming
- c. PC3: Chandra Leister
- d. PC4: Owen McCarthy
- e. PC5: Emma Christakia
- f. PC6: Sally Johnstone
- g. PC7: James Kim
- h. PC8: Breac Baker
- i. PC9: Caroline Foster
- j. PC10: Connor Sullivan
- k. PC11: Liz Jerome
- l. PC12: Bill Benson
- m. PC13: Jordi St. John
- n. PC14: Zach Nichols
- o. PC15: James Cabot
- p. PC16: Bates College
- q. PC17: Portland Public Schools
- r. PC18: Jason Judd
- s. PC19: Andrew Butcher
- t. PC20: East Deering Neighbors 2022-09-22
- u. PC21: East Deering Neighbors 2022-09-23
- v. PC22: Maine Medical Center
- w. PC23: Warren Valdmanis



Zachary Powell <zpowell@portlandmaine.gov>

Roux

Tom Errico <thomas.errico@tylin.com>

Fri, Sep 16, 2022 at 4:11 PM

To: Jenn Conley <jconley@vhb.com>

Cc: Bruce Hyman <bhyman@portlandmaine.gov>, Jeremiah Bartlett <jbartlett@portlandmaine.gov>, Zachary Powell <zpowell@portlandmaine.gov>, Karen Sentoff <ksentoff@vhb.com>, Sam Reiche <sam.reiche@ideals.org>

Thanks Jenn – a few quick responses below.

Tom Errico, PE

NE TRAFFIC ENGINEERING DIRECTOR

TYLin

From: Jenn Conley <jconley@vhb.com>

Sent: Friday, September 16, 2022 3:57 PM

To: Tom Errico <thomas.errico@tylin.com>

Cc: Bruce Hyman <bhyman@portlandmaine.gov>; Jeremiah Bartlett <jbartlett@portlandmaine.gov>; Zachary Powell <zpowell@portlandmaine.gov>; Karen Sentoff <ksentoff@vhb.com>; Sam Reiche <sam.reiche@ideals.org>

Subject: RE: [External] Roux

Tom,

Please find our comments below regarding the additional requests and the materials attached, as we indicate. Please don't hesitate to reach out if you have additional questions.

Thank you,

Jenn

- Existing Turning Movement volumes (It is unclear what Figure 3 represents) **Yes, attached.**
- The memo notes three build horizons (2026, 2031, 2041). Provide turning movement volumes for all. **Yes, attached.**
- Provide Roux trip assignment graphics for all build scenarios. **The Roux trip generation volumes by intersection and movement are represented in the graphics attached.**
- The LOS table notes results for No-Build, Full Build and Full Build with mitigation. It's confusing when as noted above you were doing 5-, 10- and 20-year forecast. Please correct/clarify. **As indicated, the memorandum included the full build conditions as a comparison against the full build conditions allowed under existing zoning as this was the focus of the zone change. Each of the interim year LOS tables were provided in the appendix and are provided attached to this email. When you revise the report please include. It not easy pulling information from the appendix.**

- Table 8 notes LOS conclusions for one time period. Why not summarize conditions for both AM and PM? I'd like to see both. As indicated above, all LOS tables (both peaks, each time horizon) were provided in the appendix. They are also attached here. When you revised the report please update Table 8 to include AM.
- The Synchro model assumes Sherwood Street approaches are aligned directly opposite each other. They are offset and I believe need split phasing. Please edit the model. This was an error and will be revised and resent.
- Please provide SimTraffic output reports. The queuing and blocking reports from simtraffic were also provided in the appendix and are provided attached. I'm looking for the SimTraffic LOS/Delay conclusions and Table 8 should reflect SimTraffic and not Synchro.
- Please extend the Washington Avenue link in Synchro and include the off ramp into the site. Also, please confirm the analysis assumed this connection (the trip assignment in the appendix notes 170 AM peak hour trips making the right onto Veranda – which would imply it's not included) As outlined in the memo, the improvements that would be required at Washington and Veranda were determined in the event that the ramp were not to be present. A separate analysis was conducted to review the ramp operations, should that ramp be put in place. That should be included and the implication of avoiding intersection widening at Wash/Veranda should be documented.
- Provide back up information on the time-of-day pattern for Roux. The information regarding when particular populations are on site was provided in the appendix and attached and was based on interviews with Chris Mallett of the Roux Institute. The hour to hour percentages for arriving and departing were developed with my judgment and included little peak spreading in order to analyze a conservative condition. I saw the breakdown in the appendix and wanted to see specific back up. I want to understand the potential for overlapping peaks. Maybe Chris can provide more detail.

[Quoted text hidden]



Zachary Powell <zpowell@portlandmaine.gov>

Comments on Roux Institute Mode Share Targets and Multimodal Program/Projects

Bruce Hyman <bhyman@portlandmaine.gov>

Wed, Sep 21, 2022 at 11:27 AM

To: "Conley, Jenn" <jconley@vhb.com>, Denise Cameron <dcaeron@woodardcurran.com>

Cc: Tom Errico <thomas.errico@tylin.com>, Jeremiah Bartlett <jbartlett@portlandmaine.gov>, Keith Gray <kgray@portlandmaine.gov>, Zachary Powell <zpowell@portlandmaine.gov>, Justin Pellerin <jrp@portlandmaine.gov>, Kevin Kraft <kkraft@portlandmaine.gov>

Good morning/afternoon, Jenn and Denise,

I've reviewed (along with other members of the city's transportation team) the mode share targets and proposed multimodal transportation program and component projects provided in the September 9, 2022 memorandum in support of the upcoming transportation workshop for the re-zoning. I wanted to provide these in advance of tomorrow morning's meeting.

We fully support the setting of aggressive mode share targets for bicycling-transit-walking but we don't find that the program/project components for those modes (in addition to the TDM program suggested) are robust enough to support meeting those targets. I alluded to this in our last call.

Some combination of additional multimodal-TDM program/project components should be considered and assessed for potential inclusion in your site planning in addition to those included in the memorandum. (This is not to suggest that Roux/IDEALS would be the sole funder or planner/designer for all or part of the capital projects listed but how they would or would not factor into achieving the stated targets?) These include:

- TRANSIT (to support the 10% target and the 85AM/111PM number of trips)
 - identifying the likely transit service frequency needed versus the existing
 - identifying the key transit route characteristics versus the existing
 - specifying the transit rider subsidy (full/free out of pocket to the rider?, partial?)
 - potential capital/operating contributions to METRO
- BICYCLING AND WALKING (to support the 18%-19% target and the 154 AM/212PM number of trips)
- *Bicycling*
 - the Casco Bay Trail/Pathway (SLA corridor) with and without the trestle bridge reconnection to the Eastern Promenade Trail shared use pathway
 - the Martin's Point Bridge Pathway
 - Phase II Bates-Veranda Streets bikeway (enhancing the city's intended short term buffered bike lane improvements from Baxter Blvd to Bates and Veranda Streets)
 - widening the approaches to the existing pathway on the north side of Tukey's Bridge (currently ~8' in width)
 - reconfiguring the NB Washington Avenue on-ramp to I-295 to access the site in possible combination with the motor vehicle off-ramp being considered for later development phases
- *Walking*
 - the shared use pathway projects noted above under 'Bicycling'
 - the direct connection from Veranda Street along the Howie's building frontage to the Roux site
- PARKING SUPPLY AND PRICING - some detail that describes the parking supply proposed for the various phases and pricing to incentivize multimodal access as part of a TDM program.

Additional comments: In addition to the above, we'd like to get larger size drawings than those provided in the memo of some of the sketches so we can check dimensions and details of the conceptual reconfigurations shown on 1) the Veranda Street approach to Washington Avenue and 2) Sherwood Street. The Sherwood Street drawing does not show the proposed street configuration (travel/turn lanes, bikeway configuration, parking, e.g.) on Veranda Street whereas the Veranda St approach to Washington Ave shows a transition to a two-way center turn lane (is this proposed to carry to Sherwood Street?).

Please don't hesitate to contact me if you have any questions on the above comments. We can further discuss this tomorrow.

Bruce

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Bruce Hyman

Transportation Program Manager
City of Portland
Department of Planning and Urban Development
[389 Congress Street, 4th Floor](#)
[Portland, Maine 04101](#)
(207) 874-8717 phone
bhyman@portlandmaine.gov





To: Zachary Powell
Bruce Hyman
Tom Errico

Date: September 9, 2022

Memorandum

Project #: 58570.00

From: Jennifer Conley, PE, PTOE

Re: Ideals Roux Institute Transportation Materials
Planning Board Workshop

Introduction

The City of Portland Planning staff has requested a number of technical transportation materials in reference to the modification of zoning for the former B&M property to accommodate a mixed use campus for the Roux Institute. Under current zoning, the site would allow for a building program that could include 1.1 million sf of office development accounting for setbacks, height restrictions, parking needs and approximate 50% lot coverage. The proposed long-term development program, consistent with the proposed Institutional Overlay Zone and Institutional Development Plan (IDP), includes the following land uses:

- › Roux Institute – 400,000 SF
- › Multi-family Housing – 650 Units
- › Office – 200,000 SF
- › Research and Development – 50,000 SF
- › Hotel – 125 Rooms
- › Retail – 10,000 SF
- › Restaurant – 15,000 SF

IDEALS has met with City and Maine DOT staff for several months to discuss transportation assumptions and that input is reflected in the information provided below and accompanying electronic files.

Trip Generation of IDP Full Development Build Out

Trip estimates for the potential build out of the site were generated using industry standard rates and Maine DOT Traffic Movement Permit guidance. Trip generation rates were obtained from the Institute of Transportation Engineers Trip Generation Manual, 11th Edition, where available. Input was received from the City of Portland regarding appropriate land use codes, specifically for the restaurant component. In addition, because the land use code for university/college does not reflect the type of institution proposed here, VHB developed a trip generation methodology based on the anticipated populations at the site.

Relevant ITE land uses for the Roux Campus include general office building (LUC 710), multi-family housing mid-rise (LUC 221), high-turnover, sit-down restaurant (LUC 932), strip retail plaza (LUC 822), and hotel (LUC 310). The trip generation assumptions for the full development program and ITE trip estimates (including all modes) are in Table 1. Information on Roux projected population and programming and the resulting trip profile are provided in Table 2 below.

Table 1 Trip Assumptions for IDP full build development program

Site Land Uses and Descriptions				AM PEAK HOUR			PM PEAK HOUR		
LUC	Land Use	Size	Unit	Total	Entering	Exiting	Total	Entering	Exiting
N/A	Roux Institute	400	1,000	314	288	26	562	138	425
221	Multifamily Housing (Mid-Rise)	650	Units	274	63	211	254	155	99
710	General Office Building	200	1,000 SF	304	268	36	288	49	239
760	Research and Development Center	50	1,000 SF	52	42	9	49	8	41
310	Hotel	125	Rooms	58	32	25	74	38	36
822	Strip Retail Plaza (<40k)	10	1,000 SF	24	14	9	66	33	33
932	High-Turnover Sit-Down Rest.	15	1,000 SF	144	79	65	136	83	53
Total Trips				1169	786	382	1428	503	926

The trip generation developed using Roux Institute programming is 113 fewer PM peak hour trips than calculated using the ITE trip estimates for LUC 550 – University/College. The comparison of trip estimates is further detailed in Table 2 below.

Table 2 Roux Trip Generation Components on a Typical Day

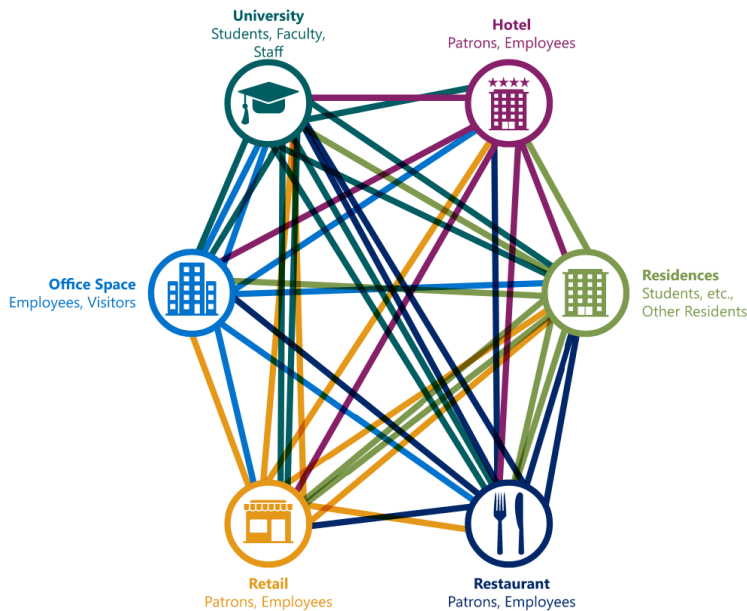
		AM peak hour	PM peak hour
1,680 Enrolled Graduate Learners (hybrid)	in	32	48
	<u>out</u>	<u>0</u>	<u>64</u>
	total	32	112
3,500+ Corporate Learners (online and hybrid)	in	70	0
	<u>out</u>	<u>0</u>	<u>140</u>
	total	70	140
150 People at Special Events	in	15	50
	<u>out</u>	<u>0</u>	<u>15</u>
	total	15	65
50+ Embedded Startups (ITE LUC Office 100 emp)	in	43	13
	<u>out</u>	<u>6</u>	<u>61</u>
	total	49	74
165 Faculty & Staff (ITE LUC Office 165 emp)	in	71	18
	<u>out</u>	<u>10</u>	<u>88</u>
	total	81	106
10% more Visiting Faculty & Staff (ITE LUC Office 16 emp)	in	7	2
	<u>out</u>	<u>1</u>	<u>9</u>
	total	8	11
105 Researchers (ITE LUC R&D 105 emp)	in	50	7
	<u>out</u>	<u>9</u>	<u>48</u>
	total	59	55
Total Roux Population	in	288	138
	<u>out</u>	<u>26</u>	<u>425</u>
	total	314	562
ITE Estimate	in	527	216
	<u>out</u>	<u>149</u>	<u>459</u>
	total	676	675
Percentage of ITE Trips		46%	83%

Internally Captured Trips

As a mixed-use development, many trips will occur between destinations on the campus. Students, faculty, and staff will often eat in on-site restaurants and shop at retail stores. Some students and employees will live in the residential units or work in the office space. Office workers may travel between offices, university buildings, restaurants, and stores. Visiting faculty, corporate partner employees, researchers and prospective students will stay in the hotel. Inclusion of integrated uses on the campus such as housing, hotel, office space, and restaurants will reduce the number of trips that impact City roadways. For traffic generation purposes, internal trips are separated from total trips estimated using engineering standards. The overall internal trip capture across the land uses for this development

were estimated to be approximately 28% in the AM peak hour and 22% in the PM peak hour for the IDP full build program.

Figure 1 Internal Trip Combinations



Mode Share

The East Deering Neighborhood is served by multiple bus routes and features a pedestrian and bicycle network. With improvements to these resources, the project site will be well-suited for trips by modes other than single-occupant vehicles. For instance, IDEALS is committed to working with Portland METRO to support increased transit opportunity to and from the campus area. A dedicated transit station adjacent to the site has been discussed with, and supported by METRO and will include an appropriate bus turn around.

Northeastern University currently subsidizes transit passes at campuses throughout their network and is currently working with METRO to offer the same at the Roux Institute. For the remainder of the site, IDEALS is committed to reaching a high transit mode share and anticipates including subsidized transit passes as part of the Transportation Demand Management planning for the site.

Connections between the campus and local and regional pedestrian and bicycle networks are also imperative to achieving the goal mode split. As such, IDEALS has committed to design a shared use path connection from the site under the north end of Tukey's bridge to the Back Cove Trail and the connection onto Tukey's bridge. In addition, for commuters to other destinations, IDEALS is committed to improving Sherwood Street to accommodate bicycles and pedestrians. Based on the limited cross section under the I-295 bridge, the facility may be shared in that area, but west of the bridge, separate sidewalks and bicycle lanes are proposed. Separate from this project, the city is also contemplating improvements to Veranda Street and Bates Street to better accommodate cyclists.

It is anticipated that these investments as well as other Transportation Demand Management strategies will reduce auto mode share. Target mode shares for each proposed Roux Campus land use were developed and discussed with City of Portland and Maine Department of Transportation officials at several meetings. These shares, as outlined in Table 3 below, were applied to external trips to determine the likely number of trips by each mode.

Table 3 Mode Share by Proposed Land Use

Land Use	% Transit	% Ped/Bike	% Vehicle	% Carpool
University	10%	20%	65%	5%
Residential	10%	20%	65%	5%
Office	10%	10%	75%	5%
Hotel	10%	10%	75%	5%
Retail	10%	50%	40%	0%
Restaurant	10%	50%	40%	0%
Overall Site Mode Shares	10%	18/19%	67/66%	5%

Applying each of these mode shares to the trip generation for the appropriate land use results in the trip generation by mode as shown in Table 4 below.

Table 4 External Trips by Land Use and Mode for Long-Term Build Out

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
University	145	22	45	11	320	49	98	25
Residential	131	20	40	10	123	19	38	9
Office	229	31	31	15	218	29	29	15
Hotel	33	4	4	2	45	6	6	3
Retail	2	0	2	0	7	2	8	0
Restaurant	24	6	31	0	25	6	31	0
Total Trips	568	85	154	39	739	111	212	52

As shown in Table 5, the single occupant automobile mode share is expected to be 66 to 67 percent of site trips. Other non-single occupant automobile mode share is anticipated to be 33 to 34 percent. Those overall mode shares are provided in Table 5 below along with the Portland Plan City wide mode shares. For an additional datapoint, data from a Portland based campus is also provided. Although this data point does not include a hotel or residential component, it does include some office space as well as minor retail and restaurant space to serve the campus.

Table 5 Overall Mode Shares compared to Other Local Mode Shares

Mode	AM	PM	Portland Plan City Wide	Portland Based Campus
Drove Alone	67%	66%	68%	71%
Transit	10%	10%	3%	18%
Non-Motorized	18%	19%	14%	5%
Carpool	5%	5%	8%	6%
Telework/Other	0%	0%	7%	%

Trip Generation of As of Right or Zone Change Developments

The zoning analysis is not evaluating a specific proposed development as is conducted in a site plan review, but rather evaluating whether the proposed Institutional Development Plan causes more intensive transportation impacts than what could be built on the site under current zoning. As indicated above, based on the limitations of the current zone including 75 feet max height, 75' front yard and 25' side yard setbacks, three levels of parking being required (one above and two underground), results in a total square footage of 2.25 million square feet of development on the site. Assuming only 50 percent lot coverage would result in approximately 1.1 million square feet of development. The most intense use allowed on the site under current zoning would be office space.

Once accounting for the mode share consistent with that used for the IDP office component, trip generation calculations for 1.1 million square feet of office development result in 1254 AM peak hour vehicle trips and 1188 PM peak hour vehicle trips. As shown in Table 6 below, the IDP full build program is 55 percent fewer trips than the trips generated by the buildout of the site under the existing zoning during the AM peak hour and 37 percent fewer trips than trips generated by the existing zoning build out during the PM peak hour.

Table 6 Comparison of Existing Zoning Trip Generation with Proposed Program Trip Generation

Peak Period	Existing Zoning Full Build with only 50% building coverage ¹	Proposed IDP Full Build Program ²	Net Total from Existing Zoning to Proposed IDP Buildout	Percentage Change from Existing Zoning to Proposed IDP Buildout
AM Peak Hour				
Enter	1104	424	-680	
Exit	150	141	-9	
Total	1254	565	-689	-55%
PM Peak Hour				
Enter	202	217	15	
Exit	986	520	-466	
Total	1188	737	-451	-37%
% Auto Usage	75%	varies by use overall 67%		

1. Assumes 50% of lot coverage under existing zoning resulting in 1.1 million sf ITE LUC 710 Office

2. Based on Proposed IDP Full Buildout Program.

Trip Assignment

To distribute the trips anticipated for the proposed site uses to the transportation network, multiple data sources were compared and contemplated. Population density and journey to work data were considered in the development of the initial distribution as illustrated in the table below. The distribution was validated with the small sample size of the existing Roux specific data, as shown in Table 7 below, and the assignment further refined in collaboration with the

city to reflect the likely assignments on Washington Avenue from local points north and west and a portion of the access to and from I-295 south via the Veranda ramps at Exit 9.

Table 7 Distribution Trip Assignments

Route	Proposed Distribution¹	Current Roux Distribution²	Difference
I-295 points north	15%	19%	-4%
I-95 points north	4%	5%	-1%
26/100 points north/west	7%	7%	0%
302 points north/west	8%	9%	-1%
25 points west	0%	0%	0%
I-295 points south	50%	46%	4%
Baxter Blvd	5%	7%	-2%
Route 1 north	7%	4%	3%
Presumpscot / Route 9	4%	4%	0%

1. Trip distribution based on population density and journey to work information.

2. Based on the limited zip code information for current Roux students, faculty, and staff.

Figure 2 Trip Distribution



After discussions with City of Portland staff and transportation consultant, distribution of the 50 percent to and from the south was further considered. As congestion increases at the intersection of Washington Avenue and Veranda Street, site related traffic may find traveling to the south via exit 9 to provide a shorter travel time. Under the full development scenario, based on likely travel ease, trips exiting the site were split between the Exit 8 ramps and the Exit 9 ramps. Entering trips were assigned 40 percent to exit 8 and 10 percent to exit 9.

Existing Traffic Volume Summary

Traffic volume data were gathered in order to establish the existing and future conditions without the project. Historic traffic count data was gathered from Maine DOT and the City of Portland for 2017 AM and PM peak hour traffic counts along the Washington Avenue corridor. In addition, VHB collected 2021 AM and PM peak period traffic count data along Washington Avenue as well as at the intersections of Veranda Street at Sherwood Street and at Bates Street at Baxter Boulevard. This zoning traffic analysis concentrates on the intersections of Washington Avenue at Veranda Street, Veranda at Sherwood Street and Baxter Boulevard at Bates Street. The City's transportation consultant requested that the intersection of Washington Avenue at Presumpscot Street be included in the analysis in order for the impacts of the lane drop along Washington Avenue to be captured in the operations of Washington Avenue at Veranda Street.

Traffic volume adjustments were applied based on weekly group mean factors according to MaineDOT guidance. The 2017 AM and PM peak hour traffic volume data was higher than the more recently collected data and was used for this analysis where available. The data were balanced when appropriate and the resulting traffic volume networks are representative of Existing conditions traffic volumes (see graphics below).

In order to create the future baseline condition traffic volume networks to evaluate the impact of site related increases, a 0.5 percent per year growth rate was applied to the existing traffic for five, ten, and twenty years, resulting in the 2026, 2031, and 2041 no build traffic volume networks. In addition, City staff requested that the traffic associated with two projects be included in the projections. The traffic associated with Front Street Housing located west of Washington Avenue and the residential project located off of Dalton Street east of Sherwood Street and just north of Veranda were each included as site specific projects in future year projections.

Figure 3 Traffic Volumes



LOS and Delay Output Summary

Capacity analyses were conducted for the study area intersections under No Build conditions as well as both potential build scenarios – Full Build under Existing Zoning and the proposed Roux Campus IDP Zoning Build Out. The summary of the results is provided in Table 8 below. In addition, as requested by the City, the No Build and Build conditions for the proposed short and mid-term development plans for the Roux campus are provided in the appendix. The LOS summary tables and Synchro output sheets are provided with this document and synchro files will be shared separately.

Table 8 Level of Service Summary Table for Long Term No Build, IDP Full Build, and Existing Zoning

	Long Term No Build	IDP Full Build	IDP Full Build with Mitigation	Long Term Existing Zoning
Veranda and Washington Ave				
Overall	D	E	D	F
EBL	D	D	D	D
EBTR	F	F	D	F
EBR	-	-	C	-
WBL	D	F	D	E
WBTR	D	F	F	F
NBL	E	F	F	F
NBT	C	E	C	F
NBTR	C	F	B	F
SBL	E	F	F	E
SBT	D	D	D	F
SBTR	D	D	D	F
Driveway at Veranda and Sherwood St				
Overall	A	F	C	F
EBLTR	A	A	B	A
WBLTR	A	A	B	A
NBLTR	B	F	C	F
NBR	-	-	A	-
SBLTR	B	C	C	F
Bates and Baxter Blvd				
Overall	A	A	B	A
EBL	A	A	B	A
EBT	-	-	B	A
WBTR	-	-	B	A
SBL	D	F	B	F
Washington and Presumpscot St				
Overall	F	F	F	F
EBLTR	E	E	E	E
WBLT	D	D	D	F
WBR	C	C	C	D
NBLT	F	F	F	F
NBR	B	A	A	C
SBL	C	C	C	B
SBTR	F	F	F	B

Improvements Required under Each Full Build Scenario

The improvements required to address any impacts of adding development traffic to the roadway network were determined. Because the operations are tied to trip generation, the full build based on existing zoning has additional impacts, and requires additional improvements, beyond the impacts of the IDP full build program.

IDP Full Build Impacts

Based on the evaluation of the IDP full build program and the anticipated impact on the transportation network, there are a series of potential projects that could mitigate these impacts. Each project is listed with the anticipated phase of the program development at which the mitigation may be necessary based on operations.

- › Sherwood Street (short term)
 - Improve Sherwood Street to accommodate bicycles and pedestrians in separate facilities (i.e. bike lanes and sidewalk) where possible with potential shared accommodations through the limited cross section under the I-295 bridge. Figure 4 below illustrates a concept for accommodating alternative modes on Sherwood Street. Figure 4 also illustrates providing a separate left and right turn lanes on Sherwood which is not anticipated to be required until the mid term.

Figure 4 Sherwood Street Concept



- › Back Cove Trail Connection (short term)
 - A shared use path connection from the site under the north end of Tukey's bridge to connect with the Back Cove Trail and the connection onto Tukey's bridge. The alignment of this shared use path is illustrated in Figure 5 below.

Figure 5 Back Cove Trail Connection



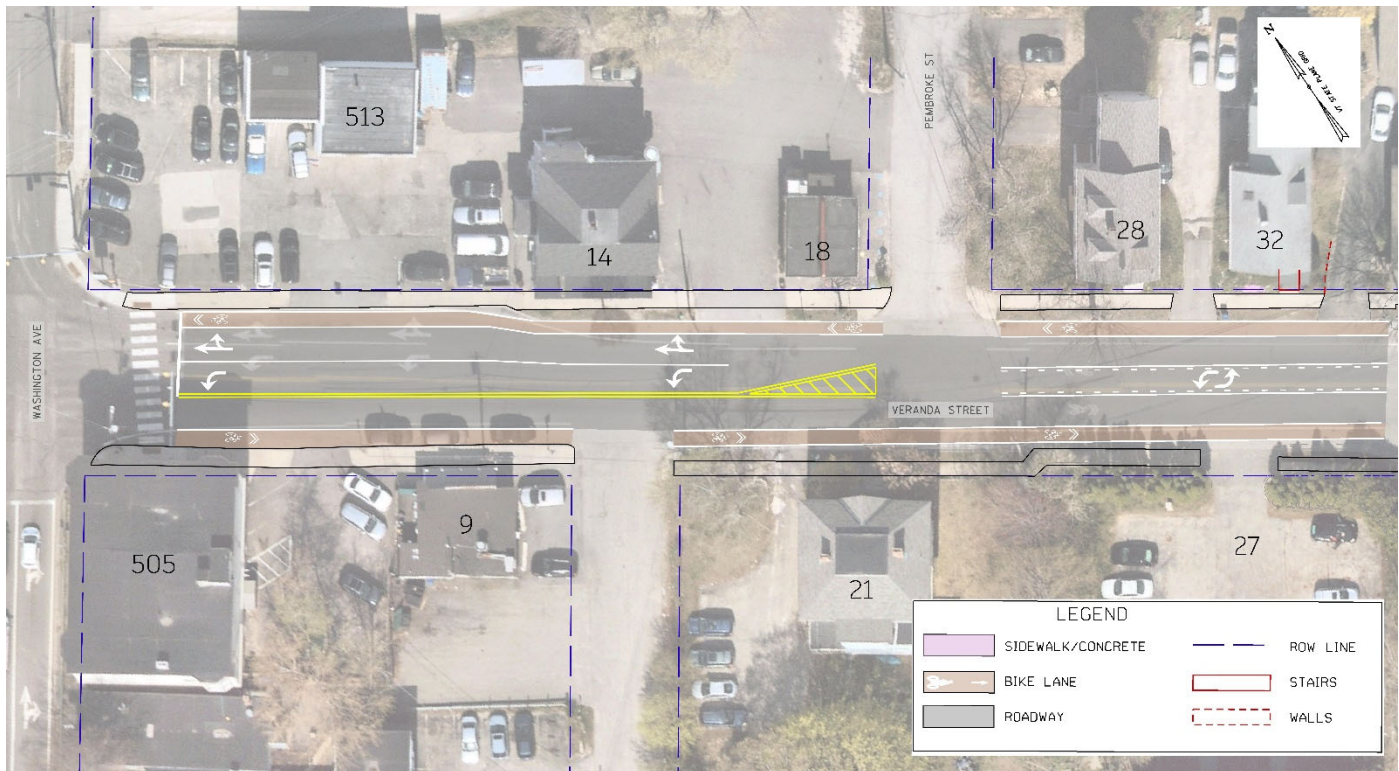
- › Washington Avenue at Veranda Street (mid to long term)
 - Addition of an eastbound right turn lane (Bates approach) and northbound right-turn lane (I-295 Ramp). With these lanes, and timing changes, the overall LOS will improve to a D during the AM and PM peak hours (was LOS E without improvement). Alternatively, the ramp from the Washington Avenue off-ramp to Sherwood Street could be considered. Figure 6 illustrates the land being set aside for the potential ramp alignment.

Figure 6 Site Overview with Potential Ramp Alignment



- › Veranda Street (mid term)
 - Improve Veranda Street to accommodate bicycles and provide two-way left turn lane between Sherwood Street and Veranda Street. Figure 7 illustrates the updated configuration.

Figure 7 Veranda Street Concept



- › Veranda Street at Sherwood Street (full IDP build program)
 - Provide signalized control including a separate northbound left-turn lane. These changes would result in an overall LOS D during the AM and PM peak hours.
- › Bates Street at Baxter Boulevard (full IDP build program)
 - Provide an all-way stop control. Under all-way stop control, the intersection would experience a slight increase in delay resulting in less than 13 seconds of delay for the eastbound and westbound approaches. However, it would significantly improve the southbound left turn from LOS D/F during the AM/PM peak hours to a LOS B.
- › Washington Avenue at Presumpscot Street (full IDP build program)
 - Per discussion with the City's Consultant, VHB also looked at the intersection of Washington Avenue at Presumpscot Street based on its likely effect on the operations of Washington Avenue at Veranda Street. For the full IDP build program, a northbound left turn prohibition would need to be considered, a second southbound thru lane added and the southbound left advance phase removed to address the poor operations during the AM peak hour. In addition, the pedestrian crossing the south leg of the intersection would need to be removed in order to improve overall operations.

Additional Improvements required under Existing Zoning Buildout

Under this existing zoning buildout, improvements would be required consistent with those outlined above for the proposed development. The following infrastructure would be required **in addition** to the above to accommodate the build out of the site under existing zoning.

- In addition to the lanes proposed under the proposed overlay buildout, a second westbound left turn lane on Veranda Street to access the I-295 SB on ramp even with accounting for 50% of the traffic using the interchange to the north on Veranda Street.
- The peak hour impacts are more intensive and more directional under existing zoning, requiring left turn lanes on Veranda Street at Sherwood Street to accommodate the traffic at the signal that would be proposed under either program.

I-295 Off-Ramp

In recognizing that a majority of trips to and from the site will route through the intersection of Washington/Veranda/I-295 Ramp and understanding that the potential to expand that intersection is limited, the Roux Institute is designing the campus so as to accommodate a future potential ramp from the existing I-295 northbound off-ramp to City-owned Sherwood Street just east of the interstate overpass. The ramp connection at Sherwood Street would be a three-leg intersection with an all-way stop condition. Provided the trips entering the site from the south on I-295 would utilize this route and ramp option, it is anticipated the new intersection would operate at a LOS A on all approaches in the AM peak hour and LOS A/A/C on each approach in the PM peak hour, with the LOS C serving those exiting the site. Queues are anticipated to be less than 80 feet in the AM peak hour and less than 140 feet in the PM peak hour. The ramp diverge would operate at LOS A/A in the AM/PM condition.

Parking Analysis

Parking will be built over time as part of the development program. All vehicular trips are intended to park on-site. As demand increases during the phased development, parking will be introduced incrementally to avoid excess supply and inadvertent encouragement of driving to the site. Base parking demand was estimated for each hour of the day using ITE Parking Generation Manual, 5th Edition rates and the same land use codes as for trip generation with the exception of the Roux Institute which used the evaluation of population travel profiles as outlined above. The estimates indicate that total parking demand across all uses on the site will peak at 4 PM as driven by Roux Institute parking needs. Demand at full build-out could be as high as almost 1630 vehicles, inclusive of day users and residents.

All site parking is intended to be communal; availability in the closest parking to a destination will not be guaranteed. Additionally, uses with opposing peak parking demands will be able to share parking resources. All parking will be paid parking, and a parking office will be created to handle permitting and enforcement for the campus. Parking costs and regulations may vary between classes of users (students, staff, residents, office tenants, visitors, etc.). IDEALS is considering on-site car share, enabling travel to and from the site using other modes, with the comfort that vehicles are available if necessary.

To ensure that Campus users do not impinge on the limited parking available in adjacent neighborhoods, IDEALS is committed to working with the City to create and support a residential permit parking program that would not prevent Campus users from parking off-site.

High Crash Locations Summary

Maine DOT identified high crash locations as segments or intersections with eight or more traffic crashes and a critical rate factor exceeding 1.00 over the most recent three-year period. Within the vicinity of the project site for calendar years 2019 through 2021, two intersections and two segments meet these criteria and are illustrated on the graphic in Figure 8.

US1 at Veranda and I-295 Ramps

All 14 crashes at this intersection were due to northeast-bound vehicles failing to yield to vehicles at the intersection. Drivers heading northeast at this location on Veranda Street approach on a slight curve. Vegetation/hedges at the inside of the curve may be contributing to the crashes, by obstructing view of the upcoming Stop signs. At this intersection, the road flares out significantly to accommodate Wordsworth Street. Streetview images show that the stop bar was worn significantly.

Reconstruction of the intersection as a part of the Veranda Street bridge replacement appears to have addressed each of these issues by removing the roadway curve and signalizing the intersection.

Washington at Randall

Almost all crashes were related to northwest-bound left turning vehicles from Washington Avenue turning onto Randall Street. There were four intersection movements, including a head-on collision, where drivers failed to yield to oncoming traffic. There were an additional three crashes of vehicles being struck from behind that appear to be stemming from vehicles attempting to make left turns into Randall. One crash was for a right turning vehicle out of Randall Street.

The sight distance is much more than the minimum at the location. The volumes are very high on this section of road, leaving few gaps for vehicles. The volumes are too high for a 'road diet' and no available width for consideration of a two-way-center-left-turn-lane (TWCLTL) and keeping two lanes in each direction. The elimination of left turns into or out of Randall Street at this location may solve this crash pattern.

Washington I-295 NB Exit 8

Of the 12 crashes, 7 crashes were related to speed of exiting vehicles from northbound I-295. Exiting vehicles appear to not be slowing down and the grade down the ramp may be inhibiting deceleration. In combination, the curve at the bottom of the ramp may be unexpected for some drivers as 6 of the crashes involve vehicles striking the outside guardrail. There is an existing sign indicating a traffic signal is ahead, which cannot be seen in advance. Consideration should be made for additional signage to reduce speed down the ramp, signs to indicate a curve ahead, and chevron signs on the curve.

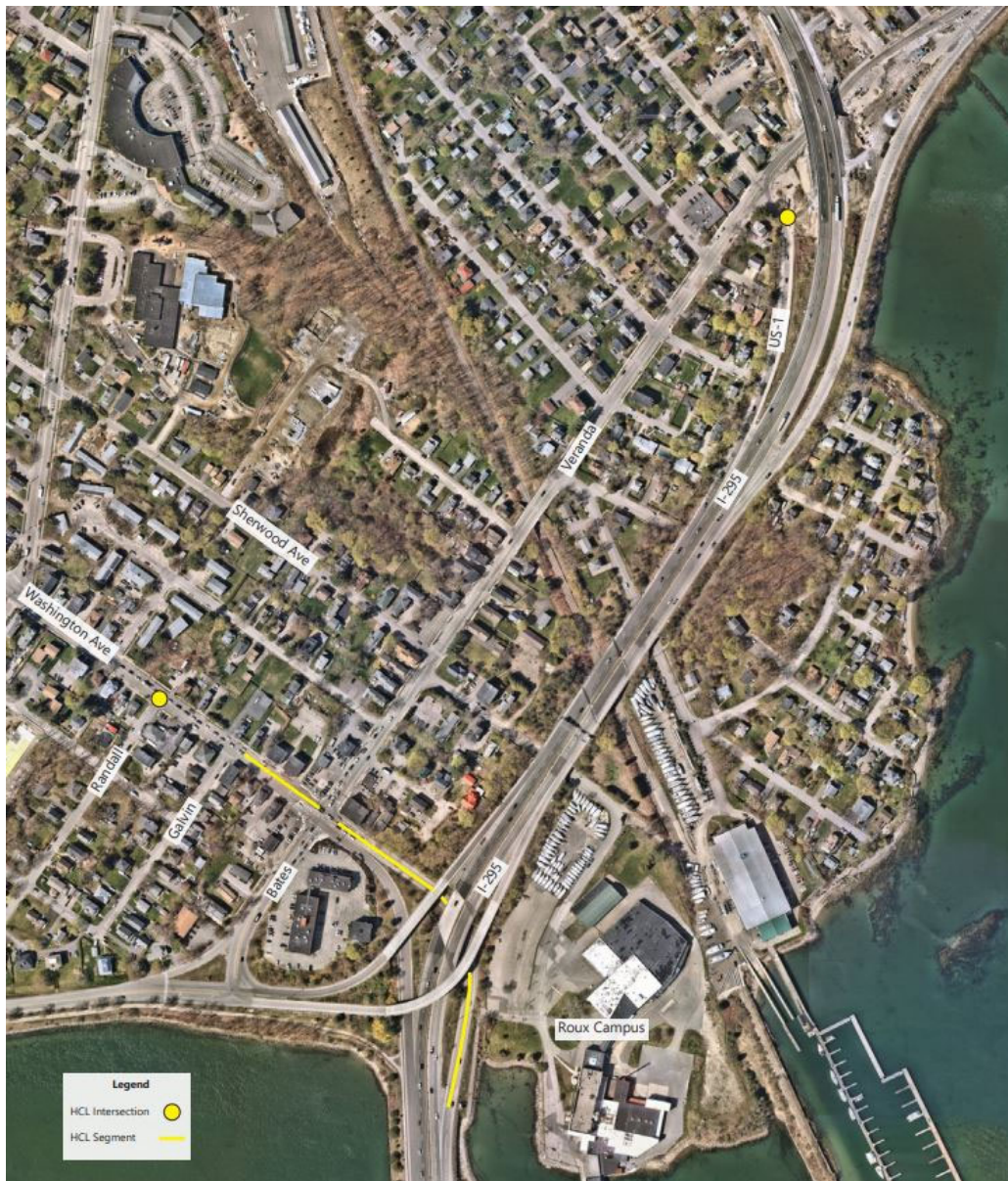
The remaining crashes could be considered typical of stop and go traffic at a signalized intersection. Optimized signal timing could possibly reduce delay, but due to known existing congestion improvements may be minimal.

Washington from Galvin to Bates

There did not appear to be any consistent crash patterns for this section of road. Some crashes were due to eastbound left turning vehicles entering the driveway between the car dealer and the apartment, which is nearly at the signalized intersection and where the exclusive left turn lane begins. Crashes may be related small gaps in traffic from

high congestion. An additional 3 crashes involved vehicles not staying in lane, but with a long straight road with plenty of sight distance, crashes may be due to drivers attempting to change lanes in response to congestion and queueing.

Figure 8 High Crash Locations in Vicinity of Project Site



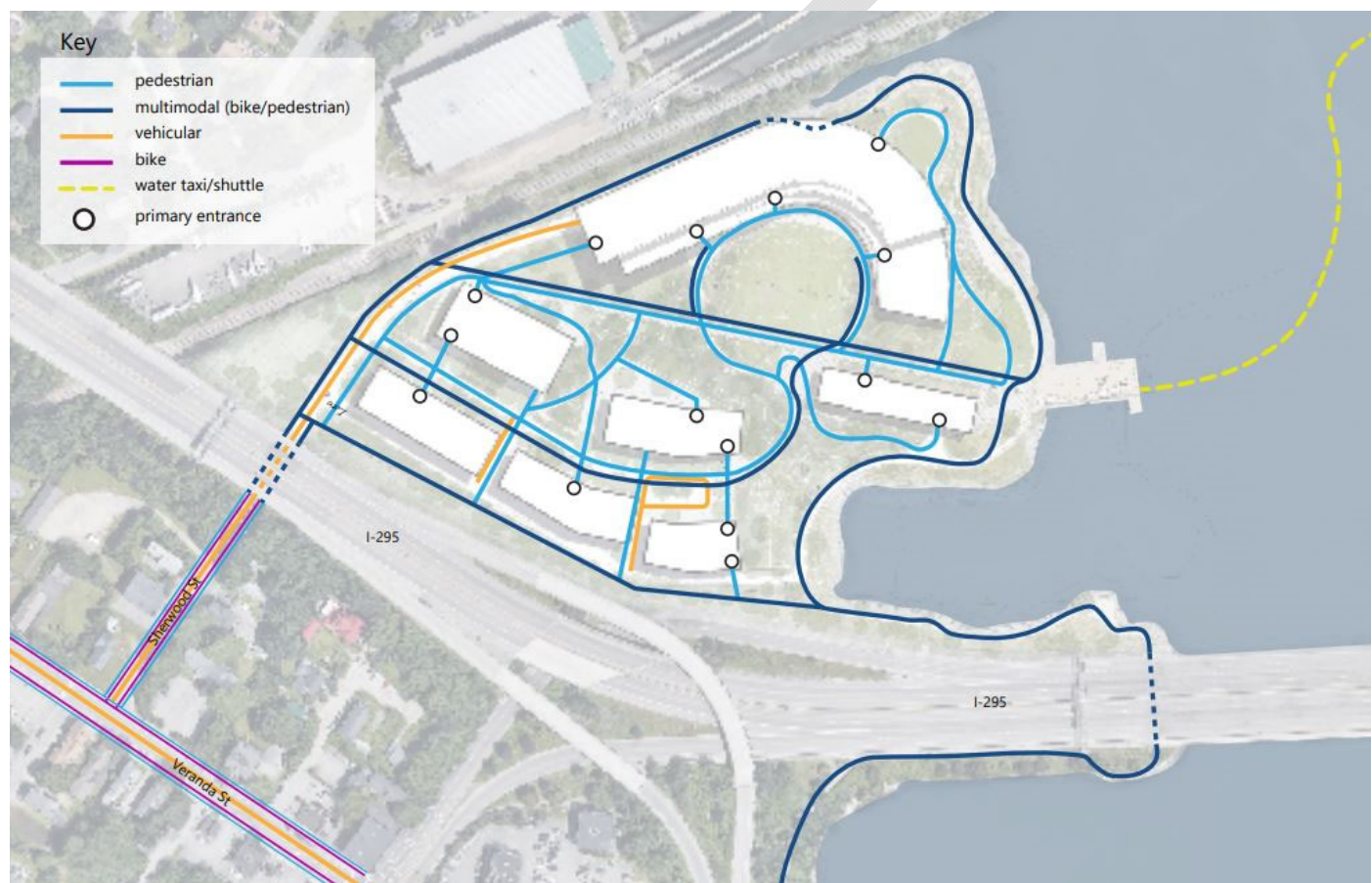
Pedestrian and Bicycle Infrastructure Conceptual Plan

Within the site, pedestrian and bicyclist circulation will be prioritized on a series of internal paths, depicted below. Bicycle parking will be made available at locations convenient to building entrances. For residential and Roux institute uses, secure and covered bike parking will also be made available for longer term bike parking and storage. It is

anticipated that those navigating to and from the site via vehicular modes will park once and utilize these pathways to move between the various uses on the site, limiting the on-site vehicle circulation. The pathways will serve all other entering and exiting modes through interconnectivity with transit stops and the broader local and regional pedestrian and bicycle networks.

Critical connections to local and more regional bike and pedestrian networks are proposed to integrate the site into the larger network, making access and egress of the site by these non-motorized modes seamless. This includes improvements to Sherwood Street between the site and Veranda Street, improvements to Veranda Street between Sherwood Street and Washington Avenue, as well as the direct Back Cove Trail connection under Tukey's Bridge.

Figure 9 Site Transportation Circulation and Connections



Conclusions

As illustrated above, the full build development program as proposed by the Institution Development Plan is anticipated to be less intensive, both in square footage and in the resulting trip generation, than an office development that could be constructed on site under existing zoning. Accordingly, the development under existing zoning would result in more delay at area intersections as well as additional improvements being required in order to mitigate impacts.

External Trips by Land Use and Mode, Short Term

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
Office	39	5	5	3	38	5	5	3
Retail	0	0	0	0	0	0	0	0
Restaurant	23	6	28	0	24	6	30	0
University	76	12	23	6	182	28	56	14
Residential	36	6	11	3	44	7	13	3
Hotel	38	5	5	3	50	7	7	3
Total	212	33	73	14	338	52	111	23

External Trips by Land Use and Mode, Medium Term

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
Office	74	10	10	5	72	10	10	5
Retail	1	0	2	0	3	1	4	0
Restaurant	17	4	21	0	18	5	23	0
University	127	20	39	10	291	45	89	22
Residential	75	12	23	6	80	12	25	6
Hotel	37	5	5	2	49	7	7	3
Total	331	50	99	23	514	79	157	37

External Trips by Land Use and Mode, Long Term

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
Office	229	31	31	15	218	29	29	15
Retail	2	0	2	0	7	2	8	0
Restaurant	24	6	31	0	25	6	31	0
University	145	22	45	11	320	49	98	25
Residential	131	20	40	10	123	19	38	9
Hotel	33	4	4	2	45	6	6	3
Total	565	84	153	39	737	111	211	52

Trip Generation - Project Specific - 5 year program
Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

Site Land Uses and Descriptions				
Code	Land Use	Size	Unit	TYPE
822	Strip Retail Plaza (<40k)	0	1,000 SF	Commercial
932	High-Turnover Sit-Down Rest.	10	1,000 SF	Commercial
710	General Office Building	10	1,000 SF	Office/Lab
	University/College	1750	Students	Roux
760	Research and Development Center	50	1,000 SF	Incubator
310	Hotel	125	Rooms	Commercial
221	Multifamily Housing (Mid-Rise)	235	Units	Housing

AM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
60%	40%	5	2.36	0.94	0	0.57	0	average	0	0	0		
55%	45%	37	9.57	11.61	96	-	-	average	96	53	43		
88%	12%	221	1.52	0.58	15	0.78	23	average	15	13	2		
		(non-ITE method, see calculations)					158		143		14		
82%	18%	39	1.03	0.65	52	0.7	69	average	52	42	9		
56%	44%	28	0.46	0.14	58	0.84	55	average	58	32	25		
23%	77%	30	0.37	0.09	87	0.91	92	regression	92	21	71		

PM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
50%	50%	25	6.59	2.94	0	0.56	0	average	0	0	0		
61%	39%	104	9.05	6.18	91	-	-	average	91	55	35		
17%	83%	232	1.44	0.60	14	0.77	25	average	14	2	12		
							307		95		211		
16%	84%	39	0.98	0.64	49	0.7	67	average	49	8	41		
51%	49%	31	0.59	0.22	74	0.78	65	average	74	38	36		
61%	39%	31	0.39	0.08	92	0.91	92	average	92	56	36		

Trip Generation developed using the ITE Trip Generation Manual, 11th Edition. 2021 for RD space, data at that size is mostly under curve, used average rate

	total	entering	exiting
AM Peak Hour Total Site Trips:	470	305	164

	total	entering	exiting
PM Peak Hour Total Site Trips:	626	254	371

Trip Generation - Project Specific - 10 year program
Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

Site Land Uses and Descriptions				
Code	Land Use	Size	Unit	TYPE
822	Strip Retail Plaza (<40k)	5	1,000 SF	Commercial
932	High-Turnover Sit-Down Rest.	10	1,000 SF	Commercial
710	General Office Building	50	1,000 SF	Office/Lab
	University/College	2500	Students	Roux
760	Research and Development Center	50	1,000 SF	Incubator
310	Hotel	125	Rooms	Commercial
221	Multifamily Housing (Mid-Rise)	415	Units	Housing

AM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
60%	40%	5	2.36	0.94	12	0.57	18	average	12	7	5		
55%	45%	37	9.57	11.61	96	-	-	average	96	53	43		
88%	12%	221	1.52	0.58	76	0.78	92	average	76	67	9		
(non-ITE method, see calculations)							260		239		21		
82%	18%	39	1.03	0.65	52	0.7	69	average	52	42	9		
56%	44%	28	0.46	0.14	58	0.84	55	average	58	32	25		
23%	77%	30	0.37	0.09	154	0.91	171	regression	171	39	132		

PM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
50%	50%	25	6.59	2.94	33	0.56	48	average	33	16	16		
61%	39%	104	9.05	6.18	91	-	-	average	91	55	35		
17%	83%	232	1.44	0.60	72	0.77	93	average	72	12	60		
							489		132		357		
16%	84%	39	0.98	0.64	49	0.7	67	average	49	8	41		
51%	49%	31	0.59	0.22	74	0.78	65	average	74	38	36		
61%	39%	31	0.39	0.08	162	0.91	162	average	162	99	63		

Trip Generation developed using the ITE Trip Generation Manual, 11th Edition. 2021

for RD space, data at that size is mostly under curve, used average rate

	total	entering	exiting
AM Peak Hour Total Site Trips:	723	479	244

	total	entering	exiting
PM Peak Hour Total Site Trips:	969	360	609

Trip Generation - Project Specific - 20 year program
Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

Site Land Uses and Descriptions				
Code	Land Use	Size	Unit	TYPE
822	Strip Retail Plaza (<40k)	10	1,000 SF	Commercial
932	High-Turnover Sit-Down Rest.	15	1,000 SF	Commercial
710	General Office Building	200	1,000 SF	Office/Lab
	University/College	4500	Students	Roux
760	Research and Development Center	50	1,000 SF	Incubator
310	Hotel	125	Rooms	Commercial
221	Multifamily Housing (Mid-Rise)	650	Units	Housing

AM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
60%	40%	5	2.36	0.94	24	0.57	29	average	24	14	9		
55%	45%	37	9.57	11.61	144	-	-	average	144	79	65		
88%	12%	221	1.52	0.58	304	0.78	304	average	304	268	36		
					(non-ITE method, see calculations)				314	288	26		
82%	18%	39	1.03	0.65	52	0.7	69	average	52	42	9		
56%	44%	28	0.46	0.14	58	0.84	55	average	58	32	25		
23%	77%	30	0.37	0.09	241	0.91	274	regression	274	63	211		

PM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
50%	50%	25	6.59	2.94	66	0.56	78	average	66	33	33		
61%	39%	104	9.05	6.18	136	-	-	average	136	83	53		
17%	83%	232	1.44	0.60	288	0.77	295	average	288	49	239		
									562	138	425		
16%	84%	39	0.98	0.64	49	0.7	67	average	49	8	41		
51%	49%	31	0.59	0.22	74	0.78	65	average	74	38	36		
61%	39%	31	0.39	0.08	254	0.91	254	average	254	155	99		

Trip Generation developed using the ITE Trip Generation Manual, 11th Edition. 2021
Assume phase 2 has HTO Sit-Down Restaurant LUC 932
for RD space, data at that size is mostly under curve, used average rate

	total	entering	exiting
AM Peak Hour Total Site Trips:	1169	786	382

	total	entering	exiting
PM Peak Hour Total Site Trips:	1428	503	926

5 Year Program - Internal Capture Calculations

Unadjusted Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	11	56	53	10
Retail 1	0	0	0	0
Retail 2	0	0	0	0
Total Retail	0	0	0	0
Restaurant	43	53	35	55
University	14	143	211	95
Residential	71	21	36	56
Hotel	25	32	36	38
Total	164	305	371	254

Table 2 - Phase 1

Vehicular Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	11	56	53	10
Retail	0	0	0	0
Restaurant	43	53	35	55
University	14	143	211	95
Residential	71	21	36	56
Hotel	25	32	36	38
Total	164	305	371	254

Table 3 - Phase 1

Internal Person - Trip Origin Destination Matrix Percentages calculated at origin															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		20%	30%	10%	1%	0%		Office		20%	4%	10%	2%	0%	
Retail	29%		13%	29%	14%	0%		Retail	2%		29%	5%	26%	5%	
Restaurant	31%	14%		31%	4%	3%		Restaurant	3%	41%		5%	18%	7%	
University	5%	28%	20%		12%	2%		University	5%	20%	4%		4%	1%	
Residential	2%	1%	20%	75%		0%		Residential	4%	42%	21%	4%		3%	
Hotel	75%	14%	8%	10%	0%			Hotel	0%	16%	68%	0%	2%		
All Other Land Uses								All Other Land Uses							
Internal Person - Trip Origin Destination Matrix Percentages calculated at destination															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		32%	10%	10%	0%	0%		Office		8%	2%	10%	4%	0%	
Retail	4%		50%	4%	2%	0%		Retail	31%		29%	31%	46%	17%	
Restaurant	14%	8%		7%	5%	4%		Restaurant	30%	50%		30%	16%	71%	
University	0%	32%	20%		50%	2%		University	30%	12%	15%		10%	1%	
Residential	3%	17%	20%	15%		0%		Residential	57%	10%	14%	57%		12%	
Hotel	2%	4%	5%	3%	0%			Hotel	0%	2%	5%	0%	0%		
All Other Land Uses								All Other Land Uses							

Table 4 - Phase 1

Internal Person - Trip Origin Destination Matrix (Computed at Origin)															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	3	1	0	0	0	Office		11	2	5	1	0	0
Retail	0		0	0	0	0	0	Retail	0		0	0	0	0	0
Restaurant	13	6		13	2	1	0	Restaurant	1	14		2	6	2	0
University	1	4	3		2	0	0	University	11	42	8		8	2	0
Residential	1	1	14	53		0	0	Residential	1	15	8	1		1	0
Hotel	19	4	2	3	0		0	Hotel	0	6	25	0	1		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	
Trip Origin Destination Matrix (Computed at Destination)															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		0	5	14	0	0	0	Office		0	1	10	2	0	0
Retail	2		26	6	0	0	0	Retail	3		16	29	26	6	0
Restaurant	8	0		10	1	1	0	Restaurant	3	0		29	9	27	0
University	0	0	11		11	1	0	University	3	0	8		6	0	0
Residential	2	0	11	21		0	0	Residential	6	0	8	54		5	0
Hotel	1	0	3	4	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 5 - Phase 1

Balanced Internal Capture															
	AM Peak								PM Peak						
	Destination (To) Entering								Destination (To)						
Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		0	3	1	0	0	0	Office		0	1	5	1	0	0
Retail	0		0	0	0	0	0	Retail	0		0	0	0	0	0
Restaurant	8	0		10	1	1	0	Restaurant	1	0		2	6	2	0
University	0	0	3		2	0	0	University	3	0	8		6	0	0
Residential	1	0	11	21		0	0	Residential	1	0	8	1		1	0
Hotel	1	0	2	3	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 6 - Phase 1

Mode Split						
	Origin (Exiting)			Destination (Entering)		
Land Use	% Transit	% Ped/Bike	% Vehicle	% Transit	% Ped/Bike	% Vehicle
Office	10%	10%	75%	10%	10%	75%
Retail	10%	50%	40%	10%	50%	40%
Restaurant	10%	50%	40%	10%	50%	40%
University	10%	20%	65%	10%	20%	65%
Residential	10%	20%	65%	10%	20%	65%
Hotel	10%	10%	75%	10%	10%	75%
All Other Land Uses	10%	20%	65%	10%	20%	65%

Table 7 - Phase 1

AM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips @ driveway)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips @ driveway)		Total	% of internal trips	Vehicles
Office	10	45	56	19%	34	5	5	Office	4	7	11	40%	5	1	1
Retail	0	0	0	-	0	0	0	Retail	0	0	0	-	0	0	0
Restaurant	19	34	53	35%	14	3	17	Restaurant	20	23	43	47%	9	2	11
University	35	108	143	25%	70	11	22	University	5	9	14	34%	6	1	2
Residential	3	18	21	13%	12	2	4	Residential	33	37	71	47%	24	4	7
Hotel	2	31	32	5%	23	3	3	Hotel	6	20	25	22%	15	2	2
All Other Land Uses								All Other Land Uses							
Totals	68	236	305	22%	153	24	50		68	96	164	42%	59	10	23
PM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips off site)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips off site)		Total	% of internal trips	Vehicles
Office	6	5	10	54%	4	0	0	Office	7	46	53	14%	34	5	5
Retail	0	0	0	-	0	0	0	Retail	0	0	0	-	0	0	0
Restaurant	20	36	55	36%	14	4	18	Restaurant	12	24	35	33%	9	2	12
University	9	86	95	9%	56	9	17	University	17	194	211	8%	126	19	39
Residential	13	43	56	23%	28	4	9	Residential	11	24	36	32%	16	2	5
Hotel	4	34	38	10%	25	3	3	Hotel	3	33	36	8%	25	3	3
All Other Land Uses								All Other Land Uses							
Totals	51	203	254	20%	127	20	47		51	321	371	14%	210	32	63

10 Year Program - Internal Capture Calculations

Unadjusted Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	18	109	101	20
Retail 1	5	7	16	16
Retail 2	0	0	0	0
Total Retail	5	7	16	16
Restaurant	43	53	35	55
University	21	239	357	132
Residential	132	39	63	99
Hotel	25	32	36	38
Total	244	479	609	360

Table 2 - Phase 2

Vehicular Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	18	109	101	20
Retail	5	7	16	16
Restaurant	43	53	35	55
University	21	239	357	132
Residential	132	39	63	99
Hotel	25	32	36	38
Total	244	479	609	360

Table 3 - Phase 2

Internal Person - Trip Origin Destination Matrix Percentages calculated at origin															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		10%	30%	10%	1%	0%		Office		20%	4%	10%	2%	0%	
Retail	29%		5%	29%	14%	0%		Retail	2%		29%	5%	26%	5%	
Restaurant	31%	14%		20%	4%	3%		Restaurant	3%	41%		5%	18%	7%	
University	5%	28%	63%		12%	2%		University	5%	20%	4%		4%	1%	
Residential	2%	1%	20%	75%		0%		Residential	4%	42%	21%	4%		3%	
Hotel	75%	14%	8%	10%	0%			Hotel	0%	16%	68%	0%	2%		
All Other Land Uses								All Other Land Uses							
Internal Person - Trip Origin Destination Matrix Percentages calculated at destination															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		32%	10%	10%	0%	0%		Office		8%	2%	10%	4%	0%	
Retail	4%		50%	4%	2%	0%		Retail	31%		29%	31%	46%	17%	
Restaurant	14%	8%		7%	5%	4%		Restaurant	30%	50%		30%	16%	71%	
University	0%	15%	20%		50%	2%		University	30%	12%	15%		10%	1%	
Residential	3%	17%	20%	15%		0%		Residential	57%	10%	14%	57%		12%	
Hotel	2%	4%	5%	3%	0%			Hotel	0%	2%	5%	0%	0%		
All Other Land Uses								All Other Land Uses							

Table 4 - Phase 2

Internal Person - Trip Origin Destination Matrix (Computed at Origin)															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	6	2	0	0	0	Office		20	4	10	2	0	0
Retail	1		0	1	1	0	0	Retail	0		5	1	4	1	0
Restaurant	13	6		9	2	1	0	Restaurant	1	14		2	6	2	0
University	1	6	13		3	0	0	University	18	71	14		14	4	0
Residential	3	1	26	99		0	0	Residential	3	27	13	3		2	0
Hotel	19	4	2	3	0		0	Hotel	0	6	25	0	1		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	
Trip Origin Destination Matrix (Computed at Destination)															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	5	24	0	0	0	Office		1	1	13	4	0	0
Retail	4		26	10	1	0	0	Retail	6		16	41	45	6	0
Restaurant	15	1		17	2	1	0	Restaurant	6	8		40	16	27	0
University	0	1	11		20	1	0	University	6	2	8		10	0	0
Residential	3	1	11	36		0	0	Residential	11	2	8	75		5	0
Hotel	2	0	3	7	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 5 - Phase 2

Balanced Internal Capture															
	AM Peak								PM Peak						
	Destination (To) Entering								Destination (To)						
Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	5	2	0	0	0	Office		1	1	10	2	0	0
Retail	1		0	1	1	0	0	Retail	0		5	1	4	1	0
Restaurant	13	1		9	2	1	0	Restaurant	1	8		2	6	2	0
University	0	1	11		3	0	0	University	6	2	8		10	0	0
Residential	3	1	11	36		0	0	Residential	3	2	8	3		2	0
Hotel	2	0	2	3	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 6 - Phase 2

Mode Split						
Land Use	Origin (Exiting)			Destination (Entering)		
	% Transit	% Ped/Bike	% Vehicle	% Transit	% Ped/Bike	% Vehicle
Office	10%	10%	75%	10%	10%	75%
Retail	10%	50%	40%	10%	50%	40%
Restaurant	10%	50%	40%	10%	50%	40%
University	10%	20%	65%	10%	20%	65%
Residential	10%	20%	65%	10%	20%	65%
Hotel	10%	10%	75%	10%	10%	75%
All Other Land Uses	10%	20%	65%	10%	20%	65%

Table 7 - Phase 2

AM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates			% of internal trips	External Trips by Mode				Person-Trip Estimates			% of internal trips	External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips @ driveway)	Total			Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips @ driveway)		Total		Vehicles
Office	20	90	109	18%	67	9	9	Office	9	9	18	49%	7	1	1
Retail	5	2	7	70%	1	0	1	Retail	4	1	5	77%	0	0	1
Restaurant	29	24	53	54%	10	2	12	Restaurant	26	18	43	59%	7	2	9
University	50	189	239	21%	123	19	38	University	15	6	21	69%	4	1	1
Residential	5	34	39	12%	22	3	7	Residential	50	81	132	38%	53	8	16
Hotel	2	30	32	5%	23	3	3	Hotel	7	18	25	28%	14	2	2
All Other Land Uses								All Other Land Uses							
Totals	110	369	479	23%	246	37	70		110	134	244	45%	85	13	30
PM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates			% of internal trips	External Trips by Mode				Person-Trip Estimates			% of internal trips	External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips off site)	Total			Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips off site)		Total		Vehicles
Office	10	10	20	49%	8	1	1	Office	15	86	101	14%	65	9	9
Retail	14	3	16	82%	1	0	1	Retail	11	5	16	67%	2	1	3
Restaurant	25	31	55	45%	12	3	15	Restaurant	20	15	35	56%	6	2	8
University	15	117	132	12%	76	12	23	University	27	330	357	7%	215	33	66
Residential	23	76	99	23%	50	8	15	Residential	16	47	63	26%	30	5	9
Hotel	6	32	38	15%	24	3	3	Hotel	3	33	36	9%	25	3	3
All Other Land Uses								All Other Land Uses							
Totals	91	269	360	25%	170	27	60		91	518	609	15%	343	52	98

20 Year Program - Internal Capture Calculations

Unadjusted Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	46	310	280	57
Retail 1	9	14	33	33
Retail 2	0	0	0	0
Total Retail	9	14	33	33
Restaurant	65	79	53	83
University	26	288	425	138
Residential	211	63	99	155
Hotel	25	32	36	38
Total	382	786	926	503

Table 2 - Phase 3

Vehicular Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	46	310	280	57
Retail	9	14	33	33
Restaurant	65	79	53	83
University	26	288	425	138
Residential	211	63	99	155
Hotel	25	32	36	38
Total	382	786	926	503

Table 3 - Phase 3

Internal Person - Trip Origin Destination Matrix Percentages calculated at origin															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		20%	30%	10%	1%	0%		Office		20%	4%	10%	2%	0%	
Retail	29%		13%	29%	14%	0%		Retail	2%		29%	5%	26%	5%	
Restaurant	31%	14%		31%	4%	3%		Restaurant	3%	41%		5%	18%	7%	
University	5%	28%	40%		12%	2%		University	5%	20%	4%		4%	1%	
Residential	2%	1%	20%	75%		0%		Residential	4%	42%	21%	4%		3%	
Hotel	75%	14%	8%	10%	0%			Hotel	0%	16%	68%	0%	2%		
All Other Land Uses								All Other Land Uses							
Internal Person - Trip Origin Destination Matrix Percentages calculated at destination															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		32%	10%	10%	0%	0%		Office		8%	2%	10%	4%	0%	
Retail	4%		50%	4%	2%	0%		Retail	31%		29%	31%	46%	17%	
Restaurant	14%	8%		7%	5%	4%		Restaurant	30%	50%		30%	16%	71%	
University	0%	25%	20%		50%	2%		University	30%	12%	15%		10%	1%	
Residential	3%	17%	20%	15%		0%		Residential	57%	10%	14%	57%		12%	
Hotel	2%	4%	5%	3%	0%			Hotel	0%	2%	5%	0%	0%		
All Other Land Uses								All Other Land Uses							

Table 4 - Phase 3

Internal Person - Trip Origin Destination Matrix (Computed at Origin)															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		9	14	5	0	0	0	Office		56	11	28	6	0	0
Retail	3		1	3	1	0	0	Retail	1		10	2	9	2	0
Restaurant	20	9		20	3	2	0	Restaurant	2	22		3	10	4	0
University	1	7	10		3	1	0	University	21	85	17		17	4	0
Residential	4	2	42	158		0	0	Residential	4	42	21	4		3	0
Hotel	19	4	2	3	0		0	Hotel	0	6	25	0	1		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	
Trip Origin Destination Matrix (Computed at Destination)															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		5	8	29	0	0	0	Office		3	2	14	6	0	0
Retail	12		39	12	1	0	0	Retail	18		24	43	71	6	0
Restaurant	43	1		20	3	1	0	Restaurant	17	16		41	25	27	0
University	0	4	16		32	1	0	University	17	4	12		15	0	0
Residential	9	2	16	43		0	0	Residential	32	3	12	79		5	0
Hotel	6	1	4	9	0		0	Hotel	0	1	4	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 5 - Phase 3

Balanced Internal Capture															
	AM Peak								PM Peak						
	Destination (To) Entering								Destination (To)						
Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		5	8	5	0	0	0	Office		3	2	14	6	0	0
Retail	3		1	3	1	0	0	Retail	1		10	2	9	2	0
Restaurant	20	1		20	3	1	0	Restaurant	2	16		3	10	4	0
University	0	4	10		3	1	0	University	17	4	12		15	0	0
Residential	4	2	16	43		0	0	Residential	4	3	12	4		3	0
Hotel	6	1	2	3	0		0	Hotel	0	1	4	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 6 - Phase 3

Mode Split						
Land Use	Origin (Exiting)			Destination (Entering)		
	% Transit	% Ped/Bike	% Vehicle	% Transit	% Ped/Bike	% Vehicle
Office	10%	10%	75%	10%	10%	75%
Retail	10%	50%	40%	10%	50%	40%
Restaurant	10%	50%	40%	10%	50%	40%
University	10%	20%	65%	10%	20%	65%
Residential	10%	20%	65%	10%	20%	65%
Hotel	10%	10%	75%	10%	10%	75%
All Other Land Uses	10%	20%	65%	10%	20%	65%

Table 7 - Phase 3

AM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips @ driveway)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (trips off site)		Total	% of internal trips	Vehicles
Office	33	277	310	11%	207	28	28	Office	17	29	46	37%	22	3	3
Retail	12	2	14	84%	1	0	1	Retail	8	1	9	84%	1	0	1
Restaurant	37	42	79	47%	17	4	21	Restaurant	45	20	65	70%	8	2	10
University	73	215	288	25%	140	21	43	University	18	8	26	68%	5	1	2
Residential	7	56	63	11%	36	6	11	Residential	65	146	211	31%	95	15	29
Hotel	2	30	32	6%	23	3	3	Hotel	11	14	25	45%	10	1	1
All Other Land Uses								All Other Land Uses							
Totals	164	622	786	21%	424	62	107		164	218	382	43%	141	22	46
PM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips off site)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (trips off site)		Total	% of internal trips	Vehicles
Office	23	34	57	41%	25	3	3	Office	24	257	280	8%	192	26	26
Retail	27	6	33	82%	2	1	3	Retail	22	11	33	67%	4	1	5
Restaurant	39	43	83	48%	17	4	22	Restaurant	34	19	53	64%	8	2	9
University	22	116	138	16%	75	12	23	University	49	376	425	12%	244	38	75
Residential	39	115	155	25%	75	12	23	Residential	26	73	99	26%	48	7	15
Hotel	9	29	38	23%	22	3	3	Hotel	5	31	36	13%	24	3	3
All Other Land Uses								All Other Land Uses							
Totals	160	343	503	32%	217	34	77		160	767	926	17%	520	77	133

Roux Institute (School and Partners Only) Trip Generation Detail
Time-of-Day Pattern by Group

	Graduate Learners (Daytime)		Graduate Learners (Night)		Corporate Learners		Daytime Special Events		Lunch Special Events		Evening Special Events	
	in	out	in	out	in	out	in	out	in	out	in	out
6am												
7am					10%		20%					
8am	10%				20%		60%					
9am	20%				40%		20%					
10am	60%				20%							
11am	10%				10%				80%			
noon									20%			
1pm										20%		
2pm			10%							80%		
3pm			60%			10%						
4pm		10%	20%			20%		20%			10%	
5pm		20%	10%			40%		60%			50%	
6pm		60%				20%		20%			40%	20%
7pm		10%				10%						50%
8pm				10%								30%
9pm				20%								
10pm				60%								
11pm				10%								

Roux Institute (School and Partners Only) Trip Generation, Short-Term

	Graduate Learners (Daytime) 40% of 359		Graduate Learners (Night) 60% of 359		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups		Faculty/Staff		Visiting Faculty		Researchers		Total Trips		
	144		215		100		25		25		100										in	out	total
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out			
6am	0	0	0	0	0	0	0	0	0	0	0	0									0	0	0
7am	0	0	0	0	10	0	5	0	0	0	0	0									15	0	15
8am	14	0	0	0	20	0	15	0	0	0	0	0	30	4	28	4	3	0	33	6	143	14	157
9am	29	0	0	0	40	0	5	0	0	0	0	0									74	0	74
10am	86	0	0	0	20	0	0	0	0	0	0	0									106	0	106
11am	14	0	0	0	10	0	0	0	20	0	0	0									44	0	44
noon	0	0	0	0	0	0	0	0	5	0	0	0									5	0	5
1pm	0	0	0	0	0	0	0	0	0	5	0	0									0	5	5
2pm	0	0	22	0	0	0	0	0	0	20	0	0									22	20	42
3pm	0	0	129	0	0	10	0	0	0	0	0	0									129	10	139
4pm	0	14	43	0	0	20	0	5	0	0	10	0									53	39	92
5pm	0	29	22	0	0	40	0	15	0	0	50	0	10	47	9	44	1	4	4	32	96	211	306
6pm	0	86	0	0	0	20	0	5	0	0	40	20									40	131	171
7pm	0	14	0	0	0	10	0	0	0	0	0	50									0	74	74
8pm	0	0	0	22	0	0	0	0	0	0	0	30									0	52	52
9pm	0	0	0	43	0	0	0	0	0	0	0	0									0	43	43
10pm	0	0	0	129	0	0	0	0	0	0	0	0									0	129	129
11pm	0	0	0	22	0	0	0	0	0	0	0	0									0	22	22

 = Peak Hour

AM Peak Hour	
In	Out
143	14
PM Peak Hour	
In	Out
96	211

Roux Institute (School and Partners Only) Trip Generation, Medium-Term

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups		Faculty/Staff		Visiting Faculty		Researchers		Total Trips		
	319		479		250		25		25		100										in	out	total
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out			
6am	0	0	0	0	0	0	0	0	0	0	0	0									0	0	0
7am	0	0	0	0	25	0	5	0	0	0	0	0									30	0	30
8am	32	0	0	0	50	0	15	0	0	0	0	0	43	6	52	7	5	1	42	7	239	21	260
9am	64	0	0	0	100	0	5	0	0	0	0	0									169	0	169
10am	192	0	0	0	50	0	0	0	0	0	0	0									242	0	242
11am	32	0	0	0	25	0	0	0	20	0	0	0									77	0	77
noon	0	0	0	0	0	0	0	0	5	0	0	0									5	0	5
1pm	0	0	0	0	0	0	0	0	0	5	0	0									0	5	5
2pm	0	0	48	0	0	0	0	0	0	20	0	0									48	20	68
3pm	0	0	287	0	0	25	0	0	0	0	0	0									287	25	312
4pm	0	32	96	0	0	50	0	5	0	0	10	0									106	87	193
5pm	0	64	48	0	0	100	0	15	0	0	50	0	13	61	14	70	1	7	6	40	132	357	489
6pm	0	192	0	0	0	50	0	5	0	0	40	20									40	267	307
7pm	0	32	0	0	0	25	0	0	0	0	0	50									0	107	107
8pm	0	0	0	48	0	0	0	0	0	0	0	30									0	78	78
9pm	0	0	0	96	0	0	0	0	0	0	0	0									0	96	96
10pm	0	0	0	287	0	0	0	0	0	0	0	0									0	287	287
11pm	0	0	0	48	0	0	0	0	0	0	0	0									0	48	48

= Peak Hour

AM Peak Hour	
In	Out
239	21
PM Peak Hour	
In	Out
132	357

Roux Institute (School and Partners Only) Trip Generation, Long-Term

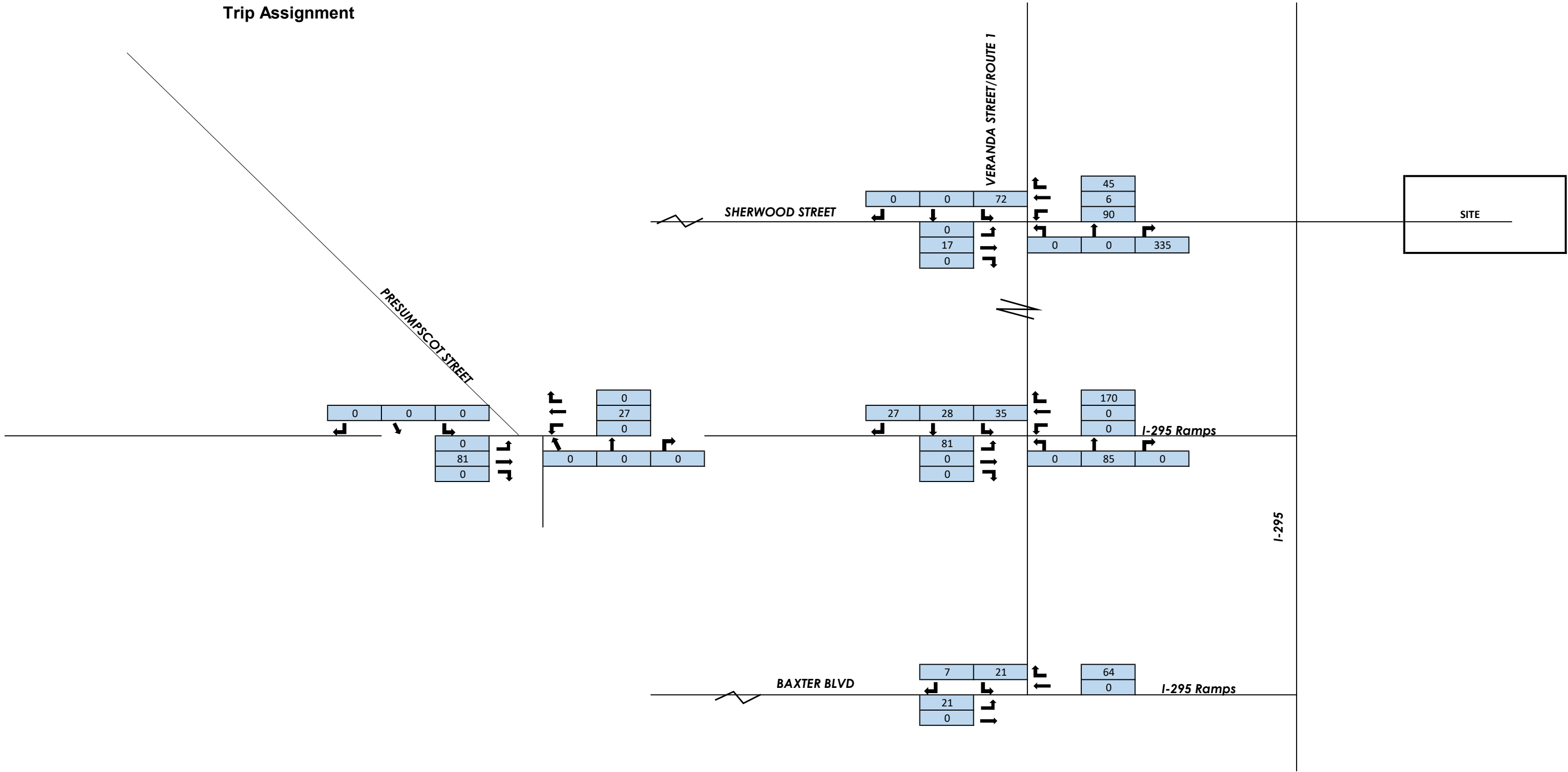
	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups		Faculty/Staff		Visiting Faculty		Researchers		Total Trips		
	319		479		350		25		25		100										in	out	total
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out			
6am	0	0	0	0	0	0	0	0	0	0	0	0									0	0	0
7am	0	0	0	0	35	0	5	0	0	0	0	0									40	0	40
8am	32	0	0	0	70	0	15	0	0	0	0	0	43	6	71	10	7	1	50	9	288	26	314
9am	64	0	0	0	140	0	5	0	0	0	0	0									209	0	209
10am	192	0	0	0	70	0	0	0	0	0	0	0									262	0	262
11am	32	0	0	0	35	0	0	0	20	0	0	0									87	0	87
noon	0	0	0	0	0	0	0	0	5	0	0	0									5	0	5
1pm	0	0	0	0	0	0	0	0	0	5	0	0									0	5	5
2pm	0	0	48	0	0	0	0	0	0	20	0	0									48	20	68
3pm	0	0	287	0	0	35	0	0	0	0	0	0									287	35	322
4pm	0	32	96	0	0	70	0	5	0	0	10	0									106	107	213
5pm	0	64	48	0	0	140	0	15	0	0	50	0	13	61	18	88	2	9	7	48	138	425	563
6pm	0	192	0	0	0	70	0	5	0	0	40	20									40	287	327
7pm	0	32	0	0	0	35	0	0	0	0	0	50									0	117	117
8pm	0	0	0	48	0	0	0	0	0	0	0	30									0	78	78
9pm	0	0	0	96	0	0	0	0	0	0	0	0									0	96	96
10pm	0	0	0	287	0	0	0	0	0	0	0	0									0	287	287
11pm	0	0	0	48	0	0	0	0	0	0	0	0									0	48	48

= Peak Hour

AM Peak Hour	
In	Out
288	26
PM Peak Hour	
In	Out
138	425

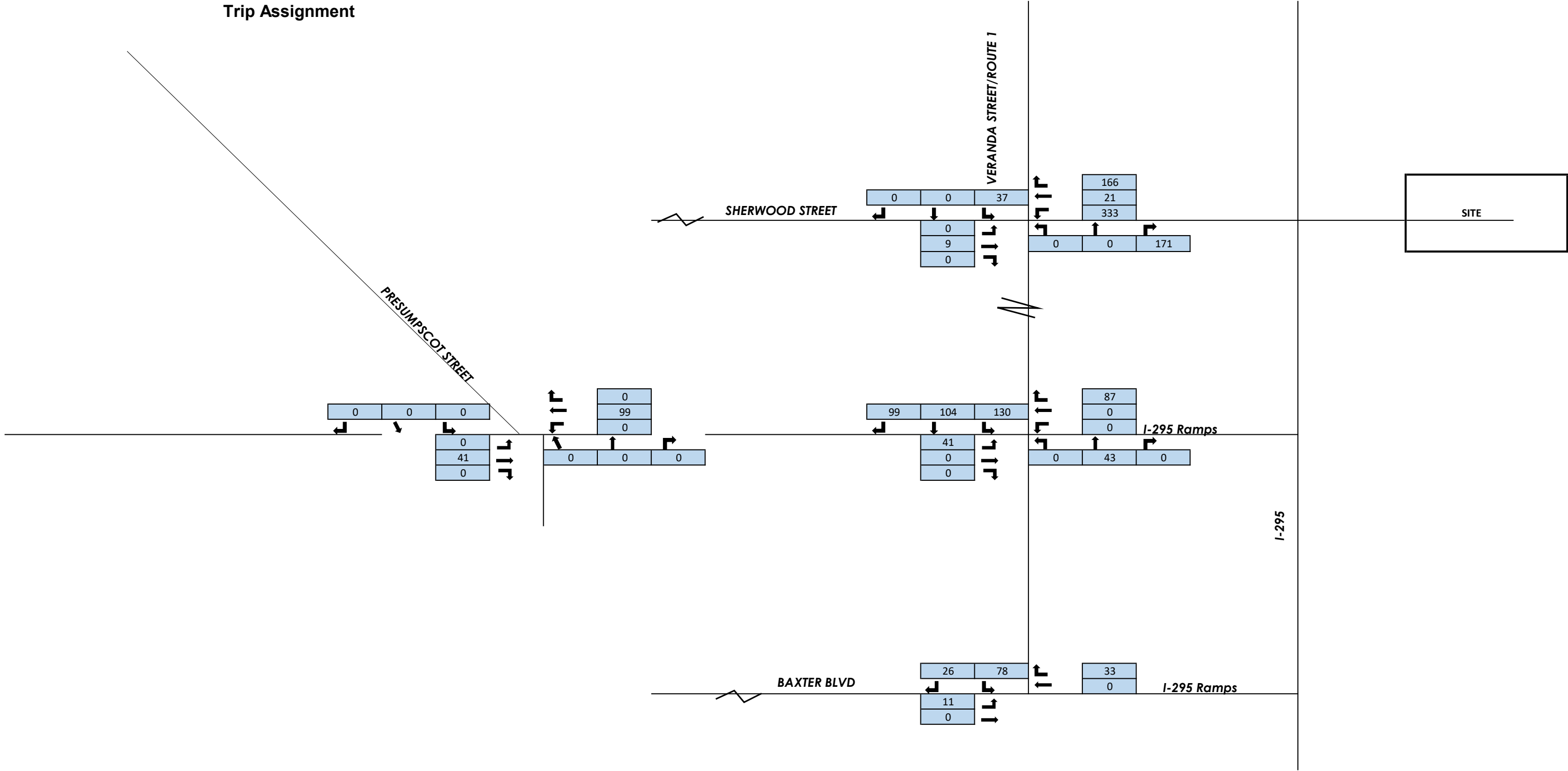
Long-Term Build, AM

Trip Assignment



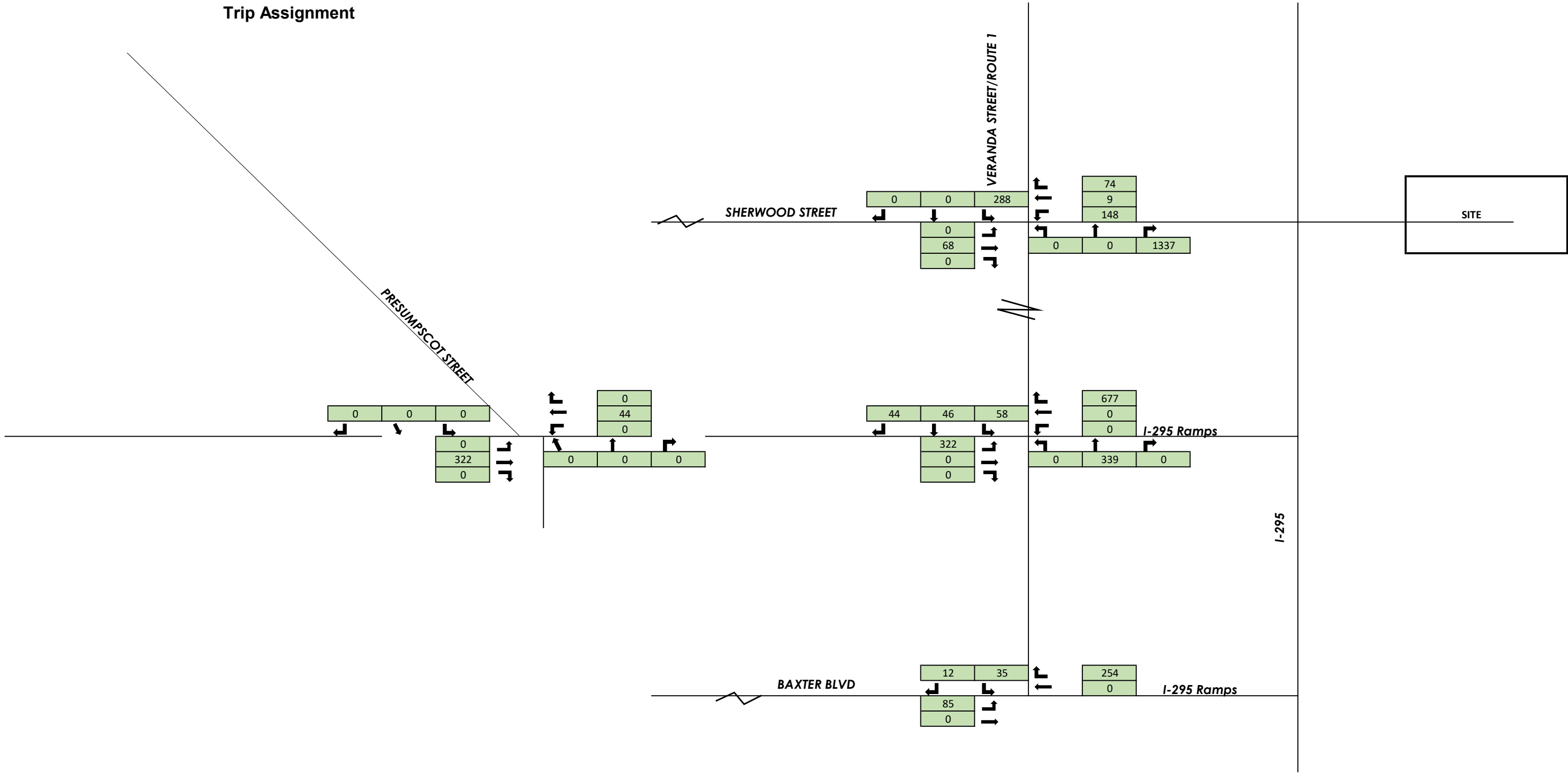
Long-Term Build, PM

Trip Assignment



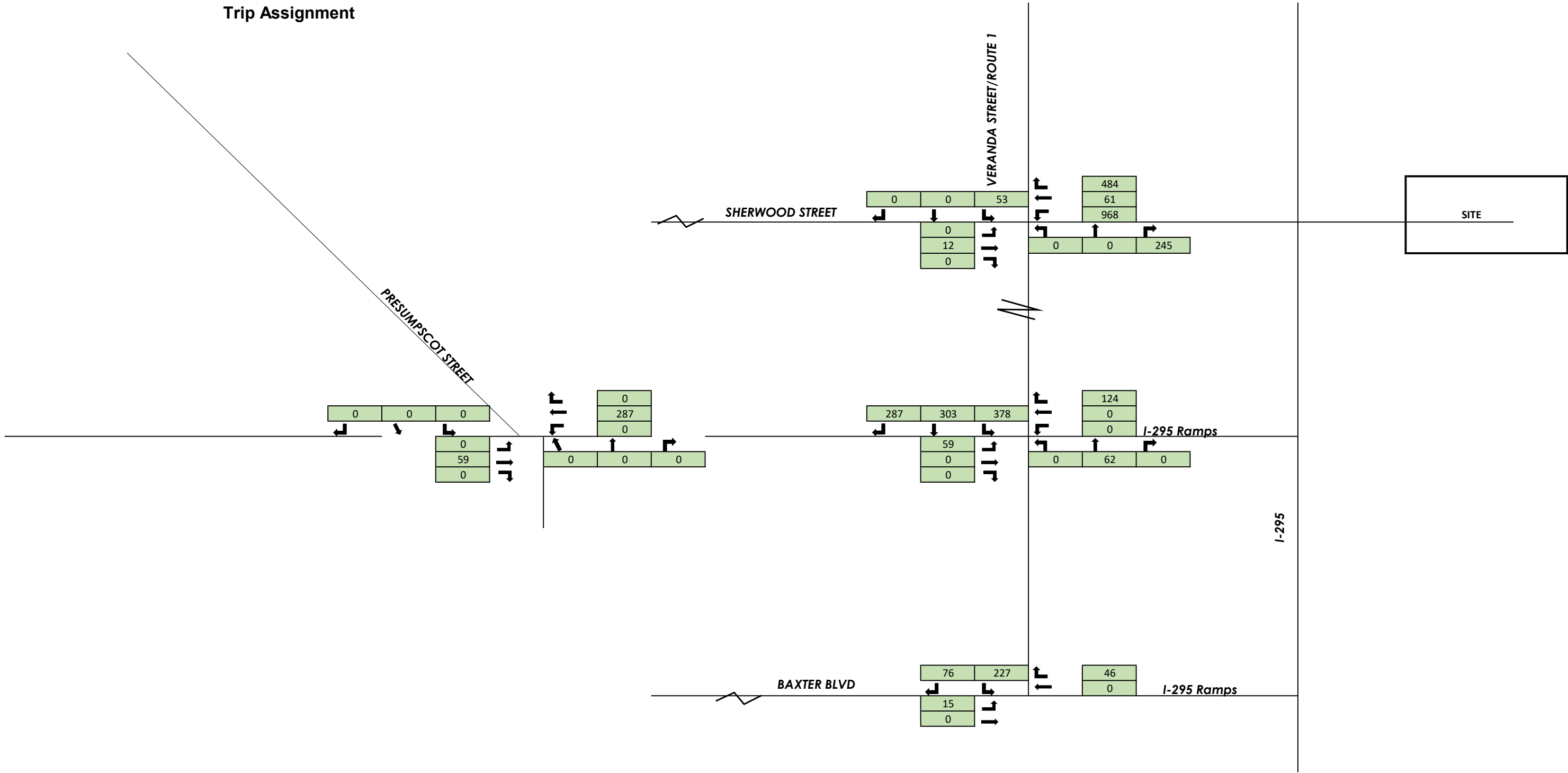
Existing Zoning Build Out, AM

Trip Assignment



Existing Zoning Build Out, PM

Trip Assignment





Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Bates St & Baxter Blvd

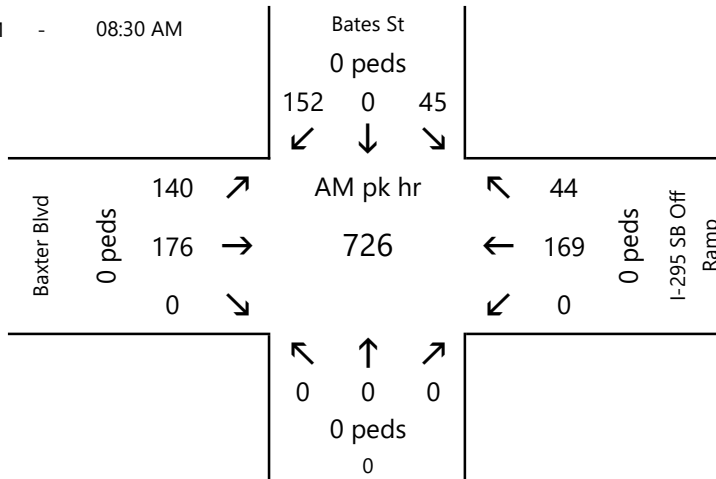
Intersection: Bates St & Baxter Blvd Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Bates St				I-295 SB Off Ramp								Baxter Blvd				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	152	0	45	0	44	169	0	0	0	0	0	0	0	176	140	0	726
PM pk hr	198	0	46	0	32	174	0	0	0	0	0	0	0	207	168	0	825

AM Peak Hour

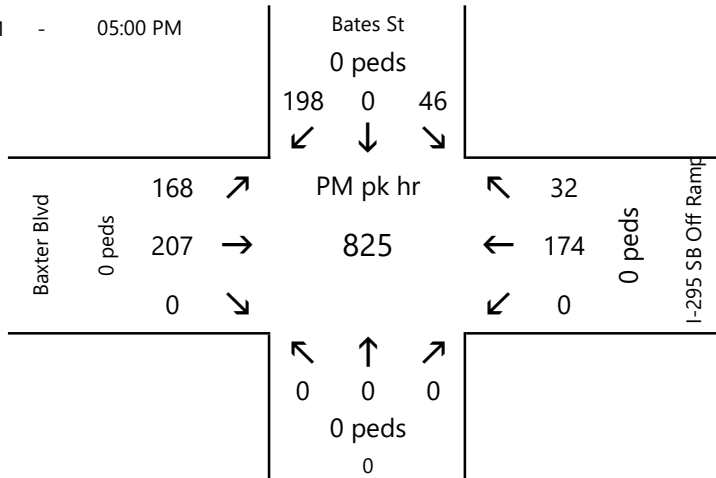
07:30 AM - 08:30 AM



%	SB	WB	NB	EB
auto	96%	99%		100%
med	0%	0%		0%
heavy	4%	1%		0%
% trucks	4%	1%		0%

PM Peak Hour

04:00 PM - 05:00 PM



%	SB	WB	NB	EB
auto	98%	100%		99%
med	0%	0%		0%
heavy	2%	0%		1%
% trucks	2%	0%		1%



Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Washington Ave & Bates St

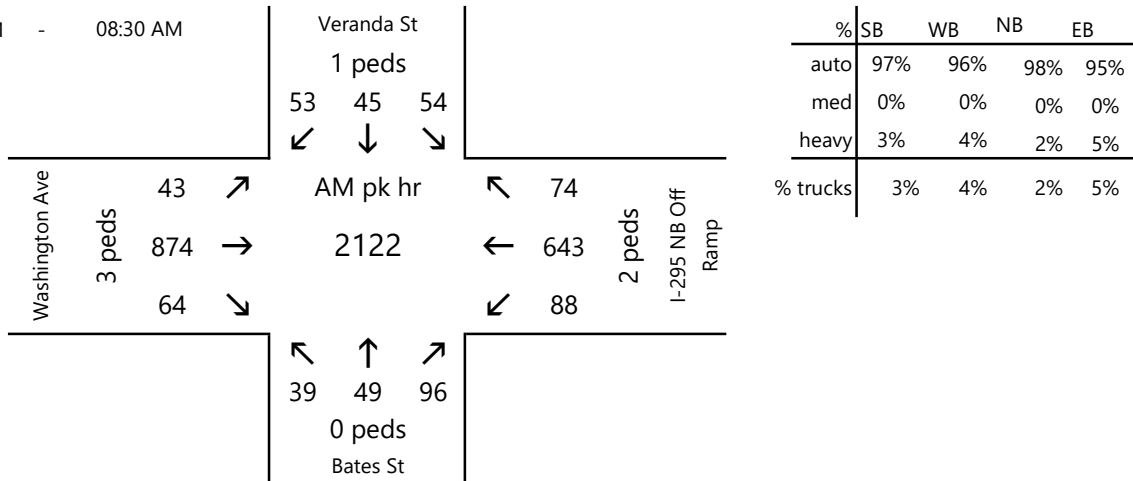
Intersection: Washington Ave & Bates St Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Veranda St				I-295 NB Off Ramp				Bates St				Washington Ave				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	53	45	54	1	74	643	88	2	96	49	39	0	64	874	43	3	2122
PM pk hr	68	82	59	2	105	874	80	0	103	53	44	9	82	768	41	9	2359

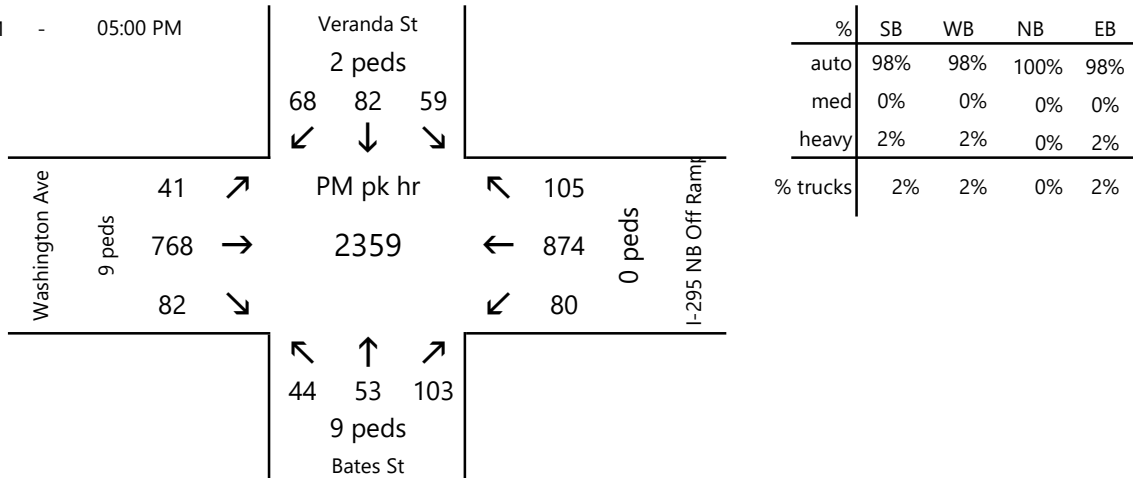
AM Peak Hour

07:30 AM - 08:30 AM



PM Peak Hour

04:00 PM - 05:00 PM





Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Washington Ave & Presumpscot St

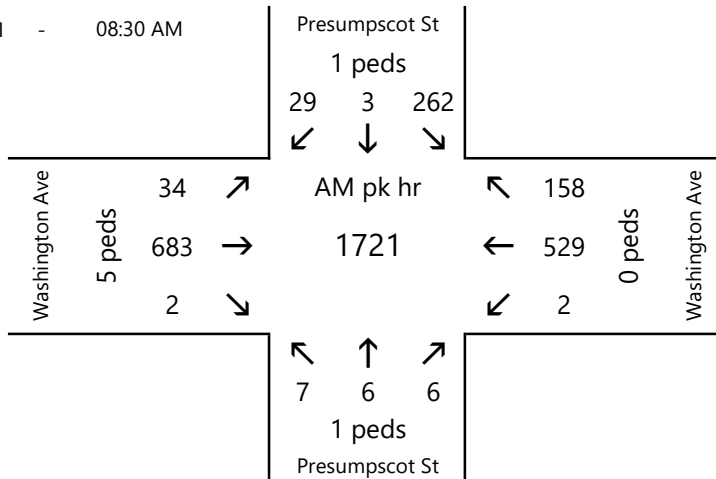
Intersection: Washington Ave & Presumpscot St Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Presumpscot St				Washington Ave				Presumpscot St				Washington Ave				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	29	3	262	1	158	529	2	0	6	6	7	1	2	683	34	5	1721
PM pk hr	40	1	207	0	250	739	8	3	7	2	8	13	3	651	28	1	1944

AM Peak Hour

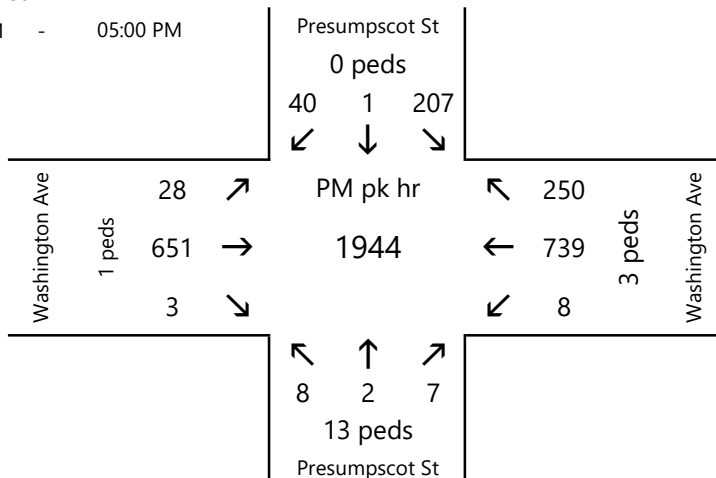
07:30 AM - 08:30 AM



%	SB	WB	NB	EB
auto	93%	96%	95%	95%
med	0%	0%	0%	0%
heavy	7%	4%	5%	5%
% trucks	7%	4%	5%	5%

PM Peak Hour

04:00 PM - 05:00 PM



%	SB	WB	NB	EB
auto	97%	98%	100%	97%
med	0%	0%	0%	0%
heavy	3%	2%	0%	3%
% trucks	3%	2%	0%	3%



Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Veranda St & Sherwood St

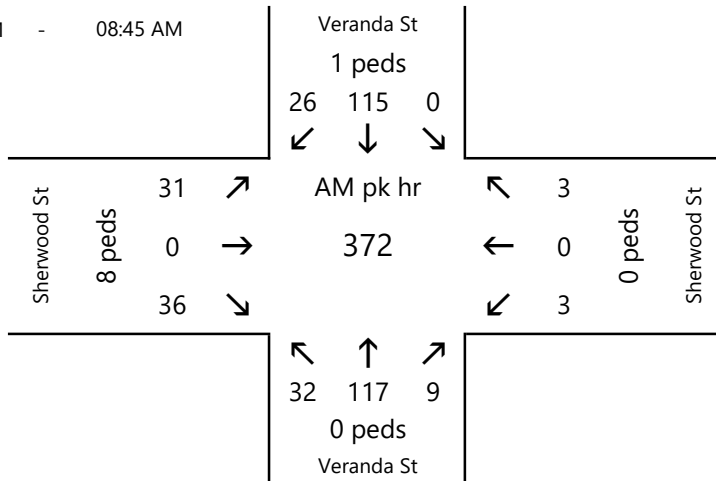
Intersection: Veranda St & Sherwood St Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Veranda St				Sherwood St				Veranda St				Sherwood St				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	26	115	0	1	3	0	3	0	9	117	32	0	36	0	31	8	372
PM pk hr	21	164	0	5	3	3	14	5	13	152	30	1	29	2	33	8	464

AM Peak Hour

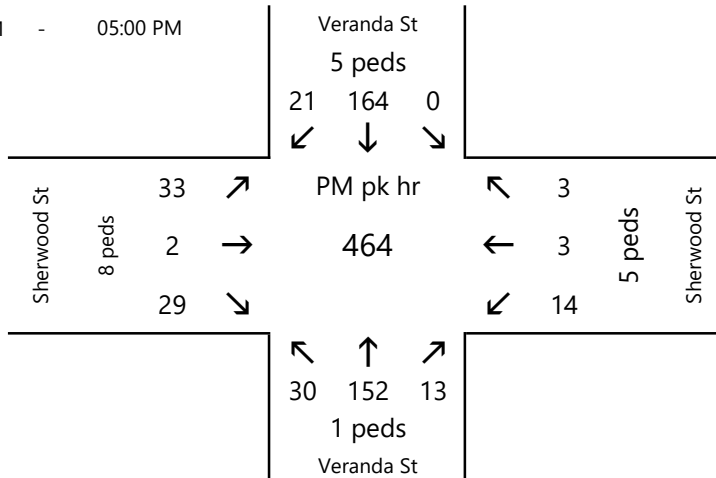
07:45 AM - 08:45 AM



%	SB	WB	NB	EB
auto	95%	50%	94%	100%
med	0%	0%	0%	0%
heavy	5%	50%	6%	0%
% trucks	5%	50%	6%	0%

PM Peak Hour

04:00 PM - 05:00 PM



%	SB	WB	NB	EB
auto	98%	96%	99%	100%
med	0%	0%	0%	0%
heavy	2%	4%	1%	0%
% trucks	2%	4%	1%	0%

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

	Start Time	SB Bates St				WB I-295 SB Off Ramp				NB 0				EB Baxter Blvd				1 HR TOTALS					
		Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Begin Time	SB	WB	NB	EB	TOTAL
1	06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
2	06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	17	39	0	55	111
3	06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	56	87	0	117	260
4	06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	107	140	0	185	432
5	07:00 AM	10	0	7	0	6	33	0	0	0	0	0	0	0	31	24	0	07:00 AM	150	216	0	283	649
6	07:15 AM	27	0	12	0	6	42	0	0	0	0	0	0	0	25	37	0	07:15 AM	181	217	0	299	697
7	07:30 AM	40	0	11	0	10	43	0	0	0	0	0	0	0	31	37	0	07:30 AM	197	213	0	316	726
8	07:45 AM	32	0	11	0	14	62	0	0	0	0	0	0	0	53	45	0	07:45 AM	207	205	0	314	726
9	08:00 AM	37	0	11	0	8	32	0	0	0	0	0	0	0	43	28	0	08:00 AM	208	170	0	276	654
10	08:15 AM	43	0	12	0	12	32	0	0	0	0	0	0	0	49	30	0	08:15 AM	160	130	0	205	495
11	08:30 AM	52	0	9	0	10	35	0	0	0	0	0	0	0	33	33	0	08:30 AM	105	86	0	126	317
12	08:45 AM	40	0	4	0	8	33	0	0	0	0	0	0	0	33	27	0	08:45 AM	44	41	0	60	145
13	09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
14	09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
15	09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
16	09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
17	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
18	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
19	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
20	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
21	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
22	11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
23	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
24	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
25	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
26	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
27	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
28	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
29	01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
30	01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
31	01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
32	01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
33	02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
34	02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
35	02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
36	02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
37	03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
38	03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	63	58	0	98	219
39	03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	129	106	0	179	414
40	03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	202	156	0	269	627
41	04:00 PM	53	0	10	0	8	50	0	0	0	0	0	0	0	54	44	0	04:00 PM	244	206	0	375	825
42	04:15 PM	55	0	11	0	9	39	0	0	0	0	0	0	0	39	42	0	04:15 PM	230	196	0	349	775
43	04:30 PM	56	0	17	0	10	40	0	0	0	0	0	0	0	47	43	0	04:30 PM	237	187	0	341	765
44	04:45 PM	34	0	8	0	5	45	0	0	0	0	0	0	0	67	39	0	04:45 PM	220	184	0	328	732
45	05:00 PM	41	0	8	0	7	41	0	0	0	0	0	0	0	39	33	0	05:00 PM	217	162	0	278	657
46	05:15 PM	58	0	15	0	10	29	0	0	0	0	0	0	0	41	32	0						
47	05:30 PM	45	0	11	0	10	37	0	0	0	0	0	0	0	42	35	0						
48	05:45 PM	31	0	8	0	5	23	0	0	0	0	0	0	0	30	26	0						

Cell ref.: 7
AM Peak Hr
07:30 AM - 8:30 AM
Vol. = 726

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 825

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

	Start Time	SB Veranda St				WB I-295 NB Off Ramp				NB Bates St				EB Washington Ave				1 HR TOTALS					
		Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Begin Time	SB	WB	NB	EB	TOTAL
1	06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
2	06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	22	113	30	173	338
3	06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	50	239	73	375	737
4	06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	88	448	120	613	1269
5	07:00 AM	5	4	13	0	11	98	4	0	20	4	6	2	9	159	5	4	07:00 AM	123	660	179	888	1850
6	07:15 AM	6	10	12	0	5	110	11	0	27	9	7	0	18	183	1	2	07:15 AM	133	724	185	976	2018
7	07:30 AM	16	8	14	0	16	165	28	0	26	15	6	0	15	213	10	1	07:30 AM	152	805	184	981	2122
8	07:45 AM	11	9	15	0	19	173	20	0	31	15	13	0	14	251	10	2	07:45 AM	153	746	180	959	2038
9	08:00 AM	12	12	8	0	20	137	20	1	18	10	8	0	16	233	12	0	08:00 AM	161	694	156	878	1889
10	08:15 AM	14	16	17	1	19	168	20	1	21	9	12	0	19	177	11	0	08:15 AM	129	517	120	617	1383
11	08:30 AM	8	20	11	0	16	113	21	0	28	9	6	1	20	186	10	1	08:30 AM	82	310	78	410	880
12	08:45 AM	14	15	14	0	14	130	16	0	21	5	9	2	13	172	9	0	08:45 AM	43	160	35	194	432
13	09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
14	09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
15	09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
16	09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
17	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
18	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
19	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
20	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
21	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
22	11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
23	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
24	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
25	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
26	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
27	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
28	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
29	01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
30	01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
31	01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
32	01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
33	02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
34	02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
35	02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
36	02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
37	03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
38	03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	47	253	52	243	595
39	03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	102	522	103	452	1179
40	03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	159	774	156	669	1758
41	04:00 PM	18	17	12	2	33	199	21	0	24	15	13	2	25	208	10	4	04:00 PM	209	1059	200	891	2359
42	04:15 PM	19	20	16	0	23	225	21	0	27	12	12	1	25	175	9	1	04:15 PM	201	1060	188	862	2311
43	04:30 PM	14	29	14	0	22	208	22	0	26	14	13	3	22	188	7	2	04:30 PM	192	1068	179	850	2289
44	04:45 PM	17	16	17	0	27	242	16	0	26	12	6	3	10	197	15	2	04:45 PM	174	1060	171	786	2191
45	05:00 PM	15	17	7	4	29	207	18	1	24	9	7	2	14	186	14	1	05:00 PM	154	990	158	714	2016
46	05:15 PM	14	22	10	0	31	221	25	0	18	14	10	2	26	160	11	6						
47	05:30 PM	11	21	7	1	26	201	17	1	21	15	9	2	16	126	11	5						
48	05:45 PM	12	7	11	0	18	176	21	0	16	7	8	4	11	127	12	0						

Cell ref.: 7
AM Peak Hr
07:30 AM - 8:30 AM
Vol. = 2122

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 2359

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

Start Time	SB Presumpscot St				WB Washington Ave				NB Presumpscot St				EB Washington Ave				1 HR TOTALS					
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Begin Time	SB	WB	NB	EB	TOTAL
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	44	107	3	147	301
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	92	232	6	307	637
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	161	413	12	488	1074
07:00 AM	3	0	41	0	26	81	0	0	1	0	2	0	0	139	8	0	07:00 AM	239	609	15	686	1549
07:15 AM	4	0	44	0	28	97	0	0	1	0	2	0	1	155	4	0	07:15 AM	264	620	16	726	1626
07:30 AM	5	0	64	0	44	136	1	0	2	1	3	1	1	178	2	2	07:30 AM	294	689	19	719	1721
07:45 AM	7	1	70	0	53	143	0	0	3	0	0	0	1	185	12	0	07:45 AM	312	627	17	703	1659
08:00 AM	4	2	63	1	7	111	0	0	1	0	3	0	0	180	7	1	08:00 AM	290	586	18	661	1555
08:15 AM	13	0	65	0	54	139	1	0	0	5	1	0	0	140	13	2	08:15 AM	221	468	14	474	1177
08:30 AM	15	2	70	1	30	88	1	1	1	3	0	1	1	149	15	0	08:30 AM	143	274	8	321	746
08:45 AM	11	0	45	0	42	112	1	0	2	0	2	3	1	142	13	1	08:45 AM	56	155	4	156	371
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	62	228	3	187	480
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	123	485	5	346	959
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	174	732	11	514	1431
04:00 PM	10	0	52	0	59	167	2	0	2	0	1	2	1	171	15	1	04:00 PM	248	997	17	682	1944
04:15 PM	6	0	55	0	68	187	2	1	0	1	1	4	2	155	2	0	04:15 PM	251	1006	18	658	1933
04:30 PM	11	0	40	0	53	194	0	2	2	0	4	3	0	163	5	0	04:30 PM	227	988	20	664	1899
04:45 PM	13	1	60	0	70	191	4	0	3	1	2	4	0	162	6	0	04:45 PM	215	960	17	610	1802
05:00 PM	7	3	55	0	53	184	0	0	1	0	3	4	1	156	6	2	05:00 PM	176	898	14	563	1651
05:15 PM	10	0	27	3	57	180	2	0	2	0	2	1	2	157	6	0						
05:30 PM	5	0	34	2	59	159	1	1	2	0	1	2	2	110	2	0						
05:45 PM	2	1	32	0	52	151	0	0	2	0	1	3	0	120	1	0						

Cell ref.: 7
AM Peak Hr
07:30 AM - 8:30 AM
Vol. = 1721

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 1944

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

Start Time	SB				WB				NB				EB				1 HR TOTALS					
	Veranda St				Sherwood St				Veranda St				Sherwood St				Begin Time	SB	WB	NB	EB	TOTAL
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds						
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	15	1	18	12	46
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	38	2	33	24	97
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	70	4	75	42	191
07:00 AM	2	13	0	0	0	0	1	0	3	13	2	0	7	0	5	5	07:00 AM	98	6	117	56	277
07:15 AM	4	19	0	0	0	0	1	0	1	12	2	0	7	0	5	2	07:15 AM	112	6	138	59	315
07:30 AM	5	27	0	0	0	1	1	0	2	31	9	0	10	0	8	0	07:30 AM	131	6	164	64	365
07:45 AM	3	25	0	0	1	0	1	0	2	30	10	0	8	0	6	1	07:45 AM	141	6	158	67	372
08:00 AM	6	23	0	0	1	0	0	0	3	30	6	0	9	0	6	3	08:00 AM	145	9	144	68	366
08:15 AM	6	36	0	1	0	0	1	0	3	29	9	0	9	0	8	1	08:15 AM	116	8	105	53	282
08:30 AM	11	31	0	0	1	0	1	0	1	28	7	0	10	0	11	3	08:30 AM	74	7	64	36	181
08:45 AM	3	29	0	0	0	0	5	0	2	23	3	0	8	1	6	1	08:45 AM	32	5	28	15	80
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	48	6	58	16	128
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	97	11	101	28	237
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	148	16	144	46	354
04:00 PM	8	40	0	2	2	1	3	1	2	46	10	0	2	1	13	2	04:00 PM	185	20	195	64	464
04:15 PM	4	45	0	1	0	1	4	0	2	34	7	0	6	0	6	2	04:15 PM	178	16	188	60	442
04:30 PM	7	44	0	1	0	1	4	3	8	33	2	1	9	0	9	2	04:30 PM	174	12	201	56	443
04:45 PM	2	35	0	1	1	0	3	1	1	39	11	0	12	1	5	2	04:45 PM	163	9	207	44	423
05:00 PM	8	32	1	0	0	1	1	1	0	42	9	0	6	0	6	3	05:00 PM	155	8	192	38	393
05:15 PM	5	40	0	1	1	0	0	1	1	41	14	1	6	0	2	2						
05:30 PM	4	36	0	2	0	1	1	1	1	38	10	0	2	0	4	5						
05:45 PM	4	25	0	0	2	0	1	0	1	31	4	0	4	0	8	0						

Cell ref.: 8
AM Peak Hr
07:45 AM - 8:45 AM
Vol. = 372

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 464

AM Peak Hour LOS Tables

	Short Term No Build					Short Term Build					Medium Term No Build					Medium Term Build					Long Term No Build				
	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
Veranda and Washington Ave																									
Overall	C					C					D					D					D				
EBL	0.35	41.3	D	81	100	0.30	36.1	D	79	126	0.26	42.3	D	83	134	0.24	38.1	D	78	147	0.28	42.4	D	86	118
EBTR	0.79	41.6	D	159	218	0.87	62.5	E	#274	255	1.01	112.5	F	171	233	0.93	82.5	F	#303	277	1.06	126.9	F	#199	226
WBL	0.80	67.8	E	#149	138	0.75	55.2	E	#171	144	0.71	48.8	D	#158	143	0.79	54	D	#191	147	0.73	49.9	D	#177	141
WBTR	0.44	41.2	D	133	203	0.40	37.2	D	153	224	0.42	43.8	D	137	205	0.44	40.8	D	164	234	0.43	43.7	D	144	218
NBL	0.69	75.1	E	#169	173	0.69	75.1	E	#169	178	0.67	71.6	E	#174	176	0.85	101	F	#198	199	0.73	78	E	#187	186
NBT	0.41	16.3	B	251	267	0.52	22.5	C	301	304	0.46	20.5	C	260	270	0.64	32	C	361	401	0.48	21	C	276	280
NBTR	0.41	16.3	B	251	267	0.52	22.5	C	301	274	0.46	20.5	C	0	239	0.64	32.1	C	0	367	0.48	20.9	C	0	234
SBL	0.38	50.7	D	m34	92	0.48	49.1	D	m59	118	0.36	54.8	D	m35	110	0.43	52.1	D	m66	131	0.40	55.5	E	m35	90
SBT	0.76	18.8	B	m353	309	0.85	22.9	C	m365	288	0.84	28.6	C	m418	323	0.87	39.6	D	m411	370	0.89	30	C	m424	330
SBTR	0.76	18.8	B	m353	309	0.85	22.9	C	m365	292	0.85	28.7	C	-	328	0.88	39.7	D	-	374	0.89	30.2	C	-	335
Driveway at Veranda and Sherwood St																									
Overall	A					A					A					A					A				
EBLTR	0.04	7.7	A	2	34	0.03	7.7	A	2	42	0.04	7.7	A	3	34	0.04	7.7	A	3	39	0.04	7.7	A	3	35
WBLTR	-	0	A	0	3	0.02	7.9	A	2	41	-	0	A	0	11	0.04	8.2	A	3	59	-	0	A	0	18
NBLTR	0.01	12.5	B	0	15	0.15	14.4	B	10	55	0.01	12.7	B	0	55	0.25	17.3	C	25	62	0.01	12.1	B	0	58
SBLTR	0.15	11	B	10	54	0.19	12.5	B	14	58	0.16	11.1	B	13	0	0.23	14	B	23	57	0.17	11.4	B	15	0
Bates and Baxter Blvd																									
Overall	A					A					A					A					A				
EBL	0.14	8.2	A	10	59	0.15	8.3	A	10	64	0.14	8.3	A	13	65	0.16	8.4	A	15	76	0.15	8.3	A	13	66
EBT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WBTR	-	-	-	-	4	-	-	-	-	3	-	-	-	-	5	-	-	-	-	17	-	-	-	-	9
SBL	0.23	20.8	C	18	64	0.25	22.2	C	20	71	0.22	21.3	C	20	64	0.30	24.5	C	30	68	0.25	23.1	C	25	60
Washington and Presumpscot St																									
Overall	E					F					F					F					F				
EBLTR	0.42	54.3	D	42	53	0.42	54.3	D	42	47	0.25	59.2	E	31	45	0.25	59.2	E	31	45	0.27	59.5	E	33	44
WBLT	0.92	57	E	#651	304	0.92	57	E	#651	310	0.89	53.2	D	#652	319	0.89	53.2	D	#652	314	0.94	62	E	#701	311
WBR	0.07	0.2	A	0	75	0.07	0.2	A	0	90	0.03	21.8	C	0	87	0.03	21.8	C	0	85	0.03	21.9	C	0	100
NBLT	0.07	100.8	F	#795	458	1.25	158.2	F	#824	476	1.36	201.4	F	#795	497	1.40	211.4	F	#831	645	1.43	232.2	F	#850	384
NBR	0.36	4.5	A	49	174	0.36	9.7	A	82	94	0.22	10	B	34	65	0.22	8.2	A	37	404	0.24	12.7	B	46	80
SBL	0.25	25	C	m24	114	0.25	21.1	C	m19	125	0.30	29.6	C	33	102	0.30	30.2	C	33	115	0.32	30.6	C	35	97
SBTR	1.06	72.4	E	#956	405	1.10	82.8	F	#1009	419	1.12	105.6	F	#964	478	1.19	131.7	F	#1047	518	1.18	128	F	#1036	491

Control Delay: m: Volume for 95th percentile queue is metered by upstream signal #: 95th %tile volume exceeds capacity, queue may be longer

AM Peak Hour LOS Tables

Long Term Build				
v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
E				
0.28	38.5	D	82	254
1.09	126	F	#420	404
0.96	89.9	F	#263	147
0.52	42.1	D	194	281
0.90	109.4	F	#211	203
0.73	35.4	D	422	411
0.73	35.7	D	0	378
0.62	56.3	E	m89	142
0.92	50.8	D	m391	354
0.92	51	D	-	360
A				
0.04	7.7	A	3	56
0.08	8.8	A	5	88
0.55	32	D	78	77
0.34	19.3	C	38	78
A				
0.18	8.7	A	18	76
-	-	-	-	-
-	-	-	-	21
0.39	30.4	D	43	66
F				
0.27	59.5	E	33	48
0.94	62	E	#701	314
0.03	21.9	C	0	98
1.50	257.7	F	#909	662
0.25	15.7	B	m59	219
0.32	30.6	C	35	119
1.29	176	F	#1182	507

Medium Term Build w/Mitigation						Long Term Build with Mitigation				
	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
Veranda and Washington Ave										
	D					D				
EBL	0.43	49.7	D	84	87	0.46	48.2	D	84	85
EBT	0.66	57.8	E	131	139	0.77	58.7	E	171	157
EBR	1.36	209.6	F	66	107	1.18	134.3	F	71	118
WBL	0.73	55.8	E	178	148	0.85	66.2	E	191	153
WBTR	0.79	56.5	E	175	231	0.81	55.4	E	198	322
NBL	0.37	47.1	D	#198	172	0.43	50.7	D	#211	177
NBT	0.50	27.1	C	256	275	0.53	27.6	C	287	289
NBR	0.29	12	B	40	60	0.41	13.5	B	50	88
SBL	0.23	39	D	m66	143	0.37	45.5	D	m89	208
SBT	0.87	30.7	C	m397	329	0.92	41.5	D	m390	345
SBR	0.88	30.8	C	-	342	0.92	41.7	D	-	348
Driveway at Veranda and Sherwood St										
	B					B				
EBLTR	0.65	13.4	B	284	197	0.75	14.4	B	#608	259
WBLTR	0.33	10.9	B	156	127	0.40	10.2	B	261	185
NBL	0.30	18.4	B	69	64	0.55	25.5	C	128	113
NBT	0.18	17.8	A	25	46	0.35	23.8	A	36	53
SBLTR	0.57	20.5	C	92	91	0.65	26	C	134	114
Bates and Baxter Blvd										
	B					B				
EBL	0.30	10.6	B	33	80	0.33	11.1	B	38	80
EBT	0.33	10.1	B	35	80	0.35	10.5	B	40	81
WBTR	0.40	10.6	B	48	86	0.46	11.5	B	63	101
SBL	0.12	9.6	A	10	57	0.15	10	A	13	59
Washington and Presumpscot St										
	F					F				
EBLTR	0.25	59.2	E	31	50	0.27	59.5	E	33	47
WBLT	0.89	53.2	D	#652	315	0.94	62	E	#701	314
WBR	0.03	21.8	C	-	90	0.03	21.9	C	-	95
NBLT	1.40	214.4	F	#866	577	1.50	254.8	F	#940	706
NBR	0.22	3.9	A	11	325	0.25	4.1	A	13	386
SBL	0.30	30.2	C	33	95	0.32	30.6	C	35	104
SBTR	1.19	131.7	F	#1047	509	1.29	176	F	#1182	532

PM Peak Hour LOS Tables

	Short Term No Build					Short Term Build					Medium Term No Build					Medium Term Build					Long Term No Build				
	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
Veranda and Washington Ave																									
Overall	D					D					D					E					D				
EBL	0.36	39.7	D	86	130	0.34	35.5	D	82	143	0.32	38.9	D	86	116	0.42	41	D	81	185	0.34	38.4	D	91	142
EBTR	0.85	60.3	E	#279	266	0.90	68.7	E	#350	291	0.92	78	E	#295	274	1.08	125.9	F	#407	344	0.93	80.3	F	#320	271
WBL	0.61	54.9	D	91	124	0.69	49.8	D	#147	291	0.56	44.1	D	#96	127	0.77	50.1	D	#193	152	0.59	44.9	D	#102	118
WBTR	0.57	46.8	D	179	193	0.62	44.6	D	259	299	0.55	46.3	D	183	202	0.81	55.8	E	#340	415	0.56	46	D	193	240
NBL	0.67	62.9	E	#205	231	0.76	72.6	E	#233	240	0.69	63.5	E	#231	232	0.80	77.2	E	#254	237	0.76	70.2	E	#247	238
NBT	0.74	24.4	C	565	957	0.89	36.5	D	#707	947	0.79	30.8	C	577	962	0.93	47.7	D	#753	920	0.83	33.3	C	628	967
NBTR	0.74	24.4	C	565	958	0.89	36.5	D	#707	958	0.80	31.4	C	0	968	0.95	51.2	D	0	931	0.85	34.3	C	0	968
SBL	0.53	61.2	E	m52	124	0.69	71.2	E	m75	141	0.57	61.4	E	m56	132	0.83	64.5	E	m#96	146	0.67	61.7	E	m55	122
SBT	0.74	35.2	D	m473	373	0.82	44	D	m495	397	0.80	47.9	D	m470	388	0.85	49.5	D	m496	431	0.84	48.4	D	m478	385
SBTR	0.74	35.2	D	m473	384	0.82	44	D	m495	409	0.80	47.9	D	-	403	0.85	49.5	D	-	447	0.84	48.5	D	-	396
Driveway at Veranda and Sherwood St																									
Overall	A					A					A					D					A				
EBLTR	0.04	7.8	A	2	44	0.04	7.8	A	2	42	0.04	7.8	A	3	40	0.04	7.8	A	3	41	0.05	7.9	A	3	43
WBLTR	-	0	A	0	6	0.02	7.9	A	2	34	-	0	A	0	4	0.03	8.1	A	3	48	-	0	A	0	3
NBLTR	-	13.9	B	0	11	0.56	24.3	C	66	88	0.00	14.1	B	0	9	0.99	77.2	F	290	189	0.01	13.2	B	0	23
SBLTR	0.15	12.5	B	10	55	0.21	15.6	C	16	56	0.16	12.7	B	15	53	0.26	18.2	C	25	60	0.18	13.1	B	15	56
Bates and Baxter Blvd																									
Overall	A					A					A					A					A				
EBL	0.17	8.4	A	12	64	0.18	8.5	A	12	71	0.17	8.4	A	15	71	0.19	8.5	A	18	72	0.19	8.5	A	18	68
EBT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WBTR	-	-	-	-	8	-	-	-	-	6	-	-	-	-	7	-	-	-	-	29	-	-	-	-	14
SBL	0.26	25.4	D	20	63	0.43	31.8	D	40	75	0.29	26.9	D	28	61	0.56	40.6	E	75	83	0.32	29.9	D	33	58
Washington and Presumpscot St																									
Overall	F					F					F					F					F				
EBLTR	0.42	54.3	D	42	62	0.42	54.3	D	42	59	0.27	59.5	E	33	56	0.27	59.5	E	33	42	0.30	58.5	E	35	51
WBLT	0.71	47.6	D	#427	248	0.71	47.6	D	#427	245	0.65	38.1	D	#406	256	0.65	38.1	D	#406	247	0.73	44.9	D	#445	264
WBR	0.08	0.3	A	0	102	0.08	0.3	A	0	96	0.03	24.4	C	0	97	0.03	24.4	C	0	84	0.03	26.5	C	0	100
NBLT	1.38	201.1	F	#1200	1295	1.59	291.2	F	m#1259	1238	1.72	353.8	F	#1268	1154	1.86	405.9	F	m#1242	1210	1.76	366.3	F	#1346	1198
NBR	0.57	4.5	A	75	1340	0.58	2.6	A	m15	1328	0.52	10	B	82	1296	0.54	5	A	m14	1281	0.55	11.9	B	m95	1342
SBL	0.17	14	B	m9	95	0.26	14.9	B	m13	129	0.21	28.8	C	24	80	0.21	28.8	C	24	87	0.22	28.6	C	24	81
SBTR	0.94	32.3	C	#858	504	0.97	36.6	D	#905	461	1.03	72.4	E	#908	554	1.07	86.1	F	#969	579	1.06	80.8	F	#984	528

Control Delay: m: Volume for 95th percentile queue is metered by upstream signal #: 95th %tile volume exceeds capacity, queue may be longer

PM Peak Hour LOS Tables

Long Term Build				
v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
E				
0.63	49.3	D	#98	267
1.16	153.1	F	#453	417
0.97	86.1	F	#290	147
1.01	92.9	F	#493	512
0.87	87.4	F	#270	239
0.98	58.1	E	#836	908
1.01	65.8	F	0	917
1.00	85.5	F	m#104	150
0.89	51	D	m506	513
0.89	51.1	D	-	526
F				
0.05	7.9 A		3	47
0.04	8.2	A	3	89
1.68	344.6	F	870	350
0.35	23.8	C	38	81
A				
0.20	8.7	A	18	102
-	-	-	-	-
-	-	-	-	95
0.78	68.5	F	135	96
F				
0.30	58.5	E	35	56
0.73	44.9	D	#445	266
0.03	26.5	C	0	106
1.95	446.8	F	m#1275	1170
0.58	5.7	A	m13	1280
0.22	28.6	C	24	112
1.11	99.6	F	#1057	612

Medium Term Build w/Mitigation						Long Term Build with Mitigation				
	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
Veranda and Washington Ave										
	D					D				
EBL	0.50	44.9	D	81	91	0.63	49.3	D	#97	119
EBT	0.53	48.9	D	170	154	0.49	45.8	D	185	177
EBR	0.76	34.5	C	14	103	0.67	31.3	C	22	132
WBL	0.57	38.5	D	165	154	0.68	38.2	D	211	149
WBTR	0.91	65.2	E	#340	394	1.01	78.2	F	#493	474
NBL	0.66	60.9	E	#254	239	0.87	87.4	F	#270	244
NBT	0.76	29.8	C	505	977	0.80	31.3	C	544	908
NBR	0.38	9.6	A	56	1081	0.42	10.1	B	65	1062
SBL	0.59	57.6	E	m#96	244	1.00	85.5	F	m#104	248
SBT	0.85	49.5	D	m496	392	0.89	51	D	m506	419
SBR	0.85	49.5	D	-	410	0.89	51.1	D	-	435
Driveway at Veranda and Sherwood St										
	B					C				
EBLTR	0.65	15.7	B	365	255	0.73	19.5	B	437	371
WBLTR	0.42	13.5	B	242	176	0.45	16.2	B	271	414
NBL	0.67	19.8	B	#295	182	0.77	23.1	C	#562	347
NBT	0.42	17.5	A	51	78	0.48	19.4	A	67	251
SBLTR	0.54	22.8	C	108	87	0.62	29.7	C	119	144
Bates and Baxter Blvd										
	B					B				
EBL	0.37	11.6	B	43	80	0.40	12.4	B	48	93
EBT	0.39	11.2	B	48	91	0.43	11.9	B	53	92
WBTR	0.42	11.2	B	50	89	0.46	12.1	B	60	100
SBL	0.20	10.4	B	18	72	0.26	11.2	B	25	67
Washington and Presumpscot St										
	F					F				
EBLTR	0.27	59.5	E	33	46	0.30	58.5	E	35	54
WBLT	0.65	38.1	D	#406	246	0.73	44.9	D	#445	260
WBR	0.03	24.4	C	-	101	0.03	26.5	C	-	91
NBLT	1.86	410.3	F	#1387	1185	1.95	447.7	F	m#1499	1077
NBR	0.54	4.1	A	9	1322	0.58	4.1	A	m21	1177
SBL	0.21	28.8	C	24	81	0.22	28.6	C	24	95
SBTR	1.07	86.1	F	#969	509	1.11	99.6	F	#1057	552

	Long Term AM Existing Zoning Build Out					Long Term PM Existing Zoning Build Out						Long Term AM Existing Zoning With Mitigation					Long Term PM Existing Zoning With Mitigation				
	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue		v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue	v/c ⁺	Delay*	LOS**	Synchro Queue	Sim Queue
Veranda and Washington Ave																					
Overall	F					F						D					E				
EBL	0.28	40.8	D	77	366	0.55	43.7	D	76	178	EBL	0.26	39.8	D	79	211	0.63	46.2	D	#87	103
EBTR	1.76	407.5	F	#748	382	1.27	199.7	F	#469	336	EBT	0.95	86.4	F	#403	351	0.39	40.6	D	178	169
											EBR	0.50	19.4	B	41	177	0.37	13.8	B	53	113
WBL	0.79	46.9	D	184	147	0.94	63.6	E	#411	156	WBL	0.97	102.7	F	#312	150	0.84	57.4	E	202	131
WBTR	0.53	41.8	D	188	300	1.22	160.4	F	#806	483	WBTR	0.49	40	D	193	408	1.17	129.7	F	#733	139
NBL	0.51	56.4	E	#175	205	0.99	117.4	F	#294	229	NBL	0.90	109.4	F	#211	225	1.01	124.2	F	#294	426
NBT	0.88	42.9	D	523	624	1.19	135.6	F	#955	800	NBT	0.66	37.1	D	342	393	0.93	46.8	D	#662	840
NBTR	0.89	46.1	D	-	669	1.22	150	F	-	818	NBR	0.79	19.4	B	263	238	0.37	7.5	A	24	834
SBL	1.86	445.9	F	#535	228	0.74	69.1	E	#173	244	SBL	0.83	49.9	D	m#334	239	0.98	111.8	F	#197	787
SBT	1.05	63.2	F	#837	1194	1.01	66.1	F	#715	453	SBT	0.95	22.1	C	#763	368	1.01	66.4	F	#715	226
SBTR	1.06	65.7	F	-	1076	1.02	66.8	F	-	467	SBTR	0.96	22.7	C	-	365	1.02	67.1	F	-	406
Driveway at Veranda and Sherwood St																					
Overall	F					F						C					D				
											EBL	0.07	9.4	A	38	52	0.39	55.1	E	m73	87
EBLTR	0.04	0.3	A	3	132	0.05	1	A	3	51	EBT	0.14	7.9	A	98	98	0.54	43.2	D	m200	198
											EBR	0.97	39.7	D	128	296	0.53	43.3	D	m49	75
WBLTR	0.33	6.9	A	35	529	0.03	1	A	3	73	WBL	0.56	16.2	B	135	462	0.22	50	D	55	555
											WBTR	0.17	8.1	A	112	582	0.67	45.6	D	262	431
NBLTR	^	^	F	^	356	3.11	978.6	F	2385	312	NBL	0.73	52.5	D	#212	152	0.79	32.5	C	#690	279
											NBTR	0.46	47.1	D	43	57	0.49	22.7	C	78	168
SBLTR	1.85	503.7	F	343	1323	0.52	41.8	F	68	76	SBLTR	0.81	53.6	D	158	178	0.40	50.9	D	109	148
Bates and Baxter Blvd																					
Overall	A					A						B					B				
EBL	0.23	9.3	A	22	207	0.20	8.7	A	19	80	EBL	0.40	11.3	B	48	94	0.42	12.5	B	53	86
EBT	0.15	0	A	-	-	0.17	0	A	-	-	EBT	0.36	9.9	A	40	96	0.46	12.2	B	60	95
WBTR	0.28	0	A	-	452	0.19	0	A	-	8	WBTR	0.60	14.2	B	100	136	0.49	13.3	B	68	89
SBL	0.50	43.8	E	62	72	1.16	164.8	F	287	107	SBL	0.15	10.3	B	13	62	0.39	13	B	48	78
Washington and Presumpscot St																					
Overall	F					F						D					D				
EBLTR	0.50	68.6	E	49	62	0.50	68.6	E	49	71	EBLTR	0.26	56.6	E	46	66	0.35	62.6	E	48	54
WBLT	1.68	368.8	F	#864	291	1.12	136.2	F	#551	309	WBLT	0.80	42.7	D	#574	308	0.86	69.2	E	#420	285
WBR	0.03	37.6	D	0	84	0.03	37.6	D	0	102	WBR	0.12	55	E	47	59	0.05	39.2	D	42	57
NBLT	1.15	116.3	F	#870	468	1.25	151.5	F	#1436	741	NBLT	1.02	76.1	E	#773	518	1.06	68.8	E	#1342	946
NBR	0.18	16.5	B	45	101	0.45	20.9	C	202	330	NBR	0.30	44.3	D	219	281	0.40	14.2	B	150	660
SBL	0.14	9	A	m6	977	0.24	18.1	B	m4	25	SBL	0.28	28.6	C	35	40	0.41	17.9	B	m6	61
SBTR	1.04	36.3	D	m#983	1792	0.86	15.6	B	m614	341	SBTR	0.72	29.7	C	440	199	0.84	15.9	B	m620	311

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	50	177	149	77	55	110	721	80	39	1325	77
Future Volume (vph)	72	50	177	149	77	55	110	721	80	39	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.883			0.937			0.985			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1645	0	1770	1745	0	1770	3486	0	1770	3511	0
Flt Permitted	0.665			0.193			0.950			0.950		
Satd. Flow (perm)	1239	1645	0	360	1745	0	1770	3486	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		124			27			14			7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	54	192	162	84	60	120	784	87	42	1440	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	246	0	162	144	0	120	871	0	42	1524	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	23.0		17.0	29.0		17.0	67.0		13.0	63.0	

AM No Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Long Term) No Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	19.2%		14.2%	24.2%		14.2%	55.8%		10.8%	52.5%	
Maximum Green (s)	5.0	17.0		11.0	23.0		11.0	61.0		7.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	18.5	13.5		30.5	21.7		11.0	64.5		7.0	60.5	
Actuated g/C Ratio	0.15	0.11		0.25	0.18		0.09	0.54		0.06	0.50	
v/c Ratio	0.37	0.83		0.74	0.43		0.74	0.46		0.41	0.86	
Control Delay	40.6	48.7		56.6	39.5		79.8	18.3		49.8	24.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.6	48.7		56.6	39.5		79.8	18.3		49.8	24.3	
LOS	D	D		E	D		E	B		D	C	
Approach Delay		46.7			48.5			25.8			25.0	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 29.7

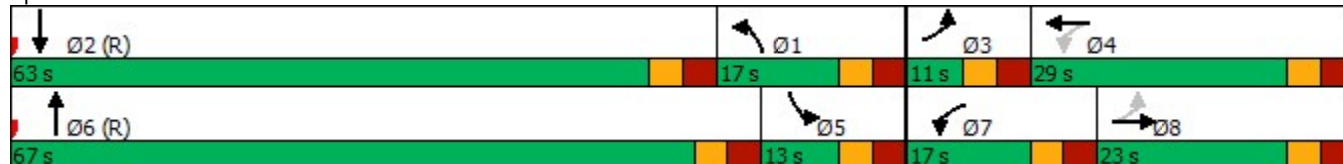
Intersection LOS: C

Intersection Capacity Utilization 87.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

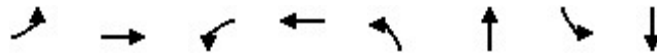


Queues

AM No Build (Long Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	246	162	144	120	871	42	1524
v/c Ratio	0.37	0.83	0.74	0.43	0.74	0.46	0.41	0.86
Control Delay	40.6	48.7	56.6	39.5	79.8	18.3	49.8	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	48.7	56.6	39.5	79.8	18.3	49.8	24.3
Queue Length 50th (ft)	46	93	101	81	92	213	32	410
Queue Length 95th (ft)	86	#199	#177	144	#187	276	m35	m424
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	213	339	220	357	162	1880	103	1774
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.73	0.74	0.40	0.74	0.46	0.41	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	50	177	149	77	55	110	721	80	39	1325	77
Future Volume (vph)	72	50	177	149	77	55	110	721	80	39	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88		1.00	0.94		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1645		1770	1746		1770	3486		1770	3510	
Flt Permitted	0.67	1.00		0.19	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1239	1645		360	1746		1770	3486		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	54	192	162	84	60	120	784	87	42	1440	84
RTOR Reduction (vph)	0	109	0	0	22	0	0	7	0	0	4	0
Lane Group Flow (vph)	78	137	0	162	122	0	120	864	0	42	1520	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	18.7	14.7		31.7	21.7		11.0	63.3		7.0	59.3	
Effective Green, g (s)	18.7	14.7		31.7	21.7		11.0	63.3		7.0	59.3	
Actuated g/C Ratio	0.16	0.12		0.26	0.18		0.09	0.53		0.06	0.49	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	210	201		224	315		162	1838		103	1734	
v/s Ratio Prot	0.01	0.08		c0.07	0.07		c0.07	0.25		0.02	c0.43	
v/s Ratio Perm	0.05			c0.12								
v/c Ratio	0.37	0.68		0.72	0.39		0.74	0.47		0.41	0.88	
Uniform Delay, d1	44.7	50.4		37.0	43.3		53.1	17.8		54.5	27.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.82	0.81	
Incremental Delay, d2	1.1	9.2		11.0	0.8		26.0	0.9		4.3	2.6	
Delay (s)	45.9	59.6		48.0	44.1		79.1	18.7		49.2	24.5	
Level of Service	D	E		D	D		E	B		D	C	
Approach Delay (s)		56.3			46.2			26.0			25.2	
Approach LOS		E			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			87.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	50	177	149	77	55	110	721	80	39	1325	77
Future Volume (veh/h)	72	50	177	149	77	55	110	721	80	39	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	54	192	162	84	60	120	784	87	42	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	51	181	223	194	139	164	1639	182	104	1621	94
Arrive On Green	0.04	0.14	0.14	0.09	0.19	0.19	0.09	0.51	0.51	0.06	0.47	0.47
Sat Flow, veh/h	1781	360	1280	1781	1015	725	1781	3225	358	1781	3413	198
Grp Volume(v), veh/h	78	0	246	162	0	144	120	432	439	42	747	777
Grp Sat Flow(s),veh/h/ln	1781	0	1640	1781	0	1740	1781	1777	1806	1781	1777	1835
Q Serve(g_s), s	4.5	0.0	17.0	9.0	0.0	8.8	7.9	18.9	19.0	2.7	45.7	46.2
Cycle Q Clear(g_c), s	4.5	0.0	17.0	9.0	0.0	8.8	7.9	18.9	19.0	2.7	45.7	46.2
Prop In Lane	1.00		0.78	1.00		0.42	1.00		0.20	1.00		0.11
Lane Grp Cap(c), veh/h	282	0	232	223	0	333	164	903	918	104	844	871
V/C Ratio(X)	0.28	0.00	1.06	0.73	0.00	0.43	0.73	0.48	0.48	0.40	0.89	0.89
Avail Cap(c_a), veh/h	282	0	232	223	0	333	164	903	918	104	844	871
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	41.9	0.0	51.5	38.7	0.0	42.8	53.0	19.2	19.2	54.5	28.5	28.7
Incr Delay (d2), s/veh	0.5	0.0	75.4	11.3	0.0	0.9	24.9	1.8	1.8	1.0	1.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	11.8	4.6	0.0	3.9	4.7	8.2	8.3	1.3	19.2	20.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.4	0.0	126.9	49.9	0.0	43.7	78.0	21.0	20.9	55.5	30.0	30.2
LnGrp LOS	D	A	F	D	A	D	E	C	C	E	C	C
Approach Vol, veh/h		324			306			991			1566	
Approach Delay, s/veh		106.6			47.0			27.9			30.8	
Approach LOS		F			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	63.0	11.0	29.0	13.0	67.0	17.0	23.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	57.0	5.0	23.0	7.0	61.0	11.0	17.0				
Max Q Clear Time (g_c+I1), s	9.9	48.2	6.5	10.8	4.7	21.0	11.0	19.0				
Green Ext Time (p_c), s	0.0	5.2	0.0	0.4	0.0	4.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			39.1									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	457	4	43	2	581	250	31	826	3
Future Volume (vph)	8	2	8	457	4	43	2	581	250	31	826	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850			
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1863	0
Flt Permitted		0.630			0.713			0.707		0.086		
Satd. Flow (perm)	0	1102	0	0	1328	1583	0	1317	1583	160	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				136			218			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	497	4	47	2	632	272	34	898	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	501	47	0	634	272	34	901	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		35.0	35.0	35.0	48.0	48.0	48.0	11.0	59.0	

AM No Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPSCOT

AM No Build (Long Term) No Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		29.2%	29.2%	29.2%	40.0%	40.0%	40.0%	9.2%	49.2%	
Maximum Green (s)	20.0	20.0		29.0	29.0	29.0	42.0	42.0	42.0	5.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.3			48.0	48.0		46.4	46.4	53.0	53.0	
Actuated g/C Ratio		0.07			0.40	0.40		0.39	0.39	0.44	0.44	
v/c Ratio		0.24			0.95	0.07		1.25	0.37	0.25	1.10	
Control Delay		41.6			64.1	0.2		151.7	4.0	23.6	93.8	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6			64.1	0.2		151.7	4.0	23.6	93.8	
LOS		D			E	A		F	A	C	F	
Approach Delay		41.6			58.6			107.3			91.3	
Approach LOS		D			E			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.25

Intersection Signal Delay: 89.5

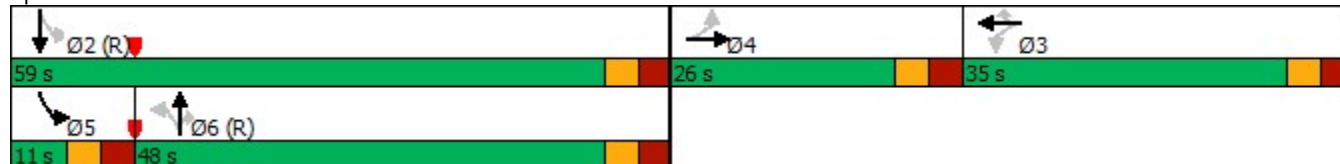
Intersection LOS: F

Intersection Capacity Utilization 85.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPSCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

AM No Build (Long Term) No Mitigation

09/02/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	501	47	634	272	34	901
v/c Ratio	0.24	0.95	0.07	1.25	0.37	0.25	1.10
Control Delay	41.6	64.1	0.2	151.7	4.0	23.6	93.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	64.1	0.2	151.7	4.0	23.6	93.8
Queue Length 50th (ft)	8	330	0	~659	4	15	~789
Queue Length 95th (ft)	33	#701	0	#850	46	35	#1036
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	191	530	714	508	745	137	822
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.95	0.07	1.25	0.37	0.25	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	457	4	43	2	581	250	31	826	3
Future Volume (vph)	8	2	8	457	4	43	2	581	250	31	826	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.63			0.71	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1103			1329	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	497	4	47	2	632	272	34	898	3
RTOR Reduction (vph)	0	9	0	0	0	28	0	0	145	0	0	0
Lane Group Flow (vph)	0	11	0	0	501	19	0	634	127	34	901	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.6			48.0	48.0		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.6			48.0	48.0		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			531	633		443	532	106	766	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.01			c0.38	0.01		c0.48	0.08	0.12		
v/c Ratio		0.27			0.94	0.03		1.43	0.24	0.32	1.18	
Uniform Delay, d1		56.1			34.7	21.9		39.8	28.7	28.8	35.3	
Progression Factor		1.00			1.00	1.00		0.67	0.41	1.00	1.00	
Incremental Delay, d2		3.5			27.3	0.1		205.6	1.0	1.8	92.7	
Delay (s)		59.5			62.0	21.9		232.2	12.7	30.6	128.0	
Level of Service		E			E	C		F	B	C	F	
Approach Delay (s)		59.5			58.6			166.3			124.5	
Approach LOS		E			E			F			F	
Intersection Summary												
HCM 2000 Control Delay		124.7		HCM 2000 Level of Service				F				
HCM 2000 Volume to Capacity ratio		1.17										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				24.0				
Intersection Capacity Utilization		85.9%		ICU Level of Service				E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

AM No Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	227	215	0	0	193
Future Volume (vph)	0	227	215	0	0	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	247	234	0	0	210
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	247	234	0	0	210
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	29.9%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

AM No Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	177	227	215	55	61	0
Future Volume (vph)	177	227	215	55	61	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.972					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1811	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1811	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	192	247	234	60	66	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	192	247	294	0	66	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	37.8%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	177	227	215	55	61	0
Future Vol, veh/h	177	227	215	55	61	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	192	247	234	60	66	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	294	0	-	0	895	-
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	631	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1268	-	-	-	311	0
Stage 1	-	-	-	-	780	0
Stage 2	-	-	-	-	530	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1268	-	-	-	264	-
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	530	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.7	0		23.1		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1268	-	-	-	264	
HCM Lane V/C Ratio	0.152	-	-	-	0.251	
HCM Control Delay (s)	8.3	-	-	-	23.1	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	1	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	149	16	0	149	33	2	1	1	39	0	65
Future Volume (vph)	46	149	16	0	149	33	2	1	1	39	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.975			0.966			0.915	
Flt Protected		0.989						0.976			0.982	
Satd. Flow (prot)	0	1824	0	0	1816	0	0	1756	0	0	1674	0
Flt Permitted		0.989						0.976			0.982	
Satd. Flow (perm)	0	1824	0	0	1816	0	0	1756	0	0	1674	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	162	17	0	162	36	2	1	1	42	0	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	229	0	0	198	0	0	4	0	0	113	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	38.3%											
Analysis Period (min)	15											
	ICU Level of Service A											

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	46	149	16	0	149	33	2	1	1	39	0	65
Future Vol, veh/h	46	149	16	0	149	33	2	1	1	39	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	162	17	0	162	36	2	1	1	42	0	71
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	198	0	0	179	0	0	487	469	171	452	459	180
Stage 1	-	-	-	-	-	-	271	271	-	180	180	-
Stage 2	-	-	-	-	-	-	216	198	-	272	279	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1375	-	-	1397	-	-	491	492	873	518	499	863
Stage 1	-	-	-	-	-	-	735	685	-	822	750	-
Stage 2	-	-	-	-	-	-	786	737	-	734	680	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1375	-	-	1397	-	-	437	472	873	501	479	863
Mov Cap-2 Maneuver	-	-	-	-	-	-	437	472	-	501	479	-
Stage 1	-	-	-	-	-	-	706	658	-	789	750	-
Stage 2	-	-	-	-	-	-	722	737	-	703	653	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			12.1			11.4		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	510	1375	-	-	1397	-	-	679				
HCM Lane V/C Ratio	0.009	0.036	-	-	-	-	-	0.166				
HCM Control Delay (s)	12.1	7.7	0	-	0	-	-	11.4				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	166	280	125	280	184	286	244	125	344	362
Average Queue (ft)	56	124	89	110	98	188	151	33	235	244
95th Queue (ft)	118	226	141	218	186	280	234	90	330	335
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		0								
Queuing Penalty (veh)		0								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		2	11	15	1	10		0	28	
Queuing Penalty (veh)		1	15	22	5	11		2	11	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	57	292	100	418	96	174	535
Average Queue (ft)	17	215	33	254	40	24	339
95th Queue (ft)	44	311	100	384	80	97	491
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		37	0			0	29
Queuing Penalty (veh)		16	0			0	9

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	92
Average Queue (ft)	31
95th Queue (ft)	70
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	86	14	74
Average Queue (ft)	32	1	34
95th Queue (ft)	66	9	60
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	53	31	71
Average Queue (ft)	9	3	36
95th Queue (ft)	35	18	58
Link Distance (ft)	427	271	1268
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 91

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	105	171	82	107	66	166	1219	200	55	1105	99
Future Volume (vph)	77	105	171	82	107	66	166	1219	200	55	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.907			0.943			0.979			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1690	0	1770	1757	0	1770	3465	0	1770	3497	0
Flt Permitted	0.514			0.211			0.950			0.950		
Satd. Flow (perm)	957	1690	0	393	1757	0	1770	3465	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61			23			23			10	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	114	186	89	116	72	180	1325	217	60	1201	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	300	0	89	188	0	180	1542	0	60	1309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	29.0		11.0	29.0		22.0	68.0		12.0	58.0	

PM No Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Long Term) No Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	24.2%		9.2%	24.2%		18.3%	56.7%		10.0%	48.3%	
Maximum Green (s)	5.0	23.0		5.0	23.0		16.0	62.0		6.0	52.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	25.8	20.8		27.0	23.0		16.0	64.2		6.0	54.2	
Actuated g/C Ratio	0.22	0.17		0.22	0.19		0.13	0.54		0.05	0.45	
v/c Ratio	0.35	0.88		0.61	0.53		0.76	0.83		0.68	0.83	
Control Delay	38.5	63.9		53.7	44.5		71.5	28.2		72.4	38.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.5	63.9		53.7	44.5		71.5	28.2		72.4	38.1	
LOS	D	E		D	D		E	C		E	D	
Approach Delay		58.3			47.4			32.8			39.6	
Approach LOS		E			D			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 97 (81%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 39.0

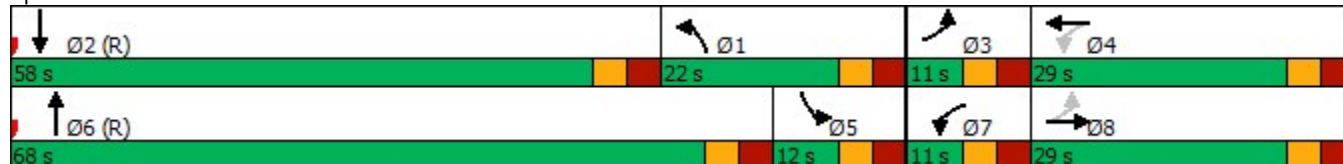
Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

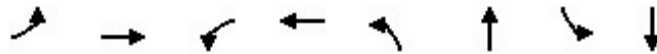


Queues

PM No Build (Long Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	300	89	188	180	1542	60	1309
v/c Ratio	0.35	0.88	0.61	0.53	0.76	0.83	0.68	0.83
Control Delay	38.5	63.9	53.7	44.5	71.5	28.2	72.4	38.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.5	63.9	53.7	44.5	71.5	28.2	72.4	38.1
Queue Length 50th (ft)	49	181	52	116	136	520	45	459
Queue Length 95th (ft)	91	#320	#102	193	#247	628	m55	m478
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	239	373	145	363	236	1865	88	1586
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.80	0.61	0.52	0.76	0.83	0.68	0.83

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	105	171	82	107	66	166	1219	200	55	1105	99
Future Volume (vph)	77	105	171	82	107	66	166	1219	200	55	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.91		1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1690		1770	1756		1770	3465		1770	3495	
Flt Permitted	0.51	1.00		0.21	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	957	1690		393	1756		1770	3465		1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	114	186	89	116	72	180	1325	217	60	1201	108
RTOR Reduction (vph)	0	50	0	0	19	0	0	11	0	0	6	0
Lane Group Flow (vph)	84	250	0	89	169	0	180	1531	0	60	1303	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	26.0	22.0		28.0	23.0		16.0	63.0		6.0	53.0	
Effective Green, g (s)	26.0	22.0		28.0	23.0		16.0	63.0		6.0	53.0	
Actuated g/C Ratio	0.22	0.18		0.23	0.19		0.13	0.52		0.05	0.44	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	234	309		149	336		236	1819		88	1543	
v/s Ratio Prot	0.01	c0.15		c0.02	0.10		c0.10	c0.44		0.03	0.37	
v/s Ratio Perm	0.07			0.11								
v/c Ratio	0.36	0.81		0.60	0.50		0.76	0.84		0.68	0.84	
Uniform Delay, d1	39.3	47.0		38.1	43.4		50.2	24.3		56.1	29.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.90	1.20	
Incremental Delay, d2	0.9	14.4		6.3	1.2		20.6	4.9		20.5	3.2	
Delay (s)	40.2	61.4		44.4	44.6		70.7	29.2		71.3	39.1	
Level of Service	D	E		D	D		E	C		E	D	
Approach Delay (s)		56.8			44.5			33.5			40.5	
Approach LOS		E			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			39.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			84.8%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	105	171	82	107	66	166	1219	200	55	1105	99
Future Volume (veh/h)	77	105	171	82	107	66	166	1219	200	55	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	114	186	89	116	72	180	1325	217	60	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	247	123	200	152	207	128	238	1582	257	89	1429	128
Arrive On Green	0.04	0.19	0.19	0.04	0.19	0.19	0.13	0.52	0.52	0.02	0.14	0.14
Sat Flow, veh/h	1781	639	1043	1781	1080	670	1781	3061	497	1781	3298	296
Grp Volume(v), veh/h	84	0	300	89	0	188	180	764	778	60	646	663
Grp Sat Flow(s),veh/h/ln	1781	0	1683	1781	0	1750	1781	1777	1781	1781	1777	1817
Q Serve(g_s), s	4.6	0.0	21.0	4.8	0.0	11.7	11.7	43.7	45.0	4.0	42.5	42.7
Cycle Q Clear(g_c), s	4.6	0.0	21.0	4.8	0.0	11.7	11.7	43.7	45.0	4.0	42.5	42.7
Prop In Lane	1.00		0.62	1.00		0.38	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	247	0	322	152	0	335	238	918	920	89	770	787
V/C Ratio(X)	0.34	0.00	0.93	0.59	0.00	0.56	0.76	0.83	0.85	0.67	0.84	0.84
Avail Cap(c_a), veh/h	247	0	322	152	0	335	238	918	920	89	770	787
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	37.6	0.0	47.7	39.1	0.0	43.9	50.1	24.6	24.9	58.0	47.3	47.4
Incr Delay (d2), s/veh	0.8	0.0	32.5	5.7	0.0	2.1	20.0	8.7	9.4	3.7	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	11.7	2.4	0.0	5.3	6.5	19.9	20.7	1.9	20.5	21.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.4	0.0	80.3	44.9	0.0	46.0	70.2	33.3	34.3	61.7	48.4	48.5
LnGrp LOS	D	A	F	D	A	D	E	C	C	E	D	D
Approach Vol, veh/h	384			277			1722			1369		
Approach Delay, s/veh	71.1			45.7			37.6			49.0		
Approach LOS	E			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.0	58.0	11.0	29.0	12.0	68.0	11.0	29.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	16.0	52.0	5.0	23.0	6.0	62.0	5.0	23.0				
Max Q Clear Time (g_c+I1), s	13.7	44.7	6.6	13.7	6.0	47.0	6.8	23.0				
Green Ext Time (p_c), s	0.1	3.9	0.0	0.5	0.0	7.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	45.8											
HCM 6th LOS	D											

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	9	303	2	46	1	881	465	21	807	17
Future Volume (vph)	9	2	9	303	2	46	1	881	465	21	807	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850		0.997	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.448			0.711			0.772		0.078		
Satd. Flow (perm)	0	784	0	0	1324	1583	0	1438	1583	145	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				136			282		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	2	10	329	2	50	1	958	505	23	877	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	331	50	0	959	505	23	895	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

PM No Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.7			40.9	40.9		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.07			0.34	0.34		0.42	0.42	0.48	0.48	
v/c Ratio		0.34			0.73	0.08		1.59	0.61	0.17	1.01	
Control Delay		47.8			48.2	0.2		291.3	6.1	19.6	65.9	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		47.8			48.2	0.2		291.3	6.1	19.6	65.9	
LOS		D			D	A		F	A	B	E	
Approach Delay		47.8			41.9			192.9			64.8	
Approach LOS		D			D			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.59

Intersection Signal Delay: 128.9

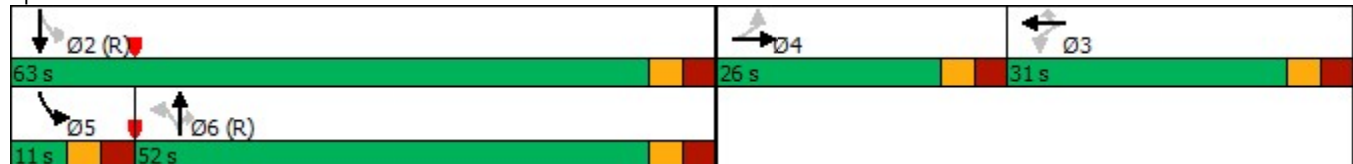
Intersection LOS: F

Intersection Capacity Utilization 91.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Long Term) No Mitigation

09/02/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	331	50	959	505	23	895
v/c Ratio	0.34	0.73	0.08	1.59	0.61	0.17	1.01
Control Delay	47.8	48.2	0.2	291.3	6.1	19.6	65.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	48.2	0.2	291.3	6.1	19.6	65.9
Queue Length 50th (ft)	9	235	0	~1088	22	9	~704
Queue Length 95th (ft)	35	#445	0	#1346	m95	24	#984
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	139	451	629	604	828	136	882
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.73	0.08	1.59	0.61	0.17	1.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	9	303	2	46	1	881	465	21	807	17
Future Volume (vph)	9	2	9	303	2	46	1	881	465	21	807	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1710			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.45			0.71	1.00		0.77	1.00	0.08	1.00	
Satd. Flow (perm)		783			1325	1583		1438	1583	144	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	2	10	329	2	50	1	958	505	23	877	18
RTOR Reduction (vph)	0	9	0	0	0	33	0	0	175	0	1	0
Lane Group Flow (vph)	0	13	0	0	331	17	0	959	330	23	894	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		6.5			40.9	40.9		45.6	45.6	54.6	54.6	
Effective Green, g (s)		6.5			40.9	40.9		45.6	45.6	54.6	54.6	
Actuated g/C Ratio		0.05			0.34	0.34		0.38	0.38	0.46	0.46	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			451	539		546	601	106	844	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.02			c0.25	0.01		c0.67	0.21	0.09		
v/c Ratio		0.30			0.73	0.03		1.76	0.55	0.22	1.06	
Uniform Delay, d1		54.6			34.8	26.4		37.2	29.1	27.6	32.7	
Progression Factor		1.00			1.00	1.00		0.58	0.33	1.00	1.00	
Incremental Delay, d2		4.0			10.1	0.1		344.9	2.1	1.0	48.1	
Delay (s)		58.5			44.9	26.5		366.3	11.9	28.6	80.8	
Level of Service		E			D	C		F	B	C	F	
Approach Delay (s)		58.5			42.5			244.0			79.5	
Approach LOS		E			D			F			E	
Intersection Summary												
HCM 2000 Control Delay		160.7			HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio		1.24										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		91.5%			ICU Level of Service				F			
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

PM No Build (Long Term) No Mitigation

09/02/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	265	221	0	0	254
Future Volume (vph)	0	265	221	0	0	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	288	240	0	0	276
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	288	240	0	0	276
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	34.0%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

PM No Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	215	265	221	54	63	0
Future Volume (vph)	215	265	221	54	63	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1812	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1812	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	288	240	59	68	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	234	288	299	0	68	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	40.3%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	215	265	221	54	63	0
Future Vol, veh/h	215	265	221	54	63	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	234	288	240	59	68	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	299	0	-	0	1026	-
Stage 1	-	-	-	-	270	-
Stage 2	-	-	-	-	756	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1262	-	-	-	260	0
Stage 1	-	-	-	-	775	0
Stage 2	-	-	-	-	464	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1262	-	-	-	212	-
Mov Cap-2 Maneuver	-	-	-	-	212	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	464	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		29.9		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1262	-	-	-	212	
HCM Lane V/C Ratio	0.185	-	-	-	0.323	
HCM Control Delay (s)	8.5	-	-	-	29.9	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.7	-	-	-	1.3	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM No Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	193	2	0	210	28	2	1	1	44	1	41
Future Volume (vph)	54	193	2	0	210	28	2	1	1	44	1	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.984			0.966			0.935	
Flt Protected		0.989						0.976			0.975	
Satd. Flow (prot)	0	1840	0	0	1833	0	0	1756	0	0	1698	0
Flt Permitted		0.989						0.976			0.975	
Satd. Flow (perm)	0	1840	0	0	1833	0	0	1756	0	0	1698	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	210	2	0	228	30	2	1	1	48	1	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	271	0	0	258	0	0	4	0	0	94	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	42.3%											
Analysis Period (min)	15											
	ICU Level of Service A											

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	54	193	2	0	210	28	2	1	1	44	1	41
Future Vol, veh/h	54	193	2	0	210	28	2	1	1	44	1	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	59	210	2	0	228	30	2	1	1	48	1	45
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	212	0	0	595	587	211	573	573	243
Stage 1	-	-	-	-	-	-	329	329	-	243	243	-
Stage 2	-	-	-	-	-	-	266	258	-	330	330	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1307	-	-	1358	-	-	416	422	829	430	430	796
Stage 1	-	-	-	-	-	-	684	646	-	761	705	-
Stage 2	-	-	-	-	-	-	739	694	-	683	646	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1307	-	-	1358	-	-	376	400	829	412	408	796
Mov Cap-2 Maneuver	-	-	-	-	-	-	376	400	-	412	408	-
Stage 1	-	-	-	-	-	-	649	613	-	722	705	-
Stage 2	-	-	-	-	-	-	697	694	-	646	613	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			13.2			13.1		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	443	1307	-	-	1358	-	-	535				
HCM Lane V/C Ratio	0.01	0.045	-	-	-	-	-	0.175				
HCM Control Delay (s)	13.2	7.9	0	-	0	-	-	13.1				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	243	320	124	312	185	806	810	124	389	403
Average Queue (ft)	60	155	61	122	159	689	676	60	293	305
95th Queue (ft)	142	271	118	240	238	967	968	122	385	396
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		0		0		46	41			
Queuing Penalty (veh)		1		0		0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	3	19	4	62		1	41	
Queuing Penalty (veh)		2	5	16	24	102		5	23	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	65	279	100	1044	1069	141	552
Average Queue (ft)	21	153	37	982	815	17	385
95th Queue (ft)	51	264	100	1198	1342	81	528
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				13	3		
Queuing Penalty (veh)				91	21		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		28	1			0	33
Queuing Penalty (veh)		13	3			0	7

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	109
Average Queue (ft)	36
95th Queue (ft)	82
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	91	24	66
Average Queue (ft)	33	1	30
95th Queue (ft)	68	14	58
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	54	4	31	70
Average Queue (ft)	13	0	5	34
95th Queue (ft)	43	3	23	56
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 311

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Future Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.915			0.934			0.961			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1704	0	1770	1740	0	1770	3401	0	1770	3511	0
Flt Permitted	0.630			0.137			0.950			0.950		
Satd. Flow (perm)	1174	1704	0	255	1740	0	1770	3401	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			30			49			6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	147	192	200	114	89	120	784	272	129	1440	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	339	0	200	203	0	120	1056	0	129	1524	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	28.0		16.0	33.0		15.0	56.0		20.0	61.0	

AM Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) No Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	23.3%		13.3%	27.5%		12.5%	46.7%		16.7%	50.8%	
Maximum Green (s)	5.0	22.0		10.0	27.0		9.0	50.0		14.0	55.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	27.0	22.0		37.2	29.2		9.0	50.0		14.0	55.0	
Actuated g/C Ratio	0.22	0.18		0.31	0.24		0.08	0.42		0.12	0.46	
v/c Ratio	0.27	0.97		0.98	0.46		0.91	0.73		0.63	0.95	
Control Delay	33.5	82.4		92.8	37.6		112.6	31.5		43.2	31.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.5	82.4		92.8	37.6		112.6	31.5		43.2	31.2	
LOS	C	F		F	D		F	C		D	C	
Approach Delay		73.2			64.9			39.8			32.2	
Approach LOS		E			E			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 109 (91%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 42.9

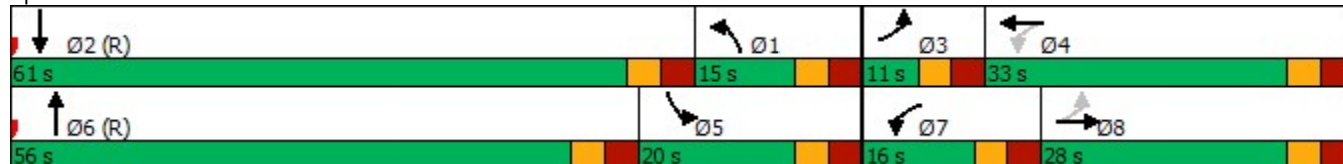
Intersection LOS: D

Intersection Capacity Utilization 93.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

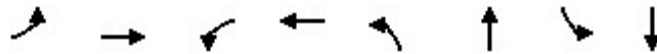


Queues

AM Build (Long Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	339	200	203	120	1056	129	1524
v/c Ratio	0.27	0.97	0.98	0.46	0.91	0.73	0.63	0.95
Control Delay	33.5	82.4	92.8	37.6	112.6	31.5	43.2	31.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	82.4	92.8	37.6	112.6	31.5	43.2	31.2
Queue Length 50th (ft)	43	230	119	117	94	340	91	472
Queue Length 95th (ft)	82	#420	#263	194	#211	422	m89	m391
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	288	351	205	445	132	1445	206	1612
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.97	0.98	0.46	0.91	0.73	0.63	0.95

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Future Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.93		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1704		1770	1740		1770	3402		1770	3510	
Flt Permitted	0.63	1.00		0.14	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1174	1704		255	1740		1770	3402		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	147	192	200	114	89	120	784	272	129	1440	84
RTOR Reduction (vph)	0	39	0	0	23	0	0	29	0	0	3	0
Lane Group Flow (vph)	78	300	0	200	180	0	120	1027	0	129	1521	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	27.2	23.2		39.2	29.2		9.0	48.8		14.0	53.8	
Effective Green, g (s)	27.2	23.2		39.2	29.2		9.0	48.8		14.0	53.8	
Actuated g/C Ratio	0.23	0.19		0.33	0.24		0.08	0.41		0.12	0.45	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	285	329		209	423		132	1383		206	1573	
v/s Ratio Prot	0.01	0.18		c0.08	0.10		c0.07	0.30		c0.07	c0.43	
v/s Ratio Perm	0.05			c0.23								
v/c Ratio	0.27	0.91		0.96	0.43		0.91	0.74		0.63	0.97	
Uniform Delay, d1	37.5	47.4		33.8	38.3		55.1	30.3		50.5	32.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.82	0.94	
Incremental Delay, d2	0.5	28.4		49.5	0.7		57.0	3.6		1.3	2.6	
Delay (s)	38.1	75.8		83.3	39.0		112.1	33.9		42.6	32.8	
Level of Service	D	E		F	D		F	C		D	C	
Approach Delay (s)		68.8			61.0			41.9			33.6	
Approach LOS		E			E			D			C	
Intersection Summary												
HCM 2000 Control Delay			43.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			93.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	135	177	184	105	82	110	721	250	119	1325	77
Future Volume (veh/h)	72	135	177	184	105	82	110	721	250	119	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	147	192	200	114	89	120	784	272	129	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	278	135	176	208	219	171	134	1078	374	208	1564	91
Arrive On Green	0.04	0.18	0.18	0.08	0.22	0.22	0.08	0.42	0.42	0.04	0.15	0.15
Sat Flow, veh/h	1781	736	961	1781	974	760	1781	2588	898	1781	3413	198
Grp Volume(v), veh/h	78	0	339	200	0	203	120	538	518	129	747	777
Grp Sat Flow(s),veh/h/ln	1781	0	1697	1781	0	1734	1781	1777	1709	1781	1777	1835
Q Serve(g_s), s	4.3	0.0	22.0	10.0	0.0	12.3	8.0	30.4	30.4	8.6	49.8	50.1
Cycle Q Clear(g_c), s	4.3	0.0	22.0	10.0	0.0	12.3	8.0	30.4	30.4	8.6	49.8	50.1
Prop In Lane	1.00		0.57	1.00		0.44	1.00		0.53	1.00		0.11
Lane Grp Cap(c), veh/h	278	0	311	208	0	390	134	740	712	208	814	841
V/C Ratio(X)	0.28	0.00	1.09	0.96	0.00	0.52	0.90	0.73	0.73	0.62	0.92	0.92
Avail Cap(c_a), veh/h	278	0	311	208	0	390	134	740	712	208	814	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	37.9	0.0	49.0	39.2	0.0	40.8	55.0	29.3	29.3	55.1	48.7	48.8
Incr Delay (d2), s/veh	0.5	0.0	77.0	50.7	0.0	1.2	54.4	6.2	6.4	1.3	2.1	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	15.9	7.7	0.0	5.4	5.6	14.0	13.6	4.1	24.2	25.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.5	0.0	126.0	89.9	0.0	42.1	109.4	35.4	35.7	56.3	50.8	51.0
LnGrp LOS	D	A	F	F	A	D	F	D	D	E	D	D
Approach Vol, veh/h		417			403			1176			1653	
Approach Delay, s/veh		109.7			65.8			43.1			51.3	
Approach LOS		F			E			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	61.0	11.0	33.0	20.0	56.0	16.0	28.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	55.0	5.0	27.0	14.0	50.0	10.0	22.0				
Max Q Clear Time (g_c+I1), s	10.0	52.1	6.3	14.3	10.6	32.4	12.0	24.0				
Green Ext Time (p_c), s	0.0	2.1	0.0	0.7	0.1	5.2	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			57.0									
HCM 6th LOS			E									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Future Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850			
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1863	0
Flt Permitted		0.630			0.713			0.707		0.086		
Satd. Flow (perm)	0	1102	0	0	1328	1583	0	1317	1583	160	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				136			208			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	497	4	47	2	661	272	34	986	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	501	47	0	663	272	34	989	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		35.0	35.0	35.0	48.0	48.0	48.0	11.0	59.0	

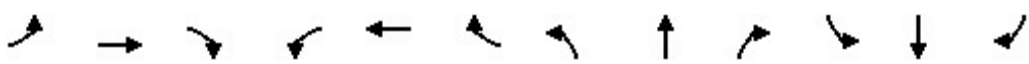
AM Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPSCOT

AM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		29.2%	29.2%	29.2%	40.0%	40.0%	40.0%	9.2%	49.2%	
Maximum Green (s)	20.0	20.0		29.0	29.0	29.0	42.0	42.0	42.0	5.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.3			48.0	48.0		46.4	46.4	53.0	53.0	
Actuated g/C Ratio		0.07			0.40	0.40		0.39	0.39	0.44	0.44	
v/c Ratio		0.24			0.95	0.07		1.31	0.37	0.25	1.20	
Control Delay		41.6			64.1	0.2		172.3	4.9	23.6	134.5	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6			64.1	0.2		172.3	4.9	23.6	134.5	
LOS		D			E	A		F	A	C	F	
Approach Delay		41.6			58.6			123.6			130.8	
Approach LOS		D			E			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.31

Intersection Signal Delay: 111.8

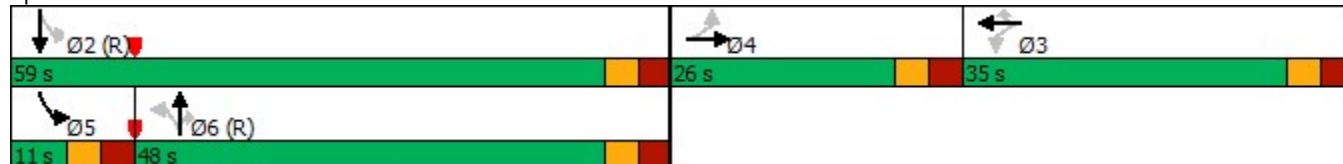
Intersection LOS: F

Intersection Capacity Utilization 90.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPSCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

AM Build (Long Term) No Mitigation

09/02/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	501	47	663	272	34	989
v/c Ratio	0.24	0.95	0.07	1.31	0.37	0.25	1.20
Control Delay	41.6	64.1	0.2	172.3	4.9	23.6	134.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	64.1	0.2	172.3	4.9	23.6	134.5
Queue Length 50th (ft)	8	330	0	~673	8	15	~931
Queue Length 95th (ft)	33	#701	0	#909	m59	35	#1182
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	191	530	714	508	739	137	822
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.95	0.07	1.31	0.37	0.25	1.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Future Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.63			0.71	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1103			1329	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	497	4	47	2	661	272	34	986	3
RTOR Reduction (vph)	0	9	0	0	0	28	0	0	138	0	0	0
Lane Group Flow (vph)	0	11	0	0	501	19	0	663	134	34	989	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.6			48.0	48.0		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.6			48.0	48.0		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			531	633		443	532	106	766	
v/s Ratio Prot										0.01	c0.53	
v/s Ratio Perm		c0.01			c0.38	0.01		c0.50	0.08	0.12		
v/c Ratio		0.27			0.94	0.03		1.50	0.25	0.32	1.29	
Uniform Delay, d1		56.1			34.7	21.9		39.8	28.8	28.8	35.3	
Progression Factor		1.00			1.00	1.00		0.64	0.51	1.00	1.00	
Incremental Delay, d2		3.5			27.3	0.1		232.2	0.8	1.8	140.7	
Delay (s)		59.5			62.0	21.9		257.7	15.7	30.6	176.0	
Level of Service		E			E	C		F	B	C	F	
Approach Delay (s)		59.5			58.6			187.3			171.2	
Approach LOS		E			E			F			F	
Intersection Summary												
HCM 2000 Control Delay		151.8			HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio		1.20										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		90.1%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

AM Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	227	215	0	0	200
Future Volume (vph)	0	227	215	0	0	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	247	234	0	0	217
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	247	234	0	0	217
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	30.4%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

AM Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	198	227	215	119	82	0
Future Volume (vph)	198	227	215	119	82	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.952					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1773	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1773	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	247	234	129	89	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	215	247	363	0	89	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	44.1%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	198	227	215	119	82	0
Future Vol, veh/h	198	227	215	119	82	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	247	234	129	89	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	363	0	-	0	976	-
Stage 1	-	-	-	-	299	-
Stage 2	-	-	-	-	677	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1196	-	-	-	279	0
Stage 1	-	-	-	-	752	0
Stage 2	-	-	-	-	505	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1196	-	-	-	229	-
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	505	-
Approach	EB	WB		SB		
HCM Control Delay, s	4	0		30.4		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1196	-	-	-	229	
HCM Lane V/C Ratio	0.18	-	-	-	0.389	
HCM Control Delay (s)	8.7	-	-	-	30.4	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.7	-	-	-	1.7	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	149	351	72	149	33	92	7	46	39	17	65
Future Volume (vph)	46	149	351	72	149	33	92	7	46	39	17	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.913			0.982			0.957			0.927	
Flt Protected		0.996			0.986			0.969			0.984	
Satd. Flow (prot)	0	1694	0	0	1804	0	0	1727	0	0	1699	0
Flt Permitted		0.996			0.986			0.969			0.984	
Satd. Flow (perm)	0	1694	0	0	1804	0	0	1727	0	0	1699	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	162	382	78	162	36	100	8	50	42	18	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	594	0	0	276	0	0	158	0	0	131	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization 55.6% ICU Level of Service B												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	7.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	149	351	72	149	33	92	7	46	39	17	65
Future Vol, veh/h	46	149	351	72	149	33	92	7	46	39	17	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	162	382	78	162	36	100	8	50	42	18	71
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	198	0	0	544	0	0	834	807	353	818	980	180
Stage 1	-	-	-	-	-	-	453	453	-	336	336	-
Stage 2	-	-	-	-	-	-	381	354	-	482	644	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1375	-	-	1025	-	-	288	315	691	295	250	863
Stage 1	-	-	-	-	-	-	586	570	-	678	642	-
Stage 2	-	-	-	-	-	-	641	630	-	565	468	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1375	-	-	1025	-	-	222	272	691	240	216	863
Mov Cap-2 Maneuver	-	-	-	-	-	-	222	272	-	240	216	-
Stage 1	-	-	-	-	-	-	554	539	-	641	587	-
Stage 2	-	-	-	-	-	-	521	576	-	488	442	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			2.5			32			19.3		
HCM LOS							D			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	286	1375	-	-	1025	-	-	382				
HCM Lane V/C Ratio	0.551	0.036	-	-	0.076	-	-	0.344				
HCM Control Delay (s)	32	7.7	0	-	8.8	0	-	19.3				
HCM Lane LOS	D	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	3.1	0.1	-	-	0.2	-	-	1.5				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	247	376	125	335	185	447	413	125	384	379
Average Queue (ft)	97	262	100	148	117	275	255	80	270	274
95th Queue (ft)	254	404	147	281	203	411	378	142	354	360
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		4								
Queuing Penalty (veh)		14								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		25	21	16	2	23		4	35	
Queuing Penalty (veh)		18	39	30	7	25		28	42	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	61	295	100	821	425	174	528
Average Queue (ft)	16	206	32	321	58	29	352
95th Queue (ft)	48	314	98	662	219	119	507
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		35	0			0	30
Queuing Penalty (veh)		15	0			0	9

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	83
Average Queue (ft)	28
95th Queue (ft)	66
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	89	48	80
Average Queue (ft)	41	2	39
95th Queue (ft)	76	21	66
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	71	117	90	107
Average Queue (ft)	18	38	47	45
95th Queue (ft)	56	88	77	78
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 228

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.920			0.934			0.971			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1714	0	1770	1740	0	1770	3437	0	1770	3497	0
Flt Permitted	0.190			0.148			0.950			0.950		
Satd. Flow (perm)	354	1714	0	276	1740	0	1770	3437	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42			31			32			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	161	186	230	229	179	180	1325	312	104	1201	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	347	0	230	408	0	180	1637	0	104	1309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	27.0		18.0	34.0		20.0	62.0		13.0	55.0	

PM Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	22.5%		15.0%	28.3%		16.7%	51.7%		10.8%	45.8%	
Maximum Green (s)	5.0	21.0		12.0	28.0		14.0	56.0		7.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	26.0	21.0		39.0	28.0		14.0	56.0		7.0	49.0	
Actuated g/C Ratio	0.22	0.18		0.32	0.23		0.12	0.47		0.06	0.41	
v/c Ratio	0.62	1.04		0.96	0.95		0.87	1.01		1.01	0.91	
Control Delay	52.3	102.3		83.9	75.2		89.5	56.4		119.2	48.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	52.3	102.3		83.9	75.2		89.5	56.4		119.2	48.8	
LOS	D	F		F	E		F	E		F	D	
Approach Delay		92.5			78.3			59.7			54.0	
Approach LOS		F			E			E			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 63.9

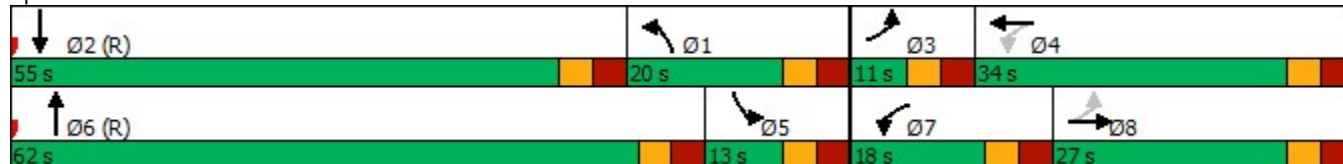
Intersection LOS: E

Intersection Capacity Utilization 98.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

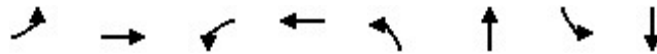


Queues

PM Build (Long Term) No Mitigation

09/02/2022

1: BATES/VERANDA & WASHINGTON AVE



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	347	230	408	180	1637	104	1309
v/c Ratio	0.62	1.04	0.96	0.95	0.87	1.01	1.01	0.91
Control Delay	52.3	102.3	83.9	75.2	89.5	56.4	119.2	48.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	102.3	83.9	75.2	89.5	56.4	119.2	48.8
Queue Length 50th (ft)	46	~261	138	293	139	~662	~81	507
Queue Length 95th (ft)	#98	#453	#290	#493	#270	#836	m#104	m506
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	135	334	239	429	206	1621	103	1433
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	1.04	0.96	0.95	0.87	1.01	1.01	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.93		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1713		1770	1740		1770	3438		1770	3495	
Flt Permitted	0.19	1.00		0.15	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	355	1713		276	1740		1770	3438		1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	161	186	230	229	179	180	1325	312	104	1201	108
RTOR Reduction (vph)	0	35	0	0	24	0	0	17	0	0	5	0
Lane Group Flow (vph)	84	312	0	230	384	0	180	1620	0	104	1304	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	26.0	21.0		39.0	28.0		14.0	56.0		7.0	49.0	
Effective Green, g (s)	26.0	21.0		39.0	28.0		14.0	56.0		7.0	49.0	
Actuated g/C Ratio	0.22	0.18		0.32	0.23		0.12	0.47		0.06	0.41	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	135	299		239	406		206	1604		103	1427	
v/s Ratio Prot	0.03	0.18		c0.10	c0.22		c0.10	c0.47		0.06	0.37	
v/s Ratio Perm	0.11			c0.22								
v/c Ratio	0.62	1.04		0.96	0.95		0.87	1.01		1.01	0.91	
Uniform Delay, d1	39.5	49.5		34.1	45.3		52.1	32.0		56.5	33.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.98	1.29	
Incremental Delay, d2	8.6	64.2		47.4	31.0		36.7	24.9		63.5	5.5	
Delay (s)	48.1	113.7		81.5	76.2		88.9	56.9		119.2	48.9	
Level of Service	D	F		F	E		F	E		F	D	
Approach Delay (s)		100.9			78.1			60.1			54.1	
Approach LOS		F			E			E			D	
Intersection Summary												
HCM 2000 Control Delay	64.9			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	1.04											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			24.0					
Intersection Capacity Utilization	98.2%			ICU Level of Service			F					
Analysis Period (min)	15											
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) No Mitigation

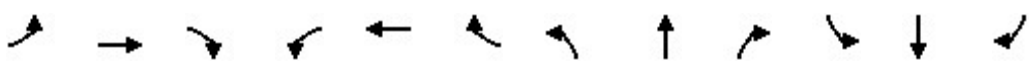
09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	161	186	230	229	179	180	1325	312	104	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	139	160	238	227	177	208	1337	309	104	1347	121
Arrive On Green	0.04	0.17	0.17	0.10	0.23	0.23	0.12	0.47	0.47	0.02	0.13	0.13
Sat Flow, veh/h	1781	791	914	1781	973	761	1781	2866	662	1781	3298	296
Grp Volume(v), veh/h	84	0	347	230	0	408	180	812	825	104	646	663
Grp Sat Flow(s),veh/h/ln	1781	0	1706	1781	0	1733	1781	1777	1751	1781	1777	1817
Q Serve(g_s), s	4.7	0.0	21.0	12.0	0.0	28.0	11.9	53.9	56.0	7.0	42.9	43.1
Cycle Q Clear(g_c), s	4.7	0.0	21.0	12.0	0.0	28.0	11.9	53.9	56.0	7.0	42.9	43.1
Prop In Lane	1.00		0.54	1.00		0.44	1.00		0.38	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	299	238	0	404	208	829	817	104	726	742
V/C Ratio(X)	0.63	0.00	1.16	0.97	0.00	1.01	0.87	0.98	1.01	1.00	0.89	0.89
Avail Cap(c_a), veh/h	134	0	299	238	0	404	208	829	817	104	726	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	40.5	0.0	49.5	37.5	0.0	46.0	52.1	31.4	32.0	58.8	49.3	49.3
Incr Delay (d2), s/veh	8.8	0.0	103.6	48.6	0.0	46.9	35.3	26.6	33.8	26.7	1.8	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	17.5	8.7	0.0	17.2	7.4	28.4	30.5	4.1	20.8	21.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.3	0.0	153.1	86.1	0.0	92.9	87.4	58.1	65.8	85.5	51.0	51.1
LnGrp LOS	D	A	F	F	A	F	F	E	F	F	D	D
Approach Vol, veh/h		431			638			1817			1413	
Approach Delay, s/veh		132.8			90.5			64.5			53.6	
Approach LOS		F			F			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	55.0	11.0	34.0	13.0	62.0	18.0	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	14.0	49.0	5.0	28.0	7.0	56.0	12.0	21.0				
Max Q Clear Time (g_c+l1), s	13.9	45.1	6.7	30.0	9.0	58.0	14.0	23.0				
Green Ext Time (p_c), s	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			71.6									
HCM 6th LOS			E									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔	↔	↔	↔	
Traffic Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Future Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850		0.997	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.448			0.711			0.772		0.078		
Satd. Flow (perm)	0	784	0	0	1324	1583	0	1438	1583	145	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				136			254		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	2	10	329	2	50	1	1064	505	23	922	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	331	50	0	1065	505	23	940	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

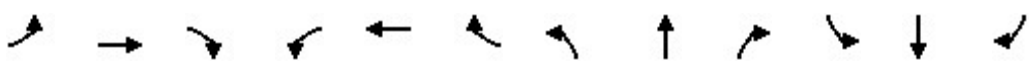
PM Build (Long Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.7			40.9	40.9		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.07			0.34	0.34		0.42	0.42	0.48	0.48	
v/c Ratio		0.34			0.73	0.08		1.76	0.62	0.17	1.07	
Control Delay		47.8			48.2	0.2		365.4	3.1	19.6	80.8	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		47.8			48.2	0.2		365.4	3.1	19.6	80.8	
LOS		D			D	A		F	A	B	F	
Approach Delay		47.8			41.9			248.9			79.4	
Approach LOS		D			D			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.76

Intersection Signal Delay: 164.9

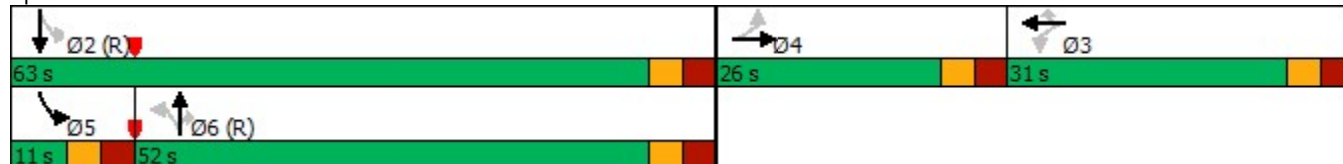
Intersection LOS: F

Intersection Capacity Utilization 93.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) No Mitigation

09/02/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	331	50	1065	505	23	940
v/c Ratio	0.34	0.73	0.08	1.76	0.62	0.17	1.07
Control Delay	47.8	48.2	0.2	365.4	3.1	19.6	80.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	48.2	0.2	365.4	3.1	19.6	80.8
Queue Length 50th (ft)	9	235	0	~1264	12	9	~805
Queue Length 95th (ft)	35	#445	0	m#1275	m13	24	#1057
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	139	451	629	604	812	136	882
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.73	0.08	1.76	0.62	0.17	1.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) No Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Future Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1710			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.45			0.71	1.00		0.77	1.00	0.08	1.00	
Satd. Flow (perm)		783			1325	1583		1438	1583	144	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	2	10	329	2	50	1	1064	505	23	922	18
RTOR Reduction (vph)	0	9	0	0	0	33	0	0	157	0	1	0
Lane Group Flow (vph)	0	13	0	0	331	17	0	1065	348	23	939	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		6.5			40.9	40.9		45.6	45.6	54.6	54.6	
Effective Green, g (s)		6.5			40.9	40.9		45.6	45.6	54.6	54.6	
Actuated g/C Ratio		0.05			0.34	0.34		0.38	0.38	0.46	0.46	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			451	539		546	601	106	844	
v/s Ratio Prot										0.01	c0.51	
v/s Ratio Perm		c0.02			c0.25	0.01		c0.74	0.22	0.09		
v/c Ratio		0.30			0.73	0.03		1.95	0.58	0.22	1.11	
Uniform Delay, d1		54.6			34.8	26.4		37.2	29.6	27.6	32.7	
Progression Factor		1.00			1.00	1.00		0.46	0.16	1.00	1.00	
Incremental Delay, d2		4.0			10.1	0.1		429.5	1.1	1.0	66.9	
Delay (s)		58.5			44.9	26.5		446.8	5.7	28.6	99.6	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		58.5			42.5			304.9			97.9	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay		201.1										
HCM 2000 Volume to Capacity ratio		1.33										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		93.6%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

PM Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	265	221	0	0	280
Future Volume (vph)	0	265	221	0	0	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	288	240	0	0	304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	288	240	0	0	304
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	35.6%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

PM Build (Long Term) No Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	226	265	221	87	141	0
Future Volume (vph)	226	265	221	87	141	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.962					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1792	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1792	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	288	240	95	153	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	246	288	335	0	153	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 47.3%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	12.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	265	221	87	141	0
Future Vol, veh/h	226	265	221	87	141	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	246	288	240	95	153	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	335	0	-	0	1068	-
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	780	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1224	-	-	-	245	0
Stage 1	-	-	-	-	761	0
Stage 2	-	-	-	-	452	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1224	-	-	-	196	-
Mov Cap-2 Maneuver	-	-	-	-	196	-
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	452	-
Approach	EB	WB		SB		
HCM Control Delay, s	4	0		68.5		
HCM LOS				F		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1224	-	-	-	196	
HCM Lane V/C Ratio	0.201	-	-	-	0.782	
HCM Control Delay (s)	8.7	-	-	-	68.5	
HCM Lane LOS	A	-	-	-	F	
HCM 95th %tile Q(veh)	0.7	-	-	-	5.4	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM Build (Long Term) No Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	193	173	37	210	28	335	21	167	44	9	41
Future Volume (vph)	54	193	173	37	210	28	335	21	167	44	9	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.986			0.957			0.941	
Flt Protected		0.994			0.993			0.969			0.977	
Satd. Flow (prot)	0	1748	0	0	1824	0	0	1727	0	0	1713	0
Flt Permitted		0.994			0.993			0.969			0.977	
Satd. Flow (perm)	0	1748	0	0	1824	0	0	1727	0	0	1713	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	210	188	40	228	30	364	23	182	48	10	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	457	0	0	298	0	0	569	0	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	74.5%					ICU Level of Service D						
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	139.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	193	173	37	210	28	335	21	167	44	9	41
Future Vol, veh/h	54	193	173	37	210	28	335	21	167	44	9	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	59	210	188	40	228	30	364	23	182	48	10	45
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	398	0	0	773	760	304	848	839	243
Stage 1	-	-	-	-	-	-	422	422	-	323	323	-
Stage 2	-	-	-	-	-	-	351	338	-	525	516	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1307	-	-	1161	-	-	~ 316	336	736	281	302	796
Stage 1	-	-	-	-	-	-	609	588	-	689	650	-
Stage 2	-	-	-	-	-	-	666	641	-	536	534	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1307	-	-	1161	-	-	~ 269	303	736	185	272	796
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 269	303	-	185	272	-
Stage 1	-	-	-	-	-	-	572	553	-	648	624	-
Stage 2	-	-	-	-	-	-	594	615	-	364	502	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			1.1			\$ 344.6			23.8		
HCM LOS							F			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	339	1307	-	-	1161	-	-	292				
HCM Lane V/C Ratio	1.677	0.045	-	-	0.035	-	-	0.35				
HCM Control Delay (s)	\$ 344.6	7.9	0	-	8.2	0	-	23.8				
HCM Lane LOS	F	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	34.8	0.1	-	-	0.1	-	-	1.5				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s				+: Computation Not Defined				*: All major volume in platoon		

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	275	379	125	442	185	809	812	125	573	582
Average Queue (ft)	105	267	117	384	150	757	755	93	365	378
95th Queue (ft)	267	417	147	512	239	908	917	150	513	526
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		12		11		63	60			
Queuing Penalty (veh)		39		66		0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)	0	31	30	57	2	63		17	47	
Queuing Penalty (veh)	0	24	113	121	12	104		92	45	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	77	270	100	1046	1054	174	635
Average Queue (ft)	21	153	40	982	739	26	424
95th Queue (ft)	56	266	106	1170	1280	112	612
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				10	2		
Queuing Penalty (veh)				75	12		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		28	0			0	35
Queuing Penalty (veh)		13	1			0	7

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	89
Average Queue (ft)	30
95th Queue (ft)	66
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	126	170	109
Average Queue (ft)	48	15	55
95th Queue (ft)	102	95	96
Link Distance (ft)	181	693	96
Upstream Blk Time (%)	0		2
Queuing Penalty (veh)	0		2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	62	133	320	103
Average Queue (ft)	14	30	278	45
95th Queue (ft)	47	89	350	81
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)			82	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 725

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (vph)	72	271	177	186	107	84	110	721	522	248	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.941			0.934			0.937			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1753	0	1770	1740	0	1770	3316	0	1770	3511	0
Flt Permitted	0.628			0.145			0.950			0.950		
Satd. Flow (perm)	1170	1753	0	270	1740	0	1770	3316	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			32			198			6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	295	192	202	116	91	120	784	567	270	1440	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	487	0	202	207	0	120	1351	0	270	1524	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	25.0		23.0	37.0		18.0	60.0		12.0	54.0	

Full Build AM 2041 Existing Zoning Ideals 11:59 pm 03/15/2021 Full Build AM 2041 Existing Zoning
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	20.8%		19.2%	30.8%		15.0%	50.0%		10.0%	45.0%	
Maximum Green (s)	5.0	19.0		17.0	31.0		12.0	54.0		6.0	48.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	25.4	20.4		42.0	33.2		12.0	54.0		6.0	48.0	
Actuated g/C Ratio	0.21	0.17		0.35	0.28		0.10	0.45		0.05	0.40	
v/c Ratio	0.29	1.54		0.70	0.41		0.68	0.84		3.07	1.08	
Control Delay	32.2	292.3		42.8	33.6		71.8	30.7		979.3	84.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	32.2	292.3		42.8	33.6		71.8	30.7		979.3	84.5	
LOS	C	F		D	C		E	C		F	F	
Approach Delay		256.4			38.1			34.1			219.2	
Approach LOS		F			D			C			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 3.07

Intersection Signal Delay: 142.4

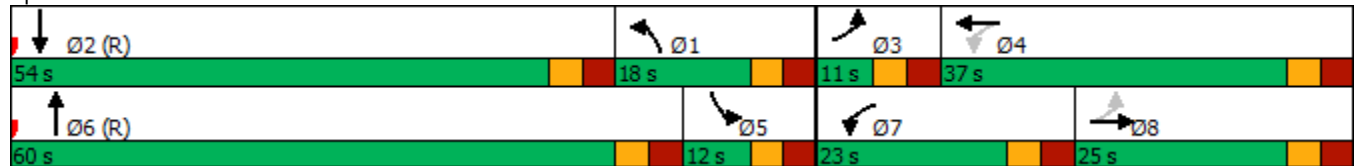
Intersection LOS: F

Intersection Capacity Utilization 105.8%

ICU Level of Service G

Analysis Period (min) 15

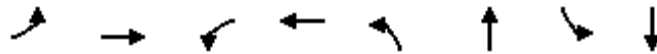
Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Queues

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	78	487	202	207	120	1351	270	1524
v/c Ratio	0.29	1.54	0.70	0.41	0.68	0.84	3.07	1.08
Control Delay	32.2	292.3	42.8	33.6	71.8	30.7	979.3	84.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	292.3	42.8	33.6	71.8	30.7	979.3	84.5
Queue Length 50th (ft)	41	~535	114	113	91	419	~364	~695
Queue Length 95th (ft)	77	#748	184	188	#175	523	#535	#837
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		200	
Base Capacity (vph)	272	316	307	504	177	1601	88	1408
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	1.54	0.66	0.41	0.68	0.84	3.07	1.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (vph)	72	271	177	186	107	84	110	721	522	248	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.93		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1753		1770	1740		1770	3316		1770	3510	
Flt Permitted	0.63	1.00		0.14	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1170	1753		270	1740		1770	3316		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	295	192	202	116	91	120	784	567	270	1440	84
RTOR Reduction (vph)	0	19	0	0	23	0	0	111	0	0	4	0
Lane Group Flow (vph)	78	468	0	202	184	0	120	1240	0	270	1520	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	25.6	21.6		43.2	33.2		12.0	52.8		6.0	46.8	
Effective Green, g (s)	25.6	21.6		43.2	33.2		12.0	52.8		6.0	46.8	
Actuated g/C Ratio	0.21	0.18		0.36	0.28		0.10	0.44		0.05	0.39	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	269	315		292	481		177	1459		88	1368	
v/s Ratio Prot	0.01	c0.27		c0.09	0.11		c0.07	0.37		c0.15	c0.43	
v/s Ratio Perm	0.05			0.16								
v/c Ratio	0.29	1.49		0.69	0.38		0.68	0.85		3.07	1.11	
Uniform Delay, d1	38.8	49.2		30.3	35.1		52.1	30.1		57.0	36.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	235.0		6.9	0.5		18.9	6.4		960.1	60.9	
Delay (s)	39.4	284.2		37.3	35.6		71.1	36.4		1017.1	97.5	
Level of Service	D	F		D	D		E	D		F	F	
Approach Delay (s)		250.4			36.4			39.3			235.9	
Approach LOS		F			D			D			F	
Intersection Summary												
HCM 2000 Control Delay	150.4			HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio	1.21											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			24.0					
Intersection Capacity Utilization	105.8%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	295	192	202	116	91	120	784	567	270	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	278	168	109	256	220	173	234	893	634	145	1365	79
Arrive On Green	0.04	0.16	0.16	0.11	0.23	0.23	0.13	0.45	0.45	0.08	0.40	0.40
Sat Flow, veh/h	1781	1058	689	1781	971	762	1781	1985	1409	1781	3413	198
Grp Volume(v), veh/h	78	0	487	202	0	207	120	700	651	270	747	777
Grp Sat Flow(s),veh/h/ln	1781	0	1746	1781	0	1733	1781	1777	1617	1781	1777	1835
Q Serve(g_s), s	4.4	0.0	19.0	11.0	0.0	12.6	7.5	42.9	44.4	9.8	48.0	48.0
Cycle Q Clear(g_c), s	4.4	0.0	19.0	11.0	0.0	12.6	7.5	42.9	44.4	9.8	48.0	48.0
Prop In Lane	1.00		0.39	1.00		0.44	1.00		0.87	1.00		0.11
Lane Grp Cap(c), veh/h	278	0	277	256	0	393	234	800	728	145	711	734
V/C Ratio(X)	0.28	0.00	1.76	0.79	0.00	0.53	0.51	0.88	0.89	1.86	1.05	1.06
Avail Cap(c_a), veh/h	278	0	277	312	0	448	234	800	728	145	711	734
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	40.2	0.0	50.5	36.4	0.0	40.7	48.5	30.0	30.4	55.1	36.0	36.0
Incr Delay (d2), s/veh	0.5	0.0	357.0	10.5	0.0	1.1	7.8	12.9	15.7	390.8	27.2	29.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	35.7	5.5	0.0	5.5	3.9	20.7	20.0	20.1	25.6	27.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	0.0	407.5	46.9	0.0	41.8	56.4	42.9	46.1	445.9	63.2	65.7
LnGrp LOS	D	A	F	D	A	D	E	D	D	F	F	F
Approach Vol, veh/h	565				409				1471			
Approach Delay, s/veh	356.9				44.3				45.4			
Approach LOS	F				D				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.8	54.0	11.0	33.2	15.8	60.0	19.2	25.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	12.0	48.0	5.0	31.0	6.0	54.0	17.0	19.0				
Max Q Clear Time (g_c+I1), s	9.5	50.0	6.4	14.6	11.8	46.4	13.0	21.0				
Green Ext Time (p_c), s	0.1	0.0	0.0	0.8	0.0	4.3	0.3	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	119.2											
HCM 6th LOS	F											

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	295	192	202	116	91	120	784	567	270	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	278	168	109	256	220	173	234	893	634	145	1365	79
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.04	0.16	0.16	0.11	0.23	0.23	0.13	0.45	0.45	0.08	0.40	0.40
Unsig. Movement Delay												
Ln Grp Delay, s/veh	40.8	0.0	407.5	46.9	0.0	41.8	56.4	42.9	46.1	445.9	63.2	65.7
Ln Grp LOS	D	A	F	D	A	D	E	D	D	F	F	F
Approach Vol, veh/h	565			409			1471			1794		
Approach Delay, s/veh	356.9			44.3			45.4			121.9		
Approach LOS	F			D			D			F		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	2		1	3	4	6	5	7	8			
Case No	4.0		2.0	1.1	4.0	4.0	2.0	1.1	4.0			
Phs Duration (G+Y+Rc), s	54.0		21.8	11.0	33.2	60.0	15.8	19.2	25.0			
Change Period (Y+Rc), s	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Max Green (Gmax), s	48.0		12.0	5.0	31.0	54.0	6.0	17.0	19.0			
Max Allow Headway (MAH), s	4.5		4.6	4.6	4.6	4.6	4.6	4.6	4.6			
Max Q Clear (g_c+I1), s	50.0		9.5	6.4	14.6	46.4	11.8	13.0	21.0			
Green Ext Time (g_e), s	0.0		0.1	0.0	0.8	4.3	0.0	0.3	0.0			
Prob of Phs Call (p_c)	1.00		1.00	0.93	1.00	1.00	1.00	1.00	1.00			
Prob of Max Out (p_x)	0.00		0.00	1.00	0.00	0.00	0.00	1.00	1.00			
Left-Turn Movement Data												
Assigned Mvmt			1	3			5	7				
Mvmt Sat Flow, veh/h			1781	1781			1781	1781				
Through Movement Data												
Assigned Mvmt	2				4	6			8			
Mvmt Sat Flow, veh/h	3413				971	1985			1058			
Right-Turn Movement Data												
Assigned Mvmt	12				14	16			18			
Mvmt Sat Flow, veh/h	198				762	1409			689			
Left Lane Group Data												
Assigned Mvmt	0	1	3	0	0	5	7	0				
Lane Assignment	L (Prot)L (Pr/Pm)						L (Prot)L (Pr/Pm)					

HCM 6th Signalized Intersection Capacity Analysis

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Lanes in Grp	0	1	1	0	0	1	1	0
Grp Vol (v), veh/h	0	120	78	0	0	270	202	0
Grp Sat Flow (s), veh/h/ln	0	1781	1781	0	0	1781	1781	0
Q Serve Time (g_s), s	0.0	7.5	4.4	0.0	0.0	9.8	11.0	0.0
Cycle Q Clear Time (g_c), s	0.0	7.5	4.4	0.0	0.0	9.8	11.0	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1175	0	0	0	909	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	19.0	0.0	0.0	0.0	21.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	14.7	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	234	278	0	0	145	256	0
V/C Ratio (X)	0.00	0.51	0.28	0.00	0.00	1.86	0.79	0.00
Avail Cap (c_a), veh/h	0	234	278	0	0	145	312	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	0.09	1.00	0.00
Uniform Delay (d1), s/veh	0.0	48.5	40.2	0.0	0.0	55.1	36.4	0.0
Incr Delay (d2), s/veh	0.0	7.8	0.5	0.0	0.0	390.8	10.5	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	56.4	40.8	0.0	0.0	445.9	46.9	0.0
1st-Term Q (Q1), veh/ln	0.0	3.4	1.9	0.0	0.0	4.4	4.8	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.5	0.0	0.0	0.0	15.7	0.7	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	3.9	2.0	0.0	0.0	20.1	5.5	0.0
%ile Storage Ratio (RQ%)	0.00	0.61	0.20	0.00	0.00	2.55	1.40	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	31.3	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0

Middle Lane Group Data

Assigned Mvmt	2	0	0	4	6	0	0	8
Lane Assignment	T				T			
Lanes in Grp	1	0	0	0	1	0	0	0
Grp Vol (v), veh/h	747	0	0	0	700	0	0	0
Grp Sat Flow (s), veh/h/ln	1777	0	0	0	1777	0	0	0
Q Serve Time (g_s), s	48.0	0.0	0.0	0.0	42.9	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	48.0	0.0	0.0	0.0	42.9	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	711	0	0	0	800	0	0	0
V/C Ratio (X)	1.05	0.00	0.00	0.00	0.88	0.00	0.00	0.00
Avail Cap (c_a), veh/h	711	0	0	0	800	0	0	0
Upstream Filter (I)	0.09	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	36.0	0.0	0.0	0.0	30.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	27.2	0.0	0.0	0.0	12.9	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	63.2	0.0	0.0	0.0	42.9	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	20.3	0.0	0.0	0.0	17.8	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	5.4	0.0	0.0	0.0	2.9	0.0	0.0	0.0

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3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	25.6	0.0	0.0	0.0	20.7	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.64	0.00	0.00	0.00	0.69	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data

Assigned Mvmt	12	0	0	14	16	0	0	18
Lane Assignment	T+R			T+R	T+R			T+R
Lanes in Grp	1	0	0	1	1	0	0	1
Grp Vol (v), veh/h	777	0	0	207	651	0	0	487
Grp Sat Flow (s), veh/h/ln	1835	0	0	1733	1617	0	0	1746
Q Serve Time (g_s), s	48.0	0.0	0.0	12.6	44.4	0.0	0.0	19.0
Cycle Q Clear Time (g_c), s	48.0	0.0	0.0	12.6	44.4	0.0	0.0	19.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.11	0.00	0.00	0.44	0.87	0.00	0.00	0.39
Lane Grp Cap (c), veh/h	734	0	0	393	728	0	0	277
V/C Ratio (X)	1.06	0.00	0.00	0.53	0.89	0.00	0.00	1.76
Avail Cap (c_a), veh/h	734	0	0	448	728	0	0	277
Upstream Filter (I)	0.09	0.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	36.0	0.0	0.0	40.7	30.4	0.0	0.0	50.5
Incr Delay (d2), s/veh	29.7	0.0	0.0	1.1	15.7	0.0	0.0	357.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	65.7	0.0	0.0	41.8	46.1	0.0	0.0	407.5
1st-Term Q (Q1), veh/ln	20.9	0.0	0.0	5.4	16.8	0.0	0.0	8.3
2nd-Term Q (Q2), veh/ln	6.1	0.0	0.0	0.1	3.2	0.0	0.0	27.4
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	27.0	0.0	0.0	5.5	20.0	0.0	0.0	35.7
%ile Storage Ratio (RQ%)	0.67	0.00	0.00	0.33	0.67	0.00	0.00	2.49
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	10.7	0.0	0.0	0.0	0.0	0.0	0.0	52.6
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4

Intersection Summary

HCM 6th Ctrl Delay	119.2
HCM 6th LOS	F

Lanes, Volumes, Timings
6: BAXTER BLVD

08/04/2022

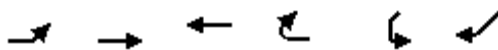


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	227	215	0	0	201
Future Volume (vph)	0	227	215	0	0	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	247	234	0	0	218
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	247	234	0	0	218
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	30.4%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

6: BAXTER BLVD

08/04/2022

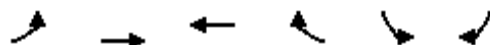


Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (veh/h)	0	227	215	0	0	201
Future Volume (Veh/h)	0	227	215	0	0	201
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	247	234	0	0	218
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	234				481	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234				481	234
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	73
cM capacity (veh/h)	1333				544	805
Direction, Lane #	EB 1	WB 1	SW 1			
Volume Total	247	234	218			
Volume Left	0	0	0			
Volume Right	0	0	218			
cSH	1700	1700	805			
Volume to Capacity	0.15	0.14	0.27			
Queue Length 95th (ft)	0	0	27			
Control Delay (s)	0.0	0.0	11.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			30.4%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

7: RAMPS

08/04/2022

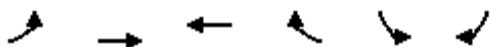


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	232	227	215	221	83	0
Future Volume (vph)	232	227	215	221	83	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.932					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1736	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1736	0	1770	0
Link Speed (mph)	30		30	30		
Link Distance (ft)	236		727	173		
Travel Time (s)	5.4		16.5	3.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	252	247	234	240	90	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	252	247	474	0	90	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	12		12	12		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control	Free		Free	Stop		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 52.3%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis

7: RAMPS

08/04/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	232	227	215	221	83	0
Future Volume (Veh/h)	232	227	215	221	83	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	252	247	234	240	90	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	474				1105	354
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	474				1105	354
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	77				50	100
cM capacity (veh/h)	1088				179	690
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	252	247	474	90		
Volume Left	252	0	0	90		
Volume Right	0	0	240	0		
cSH	1088	1700	1700	179		
Volume to Capacity	0.23	0.15	0.28	0.50		
Queue Length 95th (ft)	22	0	0	62		
Control Delay (s)	9.3	0.0	0.0	43.8		
Lane LOS	A			E		
Approach Delay (s)	4.7		0.0	43.8		
Approach LOS				E		
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization			52.3%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings

8: BATES

08/04/2022



Lane Group	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	453	83	201
Future Volume (vph)	0	0	0	453	83	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t				0.865	0.904	
Fl _t Protected					0.986	
Satd. Flow (prot)	0	0	0	1611	1660	0
Fl _t Permitted					0.986	
Satd. Flow (perm)	0	0	0	1611	1660	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	300		173		428	
Travel Time (s)	6.8		3.9		9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	492	90	218
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	492	308	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	0		0		24	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	31.4%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

8: BATES

08/04/2022

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	453	83	201
Future Volume (Veh/h)	0	0	0	453	83	201
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	492	90	218
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)					428	
pX, platoon unblocked						
vC, conflicting volume	691	199	308			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	691	199	308			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	410	842	1253			
Direction, Lane #	NB 1	SW 1				
Volume Total	492	308				
Volume Left	0	0				
Volume Right	0	218				
cSH	1700	1700				
Volume to Capacity	0.29	0.18				
Queue Length 95th (ft)	0	0				
Control Delay (s)	0.0	0.0				
Lane LOS						
Approach Delay (s)	0.0	0.0				
Approach LOS						
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			31.4%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	149	888	188	149	33	98	7	49	39	44	65
Future Volume (vph)	46	149	888	188	149	33	98	7	49	39	44	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.889			0.988			0.957			0.940	
Flt Protected		0.998			0.975			0.969			0.987	
Satd. Flow (prot)	0	1653	0	0	1794	0	0	1727	0	0	1728	0
Flt Permitted		0.998			0.975			0.969			0.987	
Satd. Flow (perm)	0	1653	0	0	1794	0	0	1727	0	0	1728	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	162	965	204	162	36	107	8	53	42	48	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1177	0	0	402	0	0	168	0	0	161	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization 110.8%												
ICU Level of Service H												
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65	
Future Volume (Veh/h)	46	149	888	188	149	33	98	7	49	39	44	65	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	50	162	965	204	162	36	107	8	53	42	48	71	
Pedestrians													
Lane Width (ft)													
Walking Speed (ft/s)													
Percent Blockage													
Right turn flare (veh)													
Median type	None			None									
Median storage (veh)													
Upstream signal (ft)	501												
pX, platoon unblocked				0.83				0.83	0.83	0.83	0.83	0.83	
vC, conflicting volume	198			1127				1428	1350	644	1390	1815	180
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	198			1053				1413	1321	474	1368	1878	180
tC, single (s)	4.1			4.1				7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)													
tF (s)	2.2			2.2				3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			63				0	90	89	29	0	92
cM capacity (veh/h)	1375			551				0	79	492	59	36	863
Direction, Lane #	EB 1	WB 1	NB 1	SB 1									
Volume Total	1177	402	168	161									
Volume Left	50	204	107	42									
Volume Right	965	36	53	71									
cSH	1375	551	0	76									
Volume to Capacity	0.04	0.37	Err	2.12									
Queue Length 95th (ft)	3	42	Err	368									
Control Delay (s)	1.1	10.9	Err	632.0									
Lane LOS	A	B	F	F									
Approach Delay (s)	1.1	10.9	Err	632.0									
Approach LOS				F	F								
Intersection Summary													
Average Delay				Err									
Intersection Capacity Utilization	110.8%			ICU Level of Service					H				
Analysis Period (min)	15												

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (vph)	77	145	171	329	304	254	166	1219	281	94	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.919			0.932			0.972			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1712	0	1770	1736	0	1770	3440	0	1770	3497	0
Flt Permitted	0.194			0.150			0.950			0.950		
Satd. Flow (perm)	361	1712	0	279	1736	0	1770	3440	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42			34			27			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	158	186	358	330	276	180	1325	305	102	1201	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	344	0	358	606	0	180	1630	0	102	1309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	16.0	25.0		28.0	37.0		18.0	52.0		15.0	49.0	

Full Build PM 2041 Existing Zoning Ideals 11:59 pm 03/15/2021 Full Build PM 2041 Existing Zoning
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	13.3%	20.8%		23.3%	30.8%		15.0%	43.3%		12.5%	40.8%	
Maximum Green (s)	10.0	19.0		22.0	31.0		12.0	46.0		9.0	43.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	28.0	19.4		47.0	34.8		12.0	46.0		9.0	43.0	
Actuated g/C Ratio	0.23	0.16		0.39	0.29		0.10	0.38		0.08	0.36	
v/c Ratio	0.45	1.11		0.95	1.15		1.02	1.22		0.77	1.04	
Control Delay	33.5	123.4		68.9	125.1		125.7	139.6		89.8	74.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.5	123.4		68.9	125.1		125.7	139.6		89.8	74.2	
LOS	C	F		E	F		F	F		F	E	
Approach Delay		105.8			104.2			138.2			75.4	
Approach LOS		F			F			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 108.9

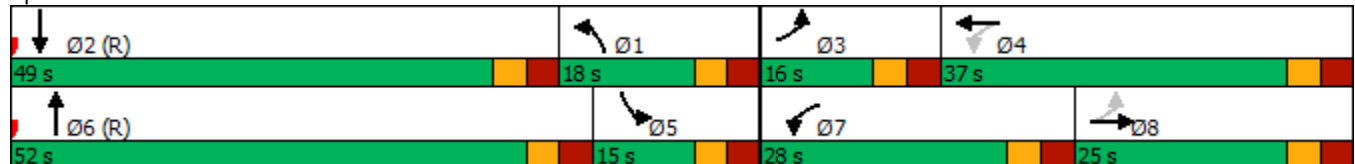
Intersection LOS: F

Intersection Capacity Utilization 104.2%

ICU Level of Service G

Analysis Period (min) 15

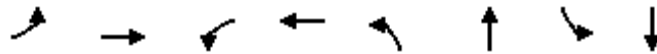
Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Queues

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	344	358	606	180	1630	102	1309
v/c Ratio	0.45	1.11	0.95	1.15	1.02	1.22	0.77	1.04
Control Delay	33.5	123.4	68.9	125.1	125.7	139.6	89.8	74.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.5	123.4	68.9	125.1	125.7	139.6	89.8	74.2
Queue Length 50th (ft)	41	~279	226	~567	~145	~813	79	~574
Queue Length 95th (ft)	76	#469	#411	#806	#294	#955	#173	#715
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		200	
Base Capacity (vph)	205	311	382	527	177	1335	132	1258
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	1.11	0.94	1.15	1.02	1.22	0.77	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (vph)	77	145	171	329	304	254	166	1219	281	94	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.93		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1712		1770	1735		1770	3440		1770	3495	
Flt Permitted	0.19	1.00		0.15	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	362	1712		280	1735		1770	3440		1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	158	186	358	330	276	180	1325	305	102	1201	108
RTOR Reduction (vph)	0	35	0	0	24	0	0	17	0	0	6	0
Lane Group Flow (vph)	84	309	0	358	582	0	180	1613	0	102	1303	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	28.0	20.6		48.2	34.8		12.0	44.8		9.0	41.8	
Effective Green, g (s)	28.0	20.6		48.2	34.8		12.0	44.8		9.0	41.8	
Actuated g/C Ratio	0.23	0.17		0.40	0.29		0.10	0.37		0.08	0.35	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	293		380	503		177	1284		132	1217	
v/s Ratio Prot	0.03	0.18		c0.17	c0.34		c0.10	c0.47		0.06	0.37	
v/s Ratio Perm	0.08			0.21								
v/c Ratio	0.49	1.06		0.94	1.16		1.02	1.26		0.77	1.07	
Uniform Delay, d1	38.2	49.7		33.9	42.6		54.0	37.6		54.5	39.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.2	67.9		31.5	91.0		72.1	121.8		34.6	47.0	
Delay (s)	40.4	117.6		65.4	133.6		126.1	159.4		89.1	86.1	
Level of Service	D	F		E	F		F	F		F	F	
Approach Delay (s)		102.4			108.3			156.1			86.3	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay	119.8			HCM 2000 Level of Service			F					
HCM 2000 Volume to Capacity ratio	1.24											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			24.0					
Intersection Capacity Utilization	104.2%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	158	186	358	330	276	180	1325	305	102	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	154	124	146	382	270	226	182	1104	250	138	1182	106
Arrive On Green	0.05	0.16	0.16	0.18	0.29	0.29	0.10	0.38	0.38	0.08	0.36	0.36
Sat Flow, veh/h	1781	783	922	1781	941	787	1781	2879	651	1781	3298	296
Grp Volume(v), veh/h	84	0	344	358	0	606	180	809	821	102	646	663
Grp Sat Flow(s),veh/h/ln	1781	0	1704	1781	0	1729	1781	1777	1753	1781	1777	1817
Q Serve(g_s), s	4.7	0.0	19.0	19.7	0.0	34.4	12.1	46.0	46.0	6.7	43.0	43.0
Cycle Q Clear(g_c), s	4.7	0.0	19.0	19.7	0.0	34.4	12.1	46.0	46.0	6.7	43.0	43.0
Prop In Lane	1.00		0.54	1.00		0.46	1.00		0.37	1.00		0.16
Lane Grp Cap(c), veh/h	154	0	270	382	0	495	182	681	672	138	637	651
V/C Ratio(X)	0.55	0.00	1.27	0.94	0.00	1.22	0.99	1.19	1.22	0.74	1.01	1.02
Avail Cap(c_a), veh/h	208	0	270	387	0	495	182	681	672	138	637	651
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.45	0.45	0.45
Uniform Delay (d), s/veh	40.7	0.0	50.5	33.7	0.0	42.8	53.8	37.0	37.0	54.2	38.5	38.5
Incr Delay (d2), s/veh	3.0	0.0	149.2	29.9	0.0	117.6	63.6	98.6	113.0	14.9	27.6	28.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	19.3	11.6	0.0	30.7	8.6	38.2	40.3	3.6	23.2	23.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.7	0.0	199.7	63.6	0.0	160.4	117.4	135.6	150.0	69.1	66.1	66.8
LnGrp LOS	D	A	F	E	A	F	F	F	F	E	F	F
Approach Vol, veh/h	428			964			1810			1411		
Approach Delay, s/veh	169.1			124.4			140.3			66.7		
Approach LOS	F			F			F			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.3	49.0	12.3	40.4	15.3	52.0	27.7	25.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	12.0	43.0	10.0	31.0	9.0	46.0	22.0	19.0				
Max Q Clear Time (g_c+I1), s	14.1	45.0	6.7	36.4	8.7	48.0	21.7	21.0				
Green Ext Time (p_c), s	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	117.1											
HCM 6th LOS	F											

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	158	186	358	330	276	180	1325	305	102	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	154	124	146	382	270	226	182	1104	250	138	1182	106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.05	0.16	0.16	0.18	0.29	0.29	0.10	0.38	0.38	0.08	0.36	0.36
Unsig. Movement Delay												
Ln Grp Delay, s/veh	43.7	0.0	199.7	63.6	0.0	160.4	117.4	135.6	150.0	69.1	66.1	66.8
Ln Grp LOS	D	A	F	E	A	F	F	F	F	E	F	F
Approach Vol, veh/h	428			964			1810			1411		
Approach Delay, s/veh	169.1			124.4			140.3			66.7		
Approach LOS	F			F			F			E		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	2		1	3	4	6	5	7	8			
Case No	4.0		2.0	1.1	4.0	4.0	2.0	1.1	4.0			
Phs Duration (G+Y+Rc), s	49.0		18.3	12.3	40.4	52.0	15.3	27.7	25.0			
Change Period (Y+Rc), s	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Max Green (Gmax), s	43.0		12.0	10.0	31.0	46.0	9.0	22.0	19.0			
Max Allow Headway (MAH), s	4.5		4.6	4.6	4.6	4.5	4.6	4.6	4.7			
Max Q Clear (g_c+I1), s	45.0		14.1	6.7	36.4	48.0	8.7	21.7	21.0			
Green Ext Time (g_e), s	0.0		0.0	0.1	0.0	0.0	0.0	0.1	0.0			
Prob of Phs Call (p_c)	1.00		1.00	0.94	1.00	1.00	1.00	1.00	1.00			
Prob of Max Out (p_x)	0.00		0.00	1.00	1.00	0.00	0.00	1.00	1.00			
Left-Turn Movement Data												
Assigned Mvmt			1	3			5	7				
Mvmt Sat Flow, veh/h			1781	1781			1781	1781				
Through Movement Data												
Assigned Mvmt	2				4	6			8			
Mvmt Sat Flow, veh/h	3298				941	2879			783			
Right-Turn Movement Data												
Assigned Mvmt	12				14	16			18			
Mvmt Sat Flow, veh/h	296				787	651			922			
Left Lane Group Data												
Assigned Mvmt	0	1	3	0	0	5	7	0				
Lane Assignment	L (Prot)L (Pr/Pm)						L (Prot)L (Pr/Pm)					

Full Build PM 2041 Existing Zoning Ideals 11:59 pm 03/15/2021 Full Build PM 2041 Existing Zoning
VHB

Synchro 11 Report
Page 6

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

Lanes in Grp	0	1	1	0	0	1	1	0
Grp Vol (v), veh/h	0	180	84	0	0	102	358	0
Grp Sat Flow (s), veh/h/ln	0	1781	1781	0	0	1781	1781	0
Q Serve Time (g_s), s	0.0	12.1	4.7	0.0	0.0	6.7	19.7	0.0
Cycle Q Clear Time (g_c), s	0.0	12.1	4.7	0.0	0.0	6.7	19.7	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	814	0	0	0	1037	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	19.0	0.0	0.0	0.0	21.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	182	154	0	0	138	382	0
V/C Ratio (X)	0.00	0.99	0.55	0.00	0.00	0.74	0.94	0.00
Avail Cap (c_a), veh/h	0	182	208	0	0	138	387	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	0.45	1.00	0.00
Uniform Delay (d1), s/veh	0.0	53.8	40.7	0.0	0.0	54.2	33.7	0.0
Incr Delay (d2), s/veh	0.0	63.6	3.0	0.0	0.0	14.9	29.9	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	117.4	43.7	0.0	0.0	69.1	63.6	0.0
1st-Term Q (Q1), veh/ln	0.0	5.4	2.1	0.0	0.0	3.0	8.4	0.0
2nd-Term Q (Q2), veh/ln	0.0	3.2	0.1	0.0	0.0	0.6	3.2	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	8.6	2.2	0.0	0.0	3.6	11.6	0.0
%ile Storage Ratio (RQ%)	0.00	1.37	0.22	0.00	0.00	0.46	2.95	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	2	0	0	4	6	0	0	8
Lane Assignment	T				T			
Lanes in Grp	1	0	0	0	1	0	0	0
Grp Vol (v), veh/h	646	0	0	0	809	0	0	0
Grp Sat Flow (s), veh/h/ln	1777	0	0	0	1777	0	0	0
Q Serve Time (g_s), s	43.0	0.0	0.0	0.0	46.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	43.0	0.0	0.0	0.0	46.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	637	0	0	0	681	0	0	0
V/C Ratio (X)	1.01	0.00	0.00	0.00	1.19	0.00	0.00	0.00
Avail Cap (c_a), veh/h	637	0	0	0	681	0	0	0
Upstream Filter (I)	0.45	0.00	0.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	38.5	0.0	0.0	0.0	37.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	27.6	0.0	0.0	0.0	98.6	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	66.1	0.0	0.0	0.0	135.6	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	18.3	0.0	0.0	0.0	19.5	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	4.9	0.0	0.0	0.0	18.7	0.0	0.0	0.0

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	23.2	0.0	0.0	0.0	38.2	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.58	0.00	0.00	0.00	1.27	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	2.3	0.0	0.0	0.0	31.9	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0

Right Lane Group Data

Assigned Mvmt	12	0	0	14	16	0	0	18
Lane Assignment	T+R			T+R	T+R			T+R
Lanes in Grp	1	0	0	1	1	0	0	1
Grp Vol (v), veh/h	663	0	0	606	821	0	0	344
Grp Sat Flow (s), veh/h/ln	1817	0	0	1729	1753	0	0	1704
Q Serve Time (g_s), s	43.0	0.0	0.0	34.4	46.0	0.0	0.0	19.0
Cycle Q Clear Time (g_c), s	43.0	0.0	0.0	34.4	46.0	0.0	0.0	19.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.16	0.00	0.00	0.46	0.37	0.00	0.00	0.54
Lane Grp Cap (c), veh/h	651	0	0	495	672	0	0	270
V/C Ratio (X)	1.02	0.00	0.00	1.22	1.22	0.00	0.00	1.27
Avail Cap (c_a), veh/h	651	0	0	495	672	0	0	270
Upstream Filter (I)	0.45	0.00	0.00	1.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	38.5	0.0	0.0	42.8	37.0	0.0	0.0	50.5
Incr Delay (d2), s/veh	28.3	0.0	0.0	117.6	113.0	0.0	0.0	149.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	66.8	0.0	0.0	160.4	150.0	0.0	0.0	199.7
1st-Term Q (Q1), veh/ln	18.8	0.0	0.0	14.5	19.2	0.0	0.0	8.1
2nd-Term Q (Q2), veh/ln	5.1	0.0	0.0	16.2	21.1	0.0	0.0	11.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	23.9	0.0	0.0	30.7	40.3	0.0	0.0	19.3
%ile Storage Ratio (RQ%)	0.60	0.00	0.00	1.83	1.34	0.00	0.00	1.34
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	3.0	0.0	0.0	27.7	37.3	0.0	0.0	18.5
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.3	0.3	0.0	0.0	0.3

Intersection Summary

HCM 6th Ctrl Delay	117.1
HCM 6th LOS	F

Lanes, Volumes, Timings
6: BAXTER BLVD

08/04/2022

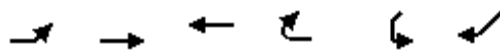


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	265	221	0	0	303
Future Volume (vph)	0	265	221	0	0	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	288	240	0	0	329
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	288	240	0	0	329
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	37.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

6: BAXTER BLVD

08/04/2022

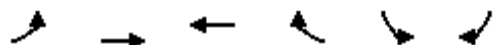


Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (veh/h)	0	265	221	0	0	303
Future Volume (Veh/h)	0	265	221	0	0	303
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	288	240	0	0	329
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	240				528	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240				528	240
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	59
cM capacity (veh/h)	1327				511	799
Direction, Lane #	EB 1	WB 1	SW 1			
Volume Total	288	240	329			
Volume Left	0	0	0			
Volume Right	0	0	329			
cSH	1700	1700	799			
Volume to Capacity	0.17	0.14	0.41			
Queue Length 95th (ft)	0	0	51			
Control Delay (s)	0.0	0.0	12.6			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	12.6			
Approach LOS			B			
Intersection Summary						
Average Delay			4.8			
Intersection Capacity Utilization			37.1%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

7: RAMPS

08/04/2022

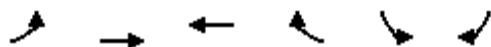


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	226	265	221	84	211	0
Future Volume (vph)	226	265	221	84	211	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.963					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1794	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1794	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	288	240	91	229	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	246	288	331	0	229	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	51.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

7: RAMPS

08/04/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	226	265	221	84	211	0
Future Volume (Veh/h)	226	265	221	84	211	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	246	288	240	91	229	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	331				1066	286
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	331				1066	286
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	80				0	100
cM capacity (veh/h)	1228				197	754
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	246	288	331	229		
Volume Left	246	0	0	229		
Volume Right	0	0	91	0		
cSH	1228	1700	1700	197		
Volume to Capacity	0.20	0.17	0.19	1.16		
Queue Length 95th (ft)	19	0	0	287		
Control Delay (s)	8.7	0.0	0.0	164.3		
Lane LOS	A			F		
Approach Delay (s)	4.0		0.0	164.3		
Approach LOS				F		
Intersection Summary						
Average Delay			36.3			
Intersection Capacity Utilization			51.0%		ICU Level of Service	
Analysis Period (min)			15			
			A			

Lanes, Volumes, Timings

8: BATES

08/04/2022



Lane Group	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	310	211	303
Future Volume (vph)	0	0	0	310	211	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.865	0.920	
Flt Protected					0.980	
Satd. Flow (prot)	0	0	0	1611	1679	0
Flt Permitted					0.980	
Satd. Flow (perm)	0	0	0	1611	1679	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	300		173		428	
Travel Time (s)	6.8		3.9		9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	337	229	329
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	337	558	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	0		0		24	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 33.6% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

8: BATES

08/04/2022

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	310	211	303
Future Volume (Veh/h)	0	0	0	310	211	303
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	337	229	329
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)					428	
pX, platoon unblocked	0.81	0.81	0.81			
vC, conflicting volume	730	394	558			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	547	129	333			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	402	743	990			
Direction, Lane #	NB 1	SW 1				
Volume Total	337	558				
Volume Left	0	0				
Volume Right	0	329				
cSH	1700	1700				
Volume to Capacity	0.20	0.33				
Queue Length 95th (ft)	0	0				
Control Delay (s)	0.0	0.0				
Lane LOS						
Approach Delay (s)	0.0	0.0				
Approach LOS						
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			33.6%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (vph)	54	193	161	34	210	28	633	40	316	44	9	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.947			0.986			0.957			0.941	
Flt Protected		0.993			0.994			0.969			0.977	
Satd. Flow (prot)	0	1752	0	0	1826	0	0	1727	0	0	1713	0
Flt Permitted		0.993			0.994			0.969			0.977	
Satd. Flow (perm)	0	1752	0	0	1826	0	0	1727	0	0	1713	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	210	175	37	228	30	688	43	343	48	10	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	444	0	0	295	0	0	1074	0	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	101.0%						ICU Level of Service G					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (Veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	210	175	37	228	30	688	43	343	48	10	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None			None								
Median storage veh												
Upstream signal (ft)	501											
pX, platoon unblocked												
vC, conflicting volume	258			385			782	748	298	1097	820	243
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	258			385			782	748	298	1097	820	243
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			97			0	86	54	45	97	94
cM capacity (veh/h)	1307			1173			270	316	742	87	286	796
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	444	295	1074	103								
Volume Left	59	37	688	48								
Volume Right	175	30	343	45								
cSH	1307	1173	341	159								
Volume to Capacity	0.05	0.03	3.15	0.65								
Queue Length 95th (ft)	4	2	Err	90								
Control Delay (s)	1.4	1.3	Err	61.5								
Lane LOS	A	A	F	F								
Approach Delay (s)	1.4	1.3	Err	61.5								
Approach LOS			F	F								
Intersection Summary												
Average Delay			5608.7									
Intersection Capacity Utilization			101.0%		ICU Level of Service				G			
Analysis Period (min)			15									

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Future Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850		0.934				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1740	0	1770	3539	1583	1770	3511	0
Flt Permitted	0.612			0.383			0.950			0.950		
Satd. Flow (perm)	1140	1863	1583	713	1740	0	1770	3539	1583	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			184		30				272		6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	147	192	200	114	89	120	784	272	129	1440	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	147	192	200	203	0	120	784	272	129	1524	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60	60	60	60		60	60	60	60	60	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	60	60	60	60	60		60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	29.0		11.0	29.0	29.0	11.0	29.0	
Total Split (s)	11.0	28.0	28.0	16.0	33.0		15.0	56.0	56.0	20.0	61.0	

AM Build (Long Term) Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	23.3%	23.3%	13.3%	27.5%		12.5%	46.7%	46.7%	16.7%	50.8%	
Maximum Green (s)	5.0	22.0	22.0	10.0	27.0		9.0	50.0	50.0	14.0	55.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Max	C-Max	C-Max	Max	C-Max	
Walk Time (s)					5.0			5.0	5.0		5.0	
Flash Dont Walk (s)					18.0			18.0	18.0		18.0	
Pedestrian Calls (#/hr)					0			0	0		0	
Act Effect Green (s)	19.7	14.7	14.7	29.9	21.9		9.0	57.3	57.3	14.0	62.3	
Actuated g/C Ratio	0.16	0.12	0.12	0.25	0.18		0.08	0.48	0.48	0.12	0.52	
v/c Ratio	0.37	0.64	0.54	0.75	0.59		0.91	0.46	0.30	0.63	0.84	
Control Delay	40.2	62.6	13.4	56.1	46.0		112.6	22.8	3.3	43.2	25.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	40.2	62.6	13.4	56.1	46.0		112.6	22.8	3.3	43.2	25.0	
LOS	D	E	B	E	D		F	C	A	D	C	
Approach Delay		35.8			51.0			27.5			26.4	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 109 (91%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 30.5

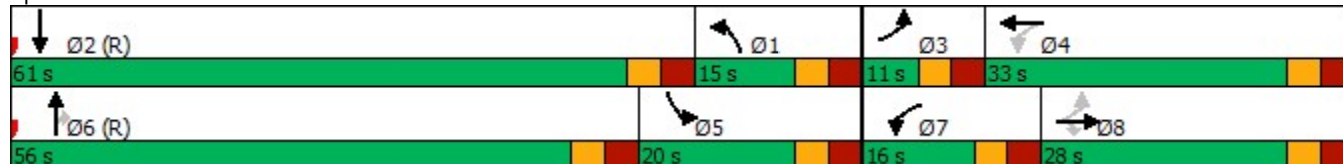
Intersection LOS: C

Intersection Capacity Utilization 82.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

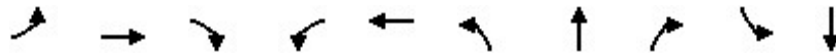


Queues

AM Build (Long Term) Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	78	147	192	200	203	120	784	272	129	1524
v/c Ratio	0.37	0.64	0.54	0.75	0.59	0.91	0.46	0.30	0.63	0.84
Control Delay	40.2	62.6	13.4	56.1	46.0	112.6	22.8	3.3	43.2	25.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.2	62.6	13.4	56.1	46.0	112.6	22.8	3.3	43.2	25.0
Queue Length 50th (ft)	47	110	6	130	127	94	208	0	91	418
Queue Length 95th (ft)	84	171	71	191	198	#211	287	50	m89	m390
Internal Link Dist (ft)		348			421		715			1001
Turn Bay Length (ft)	250			100		160			200	
Base Capacity (vph)	213	341	440	265	414	132	1689	897	206	1824
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.43	0.44	0.75	0.49	0.91	0.46	0.30	0.63	0.84

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Future Volume (vph)	72	135	177	184	105	82	110	721	250	119	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1740		1770	3539	1583	1770	3510	
Flt Permitted	0.61	1.00	1.00	0.38	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1140	1863	1583	713	1740		1770	3539	1583	1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	147	192	200	114	89	120	784	272	129	1440	84
RTOR Reduction (vph)	0	0	160	0	25	0	0	0	145	0	3	0
Lane Group Flow (vph)	78	147	32	200	178	0	120	784	127	129	1521	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Actuated Green, G (s)	19.9	15.9	15.9	31.9	21.9		9.0	56.1	56.1	14.0	61.1	
Effective Green, g (s)	19.9	15.9	15.9	31.9	21.9		9.0	56.1	56.1	14.0	61.1	
Actuated g/C Ratio	0.17	0.13	0.13	0.27	0.18		0.08	0.47	0.47	0.12	0.51	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	210	246	209	277	317		132	1654	740	206	1787	
v/s Ratio Prot	0.01	0.08		c0.06	0.10		c0.07	0.22		c0.07	c0.43	
v/s Ratio Perm	0.05		0.02	c0.13					0.08			
v/c Ratio	0.37	0.60	0.15	0.72	0.56		0.91	0.47	0.17	0.63	0.85	
Uniform Delay, d1	43.8	49.0	46.1	37.8	44.7		55.1	21.9	18.5	50.5	25.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.82	0.96	
Incremental Delay, d2	1.1	3.9	0.3	8.9	2.3		57.0	1.0	0.5	1.3	0.5	
Delay (s)	44.9	52.9	46.4	46.7	47.0		112.1	22.8	19.0	42.6	25.0	
Level of Service	D	D	D	D	D		F	C	B	D	C	
Approach Delay (s)		48.4			46.9			31.1			26.3	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			82.5%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	135	177	184	105	82	110	721	250	119	1325	77
Future Volume (veh/h)	72	135	177	184	105	82	110	721	250	119	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	147	192	200	114	89	120	784	272	129	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	171	192	163	236	140	110	277	1481	660	352	1564	91
Arrive On Green	0.04	0.10	0.10	0.08	0.14	0.14	0.16	0.42	0.42	0.13	0.31	0.31
Sat Flow, veh/h	1781	1870	1585	1781	974	760	1781	3554	1585	1781	3413	198
Grp Volume(v), veh/h	78	147	192	200	0	203	120	784	272	129	747	777
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1734	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	4.7	9.2	8.8	10.0	0.0	13.6	7.3	19.8	9.9	7.9	48.7	49.1
Cycle Q Clear(g_c), s	4.7	9.2	8.8	10.0	0.0	13.6	7.3	19.8	9.9	7.9	48.7	49.1
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	171	192	163	236	0	250	277	1481	660	352	814	841
V/C Ratio(X)	0.46	0.77	1.18	0.85	0.00	0.81	0.43	0.53	0.41	0.37	0.92	0.92
Avail Cap(c_a), veh/h	171	343	291	236	0	390	277	1481	660	352	814	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	0.79	0.00	0.79	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	46.3	52.4	27.5	46.2	0.0	49.8	45.9	26.2	11.6	45.2	39.4	39.5
Incr Delay (d2), s/veh	1.9	6.2	106.8	20.0	0.0	5.7	4.9	1.4	1.9	0.3	2.1	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	4.6	8.2	2.5	0.0	6.3	3.6	8.6	3.8	3.6	22.5	23.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.2	58.7	134.3	66.2	0.0	55.4	50.7	27.6	13.5	45.5	41.5	41.7
LnGrp LOS	D	E	F	E	A	E	D	C	B	D	D	D
Approach Vol, veh/h		417			403			1176			1653	
Approach Delay, s/veh		91.6			60.8			26.7			41.9	
Approach LOS		F			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	24.7	61.0	11.0	23.3	29.7	56.0	16.0	18.3				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	55.0	5.0	27.0	14.0	50.0	10.0	22.0				
Max Q Clear Time (g_c+I1), s	9.3	51.1	6.7	15.6	9.9	21.8	12.0	11.2				
Green Ext Time (p_c), s	0.0	2.7	0.0	0.6	0.1	6.2	0.0	1.1				
Intersection Summary												
HCM 6th Ctrl Delay			44.8									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Future Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850			
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1863	0
Flt Permitted		0.630			0.713			0.707		0.086		
Satd. Flow (perm)	0	1102	0	0	1328	1583	0	1317	1583	160	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				136			208			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	497	4	47	2	661	272	34	986	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	501	47	0	663	272	34	989	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		35.0	35.0	35.0	48.0	48.0	48.0	11.0	59.0	

AM Build (Long Term) Mitigation
VHB

Synchro 11 Report
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Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		29.2%	29.2%	29.2%	40.0%	40.0%	40.0%	9.2%	49.2%	
Maximum Green (s)	20.0	20.0		29.0	29.0	29.0	42.0	42.0	42.0	5.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.3			48.0	48.0		46.4	46.4	53.0	53.0	
Actuated g/C Ratio		0.07			0.40	0.40		0.39	0.39	0.44	0.44	
v/c Ratio		0.24			0.95	0.07		1.31	0.37	0.25	1.20	
Control Delay		41.6			64.1	0.2		172.1	2.1	23.6	134.5	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6			64.1	0.2		172.1	2.1	23.6	134.5	
LOS		D			E	A		F	A	C	F	
Approach Delay		41.6			58.6			122.6			130.8	
Approach LOS		D			E			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.31

Intersection Signal Delay: 111.4

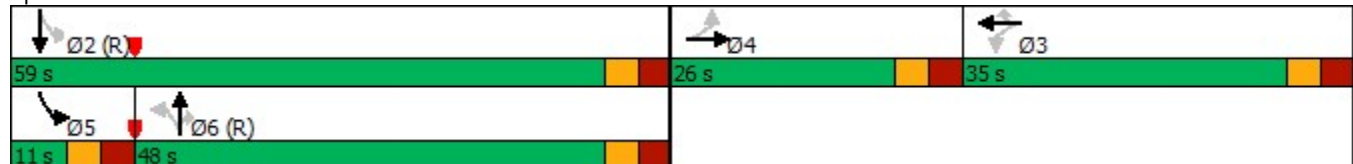
Intersection LOS: F

Intersection Capacity Utilization 90.1%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) Mitigation

09/02/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	501	47	663	272	34	989
v/c Ratio	0.24	0.95	0.07	1.31	0.37	0.25	1.20
Control Delay	41.6	64.1	0.2	172.1	2.1	23.6	134.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	64.1	0.2	172.1	2.1	23.6	134.5
Queue Length 50th (ft)	8	330	0	~706	2	15	~931
Queue Length 95th (ft)	33	#701	0	#940	13	35	#1182
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	191	530	714	508	739	137	822
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.95	0.07	1.31	0.37	0.25	1.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Future Volume (vph)	8	2	8	457	4	43	2	608	250	31	907	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.63			0.71	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1103			1329	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	497	4	47	2	661	272	34	986	3
RTOR Reduction (vph)	0	9	0	0	0	28	0	0	138	0	0	0
Lane Group Flow (vph)	0	11	0	0	501	19	0	663	134	34	989	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.6			48.0	48.0		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.6			48.0	48.0		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			531	633		443	532	106	766	
v/s Ratio Prot										0.01	c0.53	
v/s Ratio Perm		c0.01			c0.38	0.01		c0.50	0.08	0.12		
v/c Ratio		0.27			0.94	0.03		1.50	0.25	0.32	1.29	
Uniform Delay, d1		56.1			34.7	21.9		39.8	28.8	28.8	35.3	
Progression Factor		1.00			1.00	1.00		0.52	0.11	1.00	1.00	
Incremental Delay, d2		3.5			27.3	0.1		234.0	1.0	1.8	140.7	
Delay (s)		59.5			62.0	21.9		254.8	4.1	30.6	176.0	
Level of Service		E			E	C		F	A	C	F	
Approach Delay (s)		59.5			58.6			181.9			171.2	
Approach LOS		E			E			F			F	
Intersection Summary												
HCM 2000 Control Delay		149.8			HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio		1.20										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		90.1%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

AM Build (Long Term) Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	227	215	0	0	200
Future Volume (vph)	0	227	215	0	0	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	247	234	0	0	217
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	247	234	0	0	217
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	30.4%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

AM Build (Long Term) Mitigation
09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	198	227	215	119	82	0
Future Volume (vph)	198	227	215	119	82	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.952					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1773	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1773	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	247	234	129	89	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	215	247	363	0	89	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	44.1%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	198	227	215	119	82	0
Future Vol, veh/h	198	227	215	119	82	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	247	234	129	89	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	10.8	11.5	10
HCM LOS	B	B	A

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	64%	0%
Vol Right, %	0%	0%	36%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	198	227	334	82
LT Vol	198	0	0	82
Through Vol	0	227	215	0
RT Vol	0	0	119	0
Lane Flow Rate	215	247	363	89
Geometry Grp	7	7	5	2
Degree of Util (X)	0.334	0.348	0.461	0.146
Departure Headway (Hd)	5.579	5.075	4.568	5.881
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	644	706	788	606
Service Time	3.324	2.821	2.61	3.952
HCM Lane V/C Ratio	0.334	0.35	0.461	0.147
HCM Control Delay	11.1	10.5	11.5	10
HCM Lane LOS	B	B	B	A
HCM 95th-tile Q	1.5	1.6	2.5	0.5

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	149	351	72	149	33	92	7	46	39	17	65
Future Volume (vph)	46	149	351	72	149	33	92	7	46	39	17	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.913			0.982			0.871			0.927	
Flt Protected		0.996			0.986		0.950				0.984	
Satd. Flow (prot)	0	1694	0	0	1804	0	1770	1622	0	0	1699	0
Flt Permitted		0.948			0.674		0.326				0.984	
Satd. Flow (perm)	0	1612	0	0	1233	0	607	1622	0	0	1699	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		81			7			50			38	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	162	382	78	162	36	100	8	50	42	18	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	594	0	0	276	0	100	58	0	0	131	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	55.0	55.0		55.0	55.0		50.0	50.0		24.0	24.0	
Total Split (%)	42.6%	42.6%		42.6%	42.6%		38.8%	38.8%		18.6%	18.6%	
Maximum Green (s)	49.0	49.0		49.0	49.0		44.0	44.0		18.0	18.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		37.1			37.1		21.7	21.7			11.2	
Actuated g/C Ratio		0.41			0.41		0.24	0.24			0.12	
v/c Ratio		0.83			0.54		0.68	0.14			0.54	
Control Delay		33.5			26.1		58.2	11.2			40.2	
Queue Delay		0.2			0.0		0.0	0.0			0.0	
Total Delay		33.7			26.1		58.2	11.2			40.2	
LOS		C			C		E	B			D	
Approach Delay		33.7			26.1			41.0			40.2	
Approach LOS		C			C			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 129

Actuated Cycle Length: 89.6

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 33.6

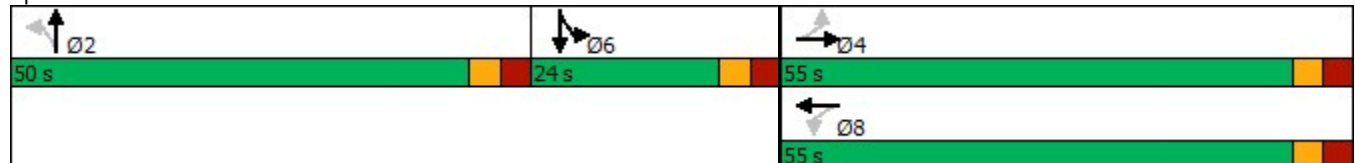
Intersection LOS: C

Intersection Capacity Utilization 57.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 9: VERANDA & SHERWOOD



Queues
9: VERANDA & SHERWOOD

AM Build (Long Term) Mitigation
09/02/2022



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	594	276	100	58	131
v/c Ratio	0.83	0.54	0.68	0.14	0.54
Control Delay	33.5	26.1	58.2	11.2	40.2
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	33.7	26.1	58.2	11.2	40.2
Queue Length 50th (ft)	247	107	51	3	50
Queue Length 95th (ft)	#608	261	128	36	134
Internal Link Dist (ft)	421	357		226	1274
Turn Bay Length (ft)					
Base Capacity (vph)	998	741	326	896	403
Starvation Cap Reductn	52	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.63	0.37	0.31	0.06	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

AM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	149	351	72	149	33	92	7	46	39	17	65
Future Volume (vph)	46	149	351	72	149	33	92	7	46	39	17	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.91			0.98		1.00	0.87			0.93	
Flt Protected		1.00			0.99		0.95	1.00			0.98	
Satd. Flow (prot)		1694			1804		1770	1622			1699	
Flt Permitted		0.95			0.67		0.33	1.00			0.98	
Satd. Flow (perm)		1613			1233		607	1622			1699	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	162	382	78	162	36	100	8	50	42	18	71
RTOR Reduction (vph)	0	47	0	0	4	0	0	38	0	0	33	0
Lane Group Flow (vph)	0	547	0	0	272	0	100	20	0	0	98	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)		37.0			37.0		21.6	21.6			11.2	
Effective Green, g (s)		37.0			37.0		21.6	21.6			11.2	
Actuated g/C Ratio		0.42			0.42		0.25	0.25			0.13	
Clearance Time (s)		6.0			6.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		679			519		149	399			216	
v/s Ratio Prot								0.01			c0.06	
v/s Ratio Perm		c0.34			0.22		c0.16					
v/c Ratio		0.81			0.52		0.67	0.05			0.45	
Uniform Delay, d1		22.3			18.9		29.9	25.3			35.5	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		6.9			1.0		11.3	0.1			1.5	
Delay (s)		29.2			19.8		41.2	25.3			37.0	
Level of Service		C			B		D	C			D	
Approach Delay (s)		29.2			19.8			35.4			37.0	
Approach LOS		C			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			28.7				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			87.8				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			57.7%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

AM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	149	351	72	149	33	92	7	46	39	17	65
Future Volume (veh/h)	46	149	351	72	149	33	92	7	46	39	17	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	50	162	382	78	162	36	100	8	50	42	18	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	108	223	465	211	406	80	182	23	143	65	28	110
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.10	0.10	0.10	0.12	0.12	0.12
Sat Flow, veh/h	80	503	1051	282	918	180	1781	223	1396	538	231	910
Grp Volume(v), veh/h	594	0	0	276	0	0	100	0	58	131	0	0
Grp Sat Flow(s),veh/h/ln	1635	0	0	1380	0	0	1781	0	1619	1680	0	0
Q Serve(g_s), s	7.3	0.0	0.0	0.0	0.0	0.0	2.9	0.0	1.8	4.0	0.0	0.0
Cycle Q Clear(g_c), s	16.9	0.0	0.0	5.6	0.0	0.0	2.9	0.0	1.8	4.0	0.0	0.0
Prop In Lane	0.08		0.64	0.28		0.13	1.00		0.86	0.32		0.54
Lane Grp Cap(c), veh/h	796	0	0	697	0	0	182	0	166	203	0	0
V/C Ratio(X)	0.75	0.00	0.00	0.40	0.00	0.00	0.55	0.00	0.35	0.65	0.00	0.00
Avail Cap(c_a), veh/h	1547	0	0	1342	0	0	1456	0	1323	561	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.0	0.0	0.0	9.9	0.0	0.0	23.0	0.0	22.5	22.6	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.4	0.0	0.0	2.6	0.0	1.3	3.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.0	1.8	0.0	0.0	1.2	0.0	0.7	1.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.4	0.0	0.0	10.2	0.0	0.0	25.5	0.0	23.8	26.0	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	C	A	C	C	A	A
Approach Vol, veh/h		594			276			158			131	
Approach Delay, s/veh		14.4			10.2			24.9			26.0	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.5		29.8		12.5		29.8				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		44.0		49.0		18.0		49.0				
Max Q Clear Time (g_c+I1), s		4.9		18.9		6.0		7.6				
Green Ext Time (p_c), s		0.6		4.9		0.5		2.2				
Intersection Summary												
HCM 6th Ctrl Delay				16.2								
HCM 6th LOS				B								

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	110	171	142	124	367	184	325	272	119	224	364	371
Average Queue (ft)	41	88	65	103	160	97	180	134	44	98	234	251
95th Queue (ft)	85	157	118	153	322	177	289	233	88	208	345	348
Link Distance (ft)		364	364		410		750	750	750		1015	1015
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					1							
Storage Bay Dist (ft)	250			100		160				200		
Storage Blk Time (%)				17	16	1	10			0	11	
Queuing Penalty (veh)				33	30	4	11			1	13	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	53	292	100	825	605	174	549
Average Queue (ft)	17	206	30	311	86	26	353
95th Queue (ft)	47	314	95	706	386	104	532
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				0	0		
Queuing Penalty (veh)				2	0		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		34	0			0	30
Queuing Penalty (veh)		15	2			0	9

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	80
Average Queue (ft)	29
95th Queue (ft)	66
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	92	92	123	70
Average Queue (ft)	50	52	63	34
95th Queue (ft)	80	81	101	59
Link Distance (ft)	181	181	693	65
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	285	240	138	62	140
Average Queue (ft)	151	97	58	27	61
95th Queue (ft)	259	185	113	53	114
Link Distance (ft)	410	400	269	269	1268
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 119

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850		0.934				0.850		0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1740	0	1770	3539	1583	1770	3497	0
Flt Permitted	0.192			0.417			0.950			0.950		
Satd. Flow (perm)	358	1863	1583	777	1740	0	1770	3539	1583	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245		31				277		9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	161	186	230	229	179	180	1325	312	104	1201	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	161	186	230	408	0	180	1325	312	104	1309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60	60	60	60		60	60	60	60	60	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	60	60	60	60	60		60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	29.0		11.0	29.0	29.0	11.0	29.0	
Total Split (s)	11.0	27.0	27.0	18.0	34.0		20.0	62.0	62.0	13.0	55.0	

PM Build (Long Term) Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	22.5%	22.5%	15.0%	28.3%		16.7%	51.7%	51.7%	10.8%	45.8%	
Maximum Green (s)	5.0	21.0	21.0	12.0	28.0		14.0	56.0	56.0	7.0	49.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Max	C-Max	C-Max	Max	C-Max	
Walk Time (s)					5.0			5.0	5.0		5.0	
Flash Dont Walk (s)					18.0			18.0	18.0		18.0	
Pedestrian Calls (#/hr)					0			0	0		0	
Act Effect Green (s)	25.7	20.7	20.7	38.7	27.7		14.0	56.3	56.3	7.0	49.3	
Actuated g/C Ratio	0.21	0.17	0.17	0.32	0.23		0.12	0.47	0.47	0.06	0.41	
v/c Ratio	0.62	0.50	0.39	0.66	0.96		0.87	0.80	0.35	1.01	0.91	
Control Delay	52.2	50.9	4.1	42.2	77.6		89.5	31.6	4.5	119.2	48.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	52.2	50.9	4.1	42.2	77.6		89.5	31.6	4.5	119.2	48.3	
LOS	D	D	A	D	E		F	C	A	F	D	
Approach Delay		31.0			64.8			32.7			53.5	
Approach LOS		C			E			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 44.1

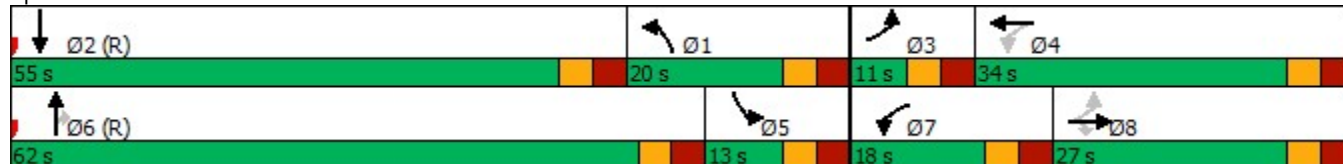
Intersection LOS: D

Intersection Capacity Utilization 88.3%

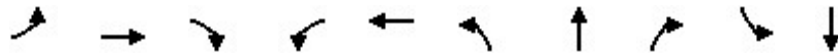
ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



1: BATES/VERANDA & WASHINGTON AVE



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	161	186	230	408	180	1325	312	104	1309
v/c Ratio	0.62	0.50	0.39	0.66	0.96	0.87	0.80	0.35	1.01	0.91
Control Delay	52.2	50.9	4.1	42.2	77.6	89.5	31.6	4.5	119.2	48.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	50.9	4.1	42.2	77.6	89.5	31.6	4.5	119.2	48.3
Queue Length 50th (ft)	46	114	0	138	293	139	448	14	~81	507
Queue Length 95th (ft)	#97	185	22	211	#493	#270	544	65	m#104	m506
Internal Link Dist (ft)		348			421		715			1001
Turn Bay Length (ft)	250			100		160			200	
Base Capacity (vph)	135	326	479	349	429	206	1660	889	103	1442
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.49	0.39	0.66	0.95	0.87	0.80	0.35	1.01	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (vph)	77	148	171	212	211	165	166	1219	287	96	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1740		1770	3539	1583	1770	3495	
Flt Permitted	0.19	1.00	1.00	0.42	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	358	1863	1583	777	1740		1770	3539	1583	1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	161	186	230	229	179	180	1325	312	104	1201	108
RTOR Reduction (vph)	0	0	154	0	24	0	0	0	147	0	5	0
Lane Group Flow (vph)	84	161	32	230	384	0	180	1325	165	104	1304	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Actuated Green, G (s)	25.8	20.8	20.8	38.7	27.7		14.0	56.3	56.3	7.0	49.3	
Effective Green, g (s)	25.8	20.8	20.8	38.7	27.7		14.0	56.3	56.3	7.0	49.3	
Actuated g/C Ratio	0.22	0.17	0.17	0.32	0.23		0.12	0.47	0.47	0.06	0.41	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	135	322	274	349	401		206	1660	742	103	1435	
v/s Ratio Prot	0.03	0.09		c0.07	c0.22		c0.10	0.37		0.06	c0.37	
v/s Ratio Perm	0.11		0.02	0.15					0.10			
v/c Ratio	0.62	0.50	0.12	0.66	0.96		0.87	0.80	0.22	1.01	0.91	
Uniform Delay, d1	39.7	44.9	41.9	32.3	45.6		52.1	27.0	18.9	56.5	33.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.98	1.30	
Incremental Delay, d2	8.6	1.2	0.2	4.5	33.8		36.7	4.1	0.7	63.5	5.2	
Delay (s)	48.3	46.1	42.0	36.8	79.4		88.9	31.1	19.6	119.2	48.3	
Level of Service	D	D	D	D	E		F	C	B	F	D	
Approach Delay (s)		44.8			64.0			34.9			53.5	
Approach LOS		D			E			C			D	
Intersection Summary												
HCM 2000 Control Delay			46.3			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			88.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	161	186	230	229	179	180	1325	312	104	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	327	277	339	227	177	208	1658	740	104	1347	121
Arrive On Green	0.04	0.17	0.17	0.10	0.23	0.23	0.12	0.47	0.47	0.02	0.13	0.13
Sat Flow, veh/h	1781	1870	1585	1781	973	761	1781	3554	1585	1781	3298	296
Grp Volume(v), veh/h	84	161	186	230	0	408	180	1325	312	104	646	663
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1733	1781	1777	1585	1781	1777	1817
Q Serve(g_s), s	4.7	9.3	9.7	12.0	0.0	28.0	11.9	38.0	9.8	7.0	42.9	43.1
Cycle Q Clear(g_c), s	4.7	9.3	9.7	12.0	0.0	28.0	11.9	38.0	9.8	7.0	42.9	43.1
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	134	327	277	339	0	404	208	1658	740	104	726	742
V/C Ratio(X)	0.63	0.49	0.67	0.68	0.00	1.01	0.87	0.80	0.42	1.00	0.89	0.89
Avail Cap(c_a), veh/h	134	327	277	339	0	404	208	1658	740	104	726	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.45	0.00	0.45	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	40.5	44.7	25.2	35.8	0.0	46.0	52.1	27.2	8.3	58.8	49.3	49.3
Incr Delay (d2), s/veh	8.8	1.1	6.1	2.5	0.0	32.2	35.3	4.1	1.8	26.7	1.8	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	4.4	4.1	5.7	0.0	15.6	7.4	16.7	3.6	4.1	20.8	21.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.3	45.8	31.3	38.2	0.0	78.2	87.4	31.3	10.1	85.5	51.0	51.1
LnGrp LOS	D	D	C	D	A	F	F	C	B	F	D	D
Approach Vol, veh/h		431			638			1817			1413	
Approach Delay, s/veh		40.2			63.8			33.2			53.6	
Approach LOS		D			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.0	55.0	11.0	34.0	13.0	62.0	18.0	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	14.0	49.0	5.0	28.0	7.0	56.0	12.0	21.0				
Max Q Clear Time (g_c+I1), s	13.9	45.1	6.7	30.0	9.0	40.0	14.0	11.7				
Green Ext Time (p_c), s	0.0	2.4	0.0	0.0	0.0	8.5	0.0	1.1				
Intersection Summary												
HCM 6th Ctrl Delay			45.2									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Future Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850		0.997	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.448			0.711			0.772		0.078		
Satd. Flow (perm)	0	784	0	0	1324	1583	0	1438	1583	145	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				136			254		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	2	10	329	2	50	1	1064	505	23	922	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	0	0	331	50	0	1065	505	23	940	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

PM Build (Long Term) Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) Mitigation

09/02/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.7			40.9	40.9		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.07			0.34	0.34		0.42	0.42	0.48	0.48	
v/c Ratio		0.34			0.73	0.08		1.76	0.62	0.17	1.07	
Control Delay		47.8			48.2	0.2		367.1	2.9	19.6	80.8	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		47.8			48.2	0.2		367.1	2.9	19.6	80.8	
LOS		D			D	A		F	A	B	F	
Approach Delay		47.8			41.9			250.0			79.4	
Approach LOS		D			D			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.76

Intersection Signal Delay: 165.5

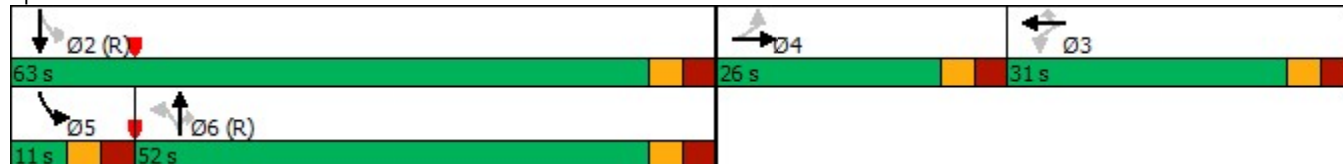
Intersection LOS: F

Intersection Capacity Utilization 93.6%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

PM Build (Long Term) Mitigation

09/02/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	331	50	1065	505	23	940
v/c Ratio	0.34	0.73	0.08	1.76	0.62	0.17	1.07
Control Delay	47.8	48.2	0.2	367.1	2.9	19.6	80.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	48.2	0.2	367.1	2.9	19.6	80.8
Queue Length 50th (ft)	9	235	0	~1292	4	9	~805
Queue Length 95th (ft)	35	#445	0	m#1499	m21	24	#1057
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	139	451	629	604	812	136	882
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.73	0.08	1.76	0.62	0.17	1.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Future Volume (vph)	9	2	9	303	2	46	1	979	465	21	848	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1710			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.45			0.71	1.00		0.77	1.00	0.08	1.00	
Satd. Flow (perm)		783			1325	1583		1438	1583	144	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	2	10	329	2	50	1	1064	505	23	922	18
RTOR Reduction (vph)	0	9	0	0	0	33	0	0	157	0	1	0
Lane Group Flow (vph)	0	13	0	0	331	17	0	1065	348	23	939	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		6.5			40.9	40.9		45.6	45.6	54.6	54.6	
Effective Green, g (s)		6.5			40.9	40.9		45.6	45.6	54.6	54.6	
Actuated g/C Ratio		0.05			0.34	0.34		0.38	0.38	0.46	0.46	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			451	539		546	601	106	844	
v/s Ratio Prot										0.01	c0.51	
v/s Ratio Perm		c0.02			c0.25	0.01		c0.74	0.22	0.09		
v/c Ratio		0.30			0.73	0.03		1.95	0.58	0.22	1.11	
Uniform Delay, d1		54.6			34.8	26.4		37.2	29.6	27.6	32.7	
Progression Factor		1.00			1.00	1.00		0.43	0.06	1.00	1.00	
Incremental Delay, d2		4.0			10.1	0.1		431.5	2.3	1.0	66.9	
Delay (s)		58.5			44.9	26.5		447.7	4.1	28.6	99.6	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		58.5			42.5			305.0			97.9	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay		201.2		HCM 2000 Level of Service				F				
HCM 2000 Volume to Capacity ratio		1.33										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				24.0				
Intersection Capacity Utilization		93.6%		ICU Level of Service				F				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

PM Build (Long Term) Mitigation
09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	265	221	0	0	280
Future Volume (vph)	0	265	221	0	0	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr t						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	288	240	0	0	304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	288	240	0	0	304
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	35.6%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

PM Build (Long Term) Mitigation

09/02/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	226	265	221	87	141	0
Future Volume (vph)	226	265	221	87	141	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.962					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1792	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1792	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	288	240	95	153	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	246	288	335	0	153	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	47.3%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection	
Intersection Delay, s/veh	12
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	265	221	87	141	0
Future Vol, veh/h	226	265	221	87	141	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	246	288	240	95	153	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	12.1	12.1	11.2
HCM LOS	B	B	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	72%	0%
Vol Right, %	0%	0%	28%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	226	265	308	141
LT Vol	226	0	0	141
Through Vol	0	265	221	0
RT Vol	0	0	87	0
Lane Flow Rate	246	288	335	153
Geometry Grp	7	7	5	2
Degree of Util (X)	0.395	0.423	0.456	0.255
Departure Headway (Hd)	5.795	5.291	4.902	5.985
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	617	674	730	595
Service Time	3.575	3.07	2.978	4.085
HCM Lane V/C Ratio	0.399	0.427	0.459	0.257
HCM Control Delay	12.4	11.9	12.1	11.2
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.9	2.1	2.4	1

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	193	173	37	210	28	335	21	167	44	9	41
Future Volume (vph)	54	193	173	37	210	28	335	21	167	44	9	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.944			0.986			0.867			0.941	
Flt Protected		0.994			0.993		0.950				0.977	
Satd. Flow (prot)	0	1748	0	0	1824	0	1770	1615	0	0	1713	0
Flt Permitted		0.886			0.839		0.466				0.977	
Satd. Flow (perm)	0	1558	0	0	1541	0	868	1615	0	0	1713	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			5			182			25	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	210	188	40	228	30	364	23	182	48	10	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	457	0	0	298	0	364	205	0	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM Build (Long Term) Mitigation

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	55.0	55.0		55.0	55.0		50.0	50.0		24.0	24.0	
Total Split (%)	42.6%	42.6%		42.6%	42.6%		38.8%	38.8%		18.6%	18.6%	
Maximum Green (s)	49.0	49.0		49.0	49.0		44.0	44.0		18.0	18.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		34.0			34.0		44.7	44.7			10.4	
Actuated g/C Ratio		0.32			0.32		0.42	0.42			0.10	
v/c Ratio		0.89			0.61		1.01	0.26			0.54	
Control Delay		52.8			35.9		84.5	6.4			48.1	
Queue Delay		0.2			0.0		0.0	0.0			0.0	
Total Delay		53.0			35.9		84.5	6.4			48.1	
LOS		D			D		F	A			D	
Approach Delay		53.0			35.9			56.4			48.1	
Approach LOS		D			D			E			D	

Intersection Summary

Area Type: Other

Cycle Length: 129

Actuated Cycle Length: 107.4

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 50.4

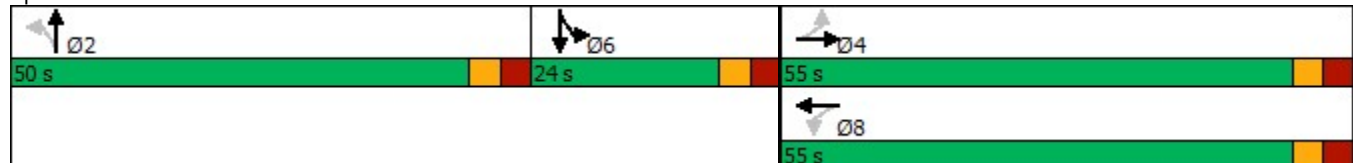
Intersection LOS: D

Intersection Capacity Utilization 70.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 9: VERANDA & SHERWOOD





Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	457	298	364	205	103
v/c Ratio	0.89	0.61	1.01	0.26	0.54
Control Delay	52.8	35.9	84.5	6.4	48.1
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	53.0	35.9	84.5	6.4	48.1
Queue Length 50th (ft)	276	167	~249	9	51
Queue Length 95th (ft)	437	271	#562	67	119
Internal Link Dist (ft)	421	357		226	1274
Turn Bay Length (ft)					
Base Capacity (vph)	738	716	361	778	312
Starvation Cap Reductn	30	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.65	0.42	1.01	0.26	0.33

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

PM Build (Long Term) Mitigation

09/02/2022

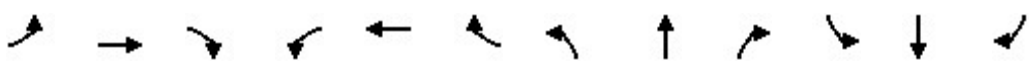
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	193	173	37	210	28	335	21	167	44	9	41
Future Volume (vph)	54	193	173	37	210	28	335	21	167	44	9	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.94			0.99		1.00	0.87			0.94	
Flt Protected		0.99			0.99		0.95	1.00			0.98	
Satd. Flow (prot)		1748			1825		1770	1615			1713	
Flt Permitted		0.89			0.84		0.47	1.00			0.98	
Satd. Flow (perm)		1559			1541		868	1615			1713	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	210	188	40	228	30	364	23	182	48	10	45
RTOR Reduction (vph)	0	21	0	0	3	0	0	106	0	0	23	0
Lane Group Flow (vph)	0	436	0	0	295	0	364	99	0	0	80	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)		34.0			34.0		44.7	44.7			10.4	
Effective Green, g (s)		34.0			34.0		44.7	44.7			10.4	
Actuated g/C Ratio		0.32			0.32		0.42	0.42			0.10	
Clearance Time (s)		6.0			6.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		494			489		362	674			166	
v/s Ratio Prot								0.06			c0.05	
v/s Ratio Perm		c0.28			0.19		c0.42					
v/c Ratio		0.88			0.60		1.01	0.15			0.48	
Uniform Delay, d1		34.7			30.8		31.2	19.4			45.8	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		16.8			2.1		48.7	0.1			2.2	
Delay (s)		51.4			32.9		79.9	19.5			48.0	
Level of Service		D			C		E	B			D	
Approach Delay (s)		51.4			32.9			58.1			48.0	
Approach LOS		D			C			E			D	
Intersection Summary												
HCM 2000 Control Delay			50.0			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			107.1			Sum of lost time (s)			18.0			
Intersection Capacity Utilization			70.2%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

PM Build (Long Term) Mitigation

09/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↗	↘			↕	
Traffic Volume (veh/h)	54	193	173	37	210	28	335	21	167	44	9	41
Future Volume (veh/h)	54	193	173	37	210	28	335	21	167	44	9	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	210	188	40	228	30	364	23	182	48	10	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	116	283	231	113	485	59	472	48	379	77	16	72
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.26	0.26	0.26	0.10	0.10	0.10
Sat Flow, veh/h	141	840	686	132	1438	176	1781	181	1432	791	165	742
Grp Volume(v), veh/h	457	0	0	298	0	0	364	0	205	103	0	0
Grp Sat Flow(s),veh/h/ln	1667	0	0	1746	0	0	1781	0	1613	1697	0	0
Q Serve(g_s), s	7.1	0.0	0.0	0.0	0.0	0.0	11.3	0.0	6.4	3.5	0.0	0.0
Cycle Q Clear(g_c), s	14.7	0.0	0.0	7.7	0.0	0.0	11.3	0.0	6.4	3.5	0.0	0.0
Prop In Lane	0.13		0.41	0.13		0.10	1.00		0.89	0.47		0.44
Lane Grp Cap(c), veh/h	630	0	0	657	0	0	472	0	427	166	0	0
V/C Ratio(X)	0.73	0.00	0.00	0.45	0.00	0.00	0.77	0.00	0.48	0.62	0.00	0.00
Avail Cap(c_a), veh/h	1405	0	0	1446	0	0	1308	0	1184	510	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.9	0.0	0.0	15.7	0.0	0.0	20.4	0.0	18.6	26.0	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.5	0.0	0.0	2.7	0.0	0.8	3.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	3.0	0.0	0.0	4.6	0.0	2.3	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.5	0.0	0.0	16.2	0.0	0.0	23.1	0.0	19.4	29.7	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	C	A	B	C	A	A
Approach Vol, veh/h		457			298			569			103	
Approach Delay, s/veh		19.5			16.2			21.7			29.7	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.9		26.2		11.9		26.2				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		44.0		49.0		18.0		49.0				
Max Q Clear Time (g_c+I1), s		13.3		16.7		5.5		9.7				
Green Ext Time (p_c), s		2.6		3.5		0.4		2.1				
Intersection Summary												
HCM 6th Ctrl Delay				20.5								
HCM 6th LOS				C								

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	145	214	165	124	429	185	798	793	783	225	456	448
Average Queue (ft)	61	100	69	115	407	155	739	728	667	118	325	340
95th Queue (ft)	119	177	132	149	474	244	898	908	1062	248	419	435
Link Distance (ft)		364	364		410		750	750	750		1015	1015
Upstream Blk Time (%)					27		70	62	33			
Queuing Penalty (veh)					160		0	0	0			
Storage Bay Dist (ft)	250			100		160				200		
Storage Blk Time (%)		0		19	60	4	72			2	33	
Queuing Penalty (veh)		0		71	128	26	120			9	32	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	70	273	100	1046	1071	152	566
Average Queue (ft)	19	151	32	1020	981	21	390
95th Queue (ft)	54	260	91	1077	1177	95	552
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				19	8		
Queuing Penalty (veh)				139	58		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		28	1			32	
Queuing Penalty (veh)		13	2			7	

Intersection: 6: BAXTER BLVD

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	9	82
Average Queue (ft)	0	29
95th Queue (ft)	6	63
Link Distance (ft)	181	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	108	105	146	82
Average Queue (ft)	56	59	60	41
95th Queue (ft)	93	92	100	67
Link Distance (ft)	181	181	693	65
Upstream Blk Time (%)				1
Queuing Penalty (veh)				1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	399	426	312	279	174
Average Queue (ft)	195	218	267	90	77
95th Queue (ft)	371	414	347	251	144
Link Distance (ft)	410	400	269	269	1268
Upstream Blk Time (%)	1	14	60	3	
Queuing Penalty (veh)	5	0	0	0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 772

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (vph)	72	271	177	186	107	84	110	721	522	248	1325	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850		0.934				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1740	0	1770	3539	1583	1770	3511	0
Flt Permitted	0.628			0.950			0.950			0.950		
Satd. Flow (perm)	1170	1863	1583	1770	1740	0	1770	3539	1583	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191		31				136		6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	295	192	202	116	91	120	784	567	270	1440	84
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	295	192	202	207	0	120	784	567	270	1524	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60	60	60	60		60	60	60	60	60	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	60	60	60	60	60		60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8	1	7	4		1	6	7	5	2	
Permitted Phases	8		8						6			
Detector Phase	3	8	1	7	4		1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	29.0		11.0	29.0	11.0	11.0	29.0	
Total Split (s)	11.0	26.0	15.0	20.0	35.0		15.0	46.0	20.0	28.0	59.0	

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	21.7%	12.5%	16.7%	29.2%		12.5%	38.3%	16.7%	23.3%	49.2%	
Maximum Green (s)	5.0	20.0	9.0	14.0	29.0		9.0	40.0	14.0	22.0	53.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	None	None		Max	C-Max	None	Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	25.0	20.0	29.0	14.0	31.2		9.0	40.0	54.0	22.0	53.0	
Actuated g/C Ratio	0.21	0.17	0.24	0.12	0.26		0.08	0.33	0.45	0.18	0.44	
v/c Ratio	0.29	0.95	0.36	0.98	0.44		0.91	0.66	0.72	0.83	0.98	
Control Delay	33.2	90.2	5.1	111.2	35.6		112.6	37.6	17.8	57.5	36.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	33.2	90.2	5.1	111.2	35.6		112.6	37.6	17.8	57.5	36.5	
LOS	C	F	A	F	D		F	D	B	E	D	
Approach Delay		53.4			72.9			36.1			39.7	
Approach LOS		D			E			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 43.5

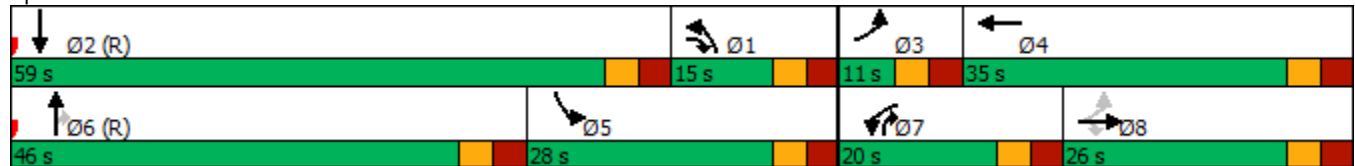
Intersection LOS: D

Intersection Capacity Utilization 89.7%

ICU Level of Service E

Analysis Period (min) 15

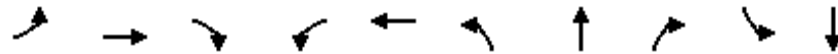
Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Queues

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	78	295	192	202	207	120	784	567	270	1524
v/c Ratio	0.29	0.95	0.36	0.98	0.44	0.91	0.66	0.72	0.83	0.98
Control Delay	33.2	90.2	5.1	111.2	35.6	112.6	37.6	17.8	57.5	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	90.2	5.1	111.2	35.6	112.6	37.6	17.8	57.5	36.5
Queue Length 50th (ft)	42	229	0	158	117	94	272	122	213	626
Queue Length 95th (ft)	79	#403	41	#312	193	#211	342	263	m#334	#763
Internal Link Dist (ft)		348			421		715			1001
Turn Bay Length (ft)	250			100		160			200	
Base Capacity (vph)	268	310	527	206	475	132	1179	787	324	1554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.95	0.36	0.98	0.44	0.91	0.66	0.72	0.83	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	295	192	202	116	91	120	784	567	270	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	297	312	383	208	235	184	134	1185	713	327	1507	88
Arrive On Green	0.04	0.17	0.17	0.12	0.24	0.24	0.08	0.33	0.33	0.37	0.88	0.88
Sat Flow, veh/h	1781	1870	1585	1781	971	762	1781	3554	1585	1781	3413	198
Grp Volume(v), veh/h	78	295	192	202	0	207	120	784	567	270	747	777
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1733	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	4.4	18.7	2.8	13.6	0.0	12.3	8.0	22.6	16.1	16.5	37.1	38.6
Cycle Q Clear(g_c), s	4.4	18.7	2.8	13.6	0.0	12.3	8.0	22.6	16.1	16.5	37.1	38.6
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	297	312	383	208	0	419	134	1185	713	327	785	810
V/C Ratio(X)	0.26	0.95	0.50	0.97	0.00	0.49	0.90	0.66	0.79	0.83	0.95	0.96
Avail Cap(c_a), veh/h	297	312	383	208	0	419	134	1185	713	327	785	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	0.86	0.00	0.86	1.00	1.00	1.00	0.61	0.61	0.61
Uniform Delay (d), s/veh	39.4	49.5	18.4	52.8	0.0	39.2	55.0	34.2	10.4	36.3	6.1	6.2
Incr Delay (d2), s/veh	0.5	36.9	1.0	49.9	0.0	0.8	54.4	2.9	8.9	13.7	16.0	16.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	11.9	3.1	8.9	0.0	5.4	5.6	10.2	6.3	7.2	6.2	6.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.8	86.4	19.4	102.7	0.0	40.0	109.4	37.1	19.4	49.9	22.1	22.7
LnGrp LOS	D	F	B	F	A	D	F	D	B	D	C	C
Approach Vol, veh/h	565				409				1471			
Approach Delay, s/veh	57.2				70.9				36.2			
Approach LOS	E				E				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	59.0	11.0	35.0	28.0	46.0	20.0	26.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	53.0	5.0	29.0	22.0	40.0	14.0	20.0				
Max Q Clear Time (g_c+I1), s	10.0	40.6	6.4	14.3	18.5	24.6	15.6	20.7				
Green Ext Time (p_c), s	0.0	6.6	0.0	0.7	0.4	6.8	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	38.3											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	295	192	202	116	91	120	784	567	270	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	297	312	383	208	235	184	134	1185	713	327	1507	88
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Prop Arrive On Green	0.04	0.17	0.17	0.12	0.24	0.24	0.08	0.33	0.33	0.37	0.88	0.88
Unsig. Movement Delay												
Ln Grp Delay, s/veh	39.8	86.4	19.4	102.7	0.0	40.0	109.4	37.1	19.4	49.9	22.1	22.7
Ln Grp LOS	D	F	B	F	A	D	F	D	B	D	C	C
Approach Vol, veh/h	565			409			1471			1794		
Approach Delay, s/veh	57.2			70.9			36.2			26.6		
Approach LOS	E			E			D			C		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	2		1	3	4	6	5	7	8			
Case No	4.0		2.0	1.1	4.0	3.0	2.0	2.0	3.0			
Phs Duration (G+Y+Rc), s	59.0		15.0	11.0	35.0	46.0	28.0	20.0	26.0			
Change Period (Y+Rc), s	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Max Green (Gmax), s	53.0		9.0	5.0	29.0	40.0	22.0	14.0	20.0			
Max Allow Headway (MAH), s	4.5		4.6	4.6	4.6	4.6	4.6	4.6	4.6			
Max Q Clear (g_c+I1), s	40.6		10.0	6.4	14.3	24.6	18.5	15.6	20.7			
Green Ext Time (g_e), s	6.6		0.0	0.0	0.7	6.8	0.4	0.0	0.0			
Prob of Phs Call (p_c)	1.00		1.00	0.93	1.00	1.00	1.00	1.00	1.00			
Prob of Max Out (p_x)	0.00		0.00	1.00	0.00	0.00	0.00	1.00	1.00			
Left-Turn Movement Data												
Assigned Mvmt			1	3			5	7				
Mvmt Sat Flow, veh/h			1781	1781			1781	1781				
Through Movement Data												
Assigned Mvmt	2				4	6			8			
Mvmt Sat Flow, veh/h	3413				971	3554			1870			
Right-Turn Movement Data												
Assigned Mvmt	12				14	16			18			
Mvmt Sat Flow, veh/h	198				762	1585			1585			
Left Lane Group Data												
Assigned Mvmt	0	1	3	0	0	5	7	0				
Lane Assignment	L (Prot)L (Pr/Pm)				L (Prot) L (Prot)							

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

Lanes in Grp	0	1	1	0	0	1	1	0
Grp Vol (v), veh/h	0	120	78	0	0	270	202	0
Grp Sat Flow (s), veh/h/ln	0	1781	1781	0	0	1781	1781	0
Q Serve Time (g_s), s	0.0	8.0	4.4	0.0	0.0	16.5	13.6	0.0
Cycle Q Clear Time (g_c), s	0.0	8.0	4.4	0.0	0.0	16.5	13.6	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	1175	0	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	134	297	0	0	327	208	0
V/C Ratio (X)	0.00	0.90	0.26	0.00	0.00	0.83	0.97	0.00
Avail Cap (c_a), veh/h	0	134	297	0	0	327	208	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	0.61	0.86	0.00
Uniform Delay (d1), s/veh	0.0	55.0	39.4	0.0	0.0	36.3	52.8	0.0
Incr Delay (d2), s/veh	0.0	54.4	0.5	0.0	0.0	13.7	49.9	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	109.4	39.8	0.0	0.0	49.9	102.7	0.0
1st-Term Q (Q1), veh/ln	0.0	3.6	1.9	0.0	0.0	5.9	6.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	2.0	0.0	0.0	0.0	1.2	2.9	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	5.6	2.0	0.0	0.0	7.2	8.9	0.0
%ile Storage Ratio (RQ%)	0.00	0.89	0.20	0.00	0.00	0.91	2.27	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	2	0	0	4	6	0	0	8
Lane Assignment	T				T			T
Lanes in Grp	1	0	0	0	2	0	0	1
Grp Vol (v), veh/h	747	0	0	0	784	0	0	295
Grp Sat Flow (s), veh/h/ln	1777	0	0	0	1777	0	0	1870
Q Serve Time (g_s), s	37.1	0.0	0.0	0.0	22.6	0.0	0.0	18.7
Cycle Q Clear Time (g_c), s	37.1	0.0	0.0	0.0	22.6	0.0	0.0	18.7
Lane Grp Cap (c), veh/h	785	0	0	0	1185	0	0	312
V/C Ratio (X)	0.95	0.00	0.00	0.00	0.66	0.00	0.00	0.95
Avail Cap (c_a), veh/h	785	0	0	0	1185	0	0	312
Upstream Filter (I)	0.61	0.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	6.1	0.0	0.0	0.0	34.2	0.0	0.0	49.5
Incr Delay (d2), s/veh	16.0	0.0	0.0	0.0	2.9	0.0	0.0	36.9
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	22.1	0.0	0.0	0.0	37.1	0.0	0.0	86.4
1st-Term Q (Q1), veh/ln	2.7	0.0	0.0	0.0	9.7	0.0	0.0	8.7
2nd-Term Q (Q2), veh/ln	3.5	0.0	0.0	0.0	0.5	0.0	0.0	3.2

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	6.2	0.0	0.0	0.0	10.2	0.0	0.0	11.9
%ile Storage Ratio (RQ%)	0.16	0.00	0.00	0.00	0.35	0.00	0.00	0.83
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data

Assigned Mvmt	12	0	0	14	16	0	0	18
Lane Assignment	T+R			T+R	R			R
Lanes in Grp	1	0	0	1	1	0	0	1
Grp Vol (v), veh/h	777	0	0	207	567	0	0	192
Grp Sat Flow (s), veh/h/ln	1835	0	0	1733	1585	0	0	1585
Q Serve Time (g_s), s	38.6	0.0	0.0	12.3	16.1	0.0	0.0	2.8
Cycle Q Clear Time (g_c), s	38.6	0.0	0.0	12.3	16.1	0.0	0.0	2.8
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	1585.1	0.0	0.0	1585.1
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	14.0	0.0	0.0	9.0
Prop RT Outside Lane (P_R)	0.11	0.00	0.00	0.44	1.00	0.00	0.00	1.00
Lane Grp Cap (c), veh/h	810	0	0	419	713	0	0	383
V/C Ratio (X)	0.96	0.00	0.00	0.49	0.79	0.00	0.00	0.50
Avail Cap (c_a), veh/h	810	0	0	419	713	0	0	383
Upstream Filter (I)	0.61	0.00	0.00	0.86	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	6.2	0.0	0.0	39.2	10.4	0.0	0.0	18.4
Incr Delay (d2), s/veh	16.6	0.0	0.0	0.8	8.9	0.0	0.0	1.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	22.7	0.0	0.0	40.0	19.4	0.0	0.0	19.4
1st-Term Q (Q1), veh/ln	2.8	0.0	0.0	5.3	4.5	0.0	0.0	2.9
2nd-Term Q (Q2), veh/ln	3.7	0.0	0.0	0.1	1.8	0.0	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	6.5	0.0	0.0	5.4	6.3	0.0	0.0	3.1
%ile Storage Ratio (RQ%)	0.16	0.00	0.00	0.33	0.22	0.00	0.00	0.21
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary

HCM 6th Ctrl Delay	38.3
HCM 6th LOS	D

Lanes, Volumes, Timings
6: BAXTER BLVD

08/04/2022

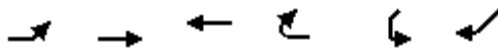


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	459	215	0	0	201
Future Volume (vph)	0	459	215	0	0	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	499	234	0	0	218
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	499	234	0	0	218
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 30.4%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis

6: BAXTER BLVD

08/04/2022

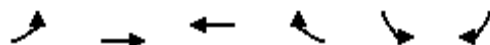


Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (veh/h)	0	459	215	0	0	201
Future Volume (Veh/h)	0	459	215	0	0	201
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	499	234	0	0	218
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	234				733	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234				733	234
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	73
cM capacity (veh/h)	1333				388	805
Direction, Lane #	EB 1	WB 1	SW 1			
Volume Total	499	234	218			
Volume Left	0	0	0			
Volume Right	0	0	218			
cSH	1700	1700	805			
Volume to Capacity	0.29	0.14	0.27			
Queue Length 95th (ft)	0	0	27			
Control Delay (s)	0.0	0.0	11.1			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			30.4%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

7: RAMPS

08/04/2022

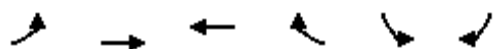


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	232	227	215	221	83	0
Future Volume (vph)	232	227	215	221	83	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.932					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1736	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1736	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	252	247	234	240	90	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	252	247	474	0	90	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	52.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

7: RAMPS

08/04/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	232	227	215	221	83	0
Future Volume (vph)	232	227	215	221	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	252	247	234	240	90	0
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total (vph)	252	247	474	90		
Volume Left (vph)	252	0	0	90		
Volume Right (vph)	0	0	240	0		
Hadj (s)	0.53	0.03	-0.27	0.23		
Departure Headway (s)	5.7	5.2	4.6	6.2		
Degree Utilization, x	0.40	0.36	0.60	0.15		
Capacity (veh/h)	608	673	772	513		
Control Delay (s)	11.3	9.9	14.2	10.3		
Approach Delay (s)	10.6		14.2	10.3		
Approach LOS	B		B	B		
Intersection Summary						
Delay			12.2			
Level of Service			B			
Intersection Capacity Utilization			52.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

8: BATES

08/04/2022



Lane Group	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	394	83	201
Future Volume (vph)	0	0	0	394	83	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t				0.865	0.904	
Fl _t Protected					0.986	
Satd. Flow (prot)	0	0	0	1611	1660	0
Fl _t Permitted					0.986	
Satd. Flow (perm)	0	0	0	1611	1660	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	300		173		428	
Travel Time (s)	6.8		3.9		9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	428	90	218
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	428	308	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	0		0		24	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 27.7% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

8: BATES

08/04/2022

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	394	83	201
Future Volume (Veh/h)	0	0	0	394	83	201
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	428	90	218
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)					428	
pX, platoon unblocked						
vC, conflicting volume	627	199	308			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	627	199	308			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	447	842	1253			
Direction, Lane #	NB 1	SW 1				
Volume Total	428	308				
Volume Left	0	0				
Volume Right	0	218				
cSH	1700	1700				
Volume to Capacity	0.25	0.18				
Queue Length 95th (ft)	0	0				
Control Delay (s)	0.0	0.0				
Lane LOS						
Approach Delay (s)	0.0	0.0				
Approach LOS						
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			27.7%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	149	888	188	149	33	98	7	49	39	44	65
Future Volume (vph)	46	149	888	188	149	33	98	7	49	39	44	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr't			0.850		0.973			0.870			0.940	
Flt Protected	0.950			0.950			0.950				0.987	
Satd. Flow (prot)	1770	1863	1583	1770	1812	0	1770	1621	0	0	1728	0
Flt Permitted	0.633			0.654			0.276				0.987	
Satd. Flow (perm)	1179	1863	1583	1218	1812	0	514	1621	0	0	1728	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			908		15			53			28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	162	965	204	162	36	107	8	53	42	48	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	162	965	204	198	0	107	61	0	0	161	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4		4	8			2					
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	72.0	72.0	72.0	72.0	72.0		24.0	24.0		24.0	24.0	
Total Split (%)	60.0%	60.0%	60.0%	60.0%	60.0%		20.0%	20.0%		20.0%	20.0%	
Maximum Green (s)	66.0	66.0	66.0	66.0	66.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	23.5	23.5	23.5	23.5	23.5		19.3	19.3			11.2	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32		0.26	0.26			0.15	
v/c Ratio	0.13	0.27	0.86	0.52	0.34		0.79	0.13			0.56	
Control Delay	16.5	18.0	10.9	23.7	17.4		73.2	12.9			35.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay	16.5	18.0	10.9	23.7	17.4		73.2	12.9			35.1	
LOS	B	B	B	C	B		E	B			D	
Approach Delay		12.1			20.6			51.3			35.1	
Approach LOS		B			C			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 73.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 19.3

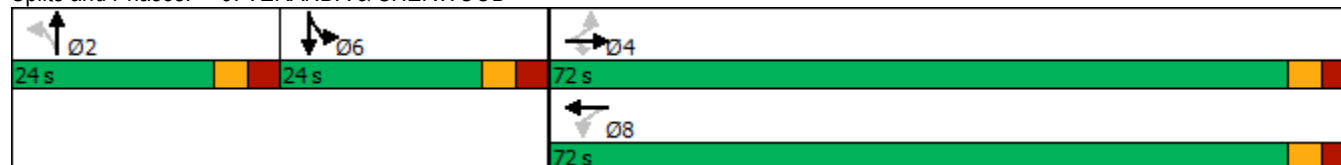
Intersection LOS: B

Intersection Capacity Utilization 88.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 9: VERANDA & SHERWOOD



Queues

9: VERANDA & SHERWOOD

08/04/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	50	162	965	204	198	107	61	161
v/c Ratio	0.13	0.27	0.86	0.52	0.34	0.79	0.13	0.56
Control Delay	16.5	18.0	10.9	23.7	17.4	73.2	12.9	35.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	18.0	10.9	23.7	17.4	73.2	12.9	35.1
Queue Length 50th (ft)	15	49	17	68	57	37	2	48
Queue Length 95th (ft)	38	98	128	135	112	#212	43	158
Internal Link Dist (ft)		421			357		226	1274
Turn Bay Length (ft)								
Base Capacity (vph)	1045	1651	1506	1079	1607	135	466	475
Starvation Cap Reductn	0	0	24	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.10	0.65	0.19	0.12	0.79	0.13	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Future Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	50	162	965	204	162	36	107	8	53	42	48	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	758	1171	992	366	927	206	146	17	115	52	59	87
Arrive On Green	0.63	0.63	0.63	0.63	0.63	0.63	0.08	0.08	0.08	0.12	0.12	0.12
Sat Flow, veh/h	1185	1870	1585	500	1482	329	1781	212	1405	447	510	755
Grp Volume(v), veh/h	50	162	965	204	0	198	107	0	61	161	0	0
Grp Sat Flow(s),veh/h/ln	1185	1870	1585	500	0	1811	1781	0	1617	1712	0	0
Q Serve(g_s), s	1.9	3.6	59.4	28.8	0.0	4.7	6.0	0.0	3.7	9.4	0.0	0.0
Cycle Q Clear(g_c), s	6.6	3.6	59.4	32.5	0.0	4.7	6.0	0.0	3.7	9.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.18	1.00		0.87	0.26		0.44
Lane Grp Cap(c), veh/h	758	1171	992	366	0	1134	146	0	133	198	0	0
V/C Ratio(X)	0.07	0.14	0.97	0.56	0.00	0.17	0.73	0.00	0.46	0.81	0.00	0.00
Avail Cap(c_a), veh/h	783	1210	1025	376	0	1172	314	0	285	302	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.4	7.8	18.3	14.5	0.0	8.0	45.7	0.0	44.7	44.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	21.4	1.7	0.0	0.1	6.8	0.0	2.5	9.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.4	24.9	3.2	0.0	1.7	2.9	0.0	1.6	4.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.4	7.9	39.7	16.2	0.0	8.1	52.5	0.0	47.1	53.6	0.0	0.0
LnGrp LOS	A	A	D	B	A	A	D	A	D	D	A	A
Approach Vol, veh/h		1177			402			168			161	
Approach Delay, s/veh		34.0			12.2			50.6			53.6	
Approach LOS		C			B			D			D	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.4		69.9		17.8		69.9				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		18.0		66.0		18.0		66.0				
Max Q Clear Time (g_c+I1), s		8.0		61.4		11.4		34.5				
Green Ext Time (p_c), s		0.4		2.5		0.4		4.4				
Intersection Summary												
HCM 6th Ctrl Delay			32.5									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Future Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	50	162	965	204	162	36	107	8	53	42	48	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	758	1171	992	366	927	206	146	17	115	52	59	87
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.63	0.63	0.63	0.63	0.63	0.63	0.08	0.08	0.08	0.12	0.12	0.12
Unsig. Movement Delay												
Ln Grp Delay, s/veh	9.4	7.9	39.7	16.2	0.0	8.1	52.5	0.0	47.1	53.6	0.0	0.0
Ln Grp LOS	A	A	D	B	A	A	D	A	D	D	A	A
Approach Vol, veh/h	1177			402			168			161		
Approach Delay, s/veh	34.0			12.2			50.6			53.6		
Approach LOS	C			B			D			D		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	6		2	4				8				
Case No	12.0		10.0	5.0				6.0				
Phs Duration (G+Y+Rc), s	17.8		14.4	69.9				69.9				
Change Period (Y+Rc), s	6.0		6.0	6.0				6.0				
Max Green (Gmax), s	18.0		18.0	66.0				66.0				
Max Allow Headway (MAH), s	5.4		4.4	4.2				6.9				
Max Q Clear (g_c+I1), s	11.4		8.0	61.4				34.5				
Green Ext Time (g_e), s	0.4		0.4	2.5				4.4				
Prob of Phs Call (p_c)	1.00		1.00	1.00				1.00				
Prob of Max Out (p_x)	0.52		0.02	0.95				0.01				
Left-Turn Movement Data												
Assigned Mvmt	1		5	7				3				
Mvmt Sat Flow, veh/h	447		1781	1185				500				
Through Movement Data												
Assigned Mvmt	6		2	4				8				
Mvmt Sat Flow, veh/h	510		212	1870				1482				
Right-Turn Movement Data												
Assigned Mvmt	16		12	14				18				
Mvmt Sat Flow, veh/h	755		1405	1585				329				
Left Lane Group Data												
Assigned Mvmt	1		5	0	7	0	0	0	3			
Lane Assignment	L+T+R		L		L				L			

HCM 6th Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

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Lanes in Grp	1	1	0	1	0	0	0	1
Grp Vol (v), veh/h	161	107	0	50	0	0	0	204
Grp Sat Flow (s), veh/h/ln	1712	1781	0	1185	0	0	0	500
Q Serve Time (g_s), s	9.4	6.0	0.0	1.9	0.0	0.0	0.0	28.8
Cycle Q Clear Time (g_c), s	9.4	6.0	0.0	6.6	0.0	0.0	0.0	32.5
Perm LT Sat Flow (s_l), veh/h/ln	0	1781	0	1185	0	0	0	500
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	63.9	0.0	0.0	0.0	63.9
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	59.2	0.0	0.0	0.0	60.2
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	28.8
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.26	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Lane Grp Cap (c), veh/h	198	146	0	758	0	0	0	366
V/C Ratio (X)	0.81	0.73	0.00	0.07	0.00	0.00	0.00	0.56
Avail Cap (c_a), veh/h	302	314	0	783	0	0	0	376
Upstream Filter (I)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	44.0	45.7	0.0	9.4	0.0	0.0	0.0	14.5
Incr Delay (d2), s/veh	9.6	6.8	0.0	0.0	0.0	0.0	0.0	1.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	53.6	52.5	0.0	9.4	0.0	0.0	0.0	16.2
1st-Term Q (Q1), veh/ln	3.9	2.6	0.0	0.5	0.0	0.0	0.0	3.0
2nd-Term Q (Q2), veh/ln	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	4.5	2.9	0.0	0.5	0.0	0.0	0.0	3.2
%ile Storage Ratio (RQ%)	0.09	0.29	0.00	0.03	0.00	0.00	0.00	0.20
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	6	2	0	4	0	0	0	8
Lane Assignment	T							
Lanes in Grp	0	0	0	1	0	0	0	0
Grp Vol (v), veh/h	0	0	0	162	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1870	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	1171	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	1210	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	7.8	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

HCM 6th Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data

Assigned Mvmt	16	12	0	14	0	0	0	18
Lane Assignment	T+R		R				T+R	
Lanes in Grp	0	1	0	1	0	0	0	1
Grp Vol (v), veh/h	0	61	0	965	0	0	0	198
Grp Sat Flow (s), veh/h/ln	0	1617	0	1585	0	0	0	1811
Q Serve Time (g_s), s	0.0	3.7	0.0	59.4	0.0	0.0	0.0	4.7
Cycle Q Clear Time (g_c), s	0.0	3.7	0.0	59.4	0.0	0.0	0.0	4.7
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.44	0.87	0.00	1.00	0.00	0.00	0.00	0.18
Lane Grp Cap (c), veh/h	0	133	0	992	0	0	0	1134
V/C Ratio (X)	0.00	0.46	0.00	0.97	0.00	0.00	0.00	0.17
Avail Cap (c_a), veh/h	0	285	0	1025	0	0	0	1172
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	44.7	0.0	18.3	0.0	0.0	0.0	8.0
Incr Delay (d2), s/veh	0.0	2.5	0.0	21.4	0.0	0.0	0.0	0.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	47.1	0.0	39.7	0.0	0.0	0.0	8.1
1st-Term Q (Q1), veh/ln	0.0	1.5	0.0	19.0	0.0	0.0	0.0	1.7
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	5.9	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.6	0.0	24.9	0.0	0.0	0.0	1.7
%ile Storage Ratio (RQ%)	0.00	0.16	0.00	1.53	0.00	0.00	0.00	0.11
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary

HCM 6th Ctrl Delay	32.5
HCM 6th LOS	C

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (vph)	77	145	171	329	304	254	166	1219	281	94	1105	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		1	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850		0.932				0.850		0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	3433	1736	0	1770	3539	1583	1770	3497	0
Flt Permitted	0.164			0.950			0.950			0.950		
Satd. Flow (perm)	305	1863	1583	3433	1736	0	1770	3539	1583	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136		36				305		9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	158	186	358	330	276	180	1325	305	102	1201	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	158	186	358	606	0	180	1325	305	102	1309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60	60	60	60		60	60	60	60	60	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	60	60	60	60	60		60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8	1	7	4		1	6	7	5	2	
Permitted Phases	8		8						6			
Detector Phase	3	8	1	7	4		1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	29.0		11.0	29.0	11.0	11.0	29.0	
Total Split (s)	11.0	29.0	18.0	24.0	42.0		18.0	54.0	24.0	13.0	49.0	

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	24.2%	15.0%	20.0%	35.0%		15.0%	45.0%	20.0%	10.8%	40.8%	
Maximum Green (s)	5.0	23.0	12.0	18.0	36.0		12.0	48.0	18.0	7.0	43.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	Max	None	None		Max	C-Max	None	Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	29.4	24.4	36.4	16.6	36.0		12.0	48.0	64.6	7.0	43.0	
Actuated g/C Ratio	0.24	0.20	0.30	0.14	0.30		0.10	0.40	0.54	0.06	0.36	
v/c Ratio	0.62	0.42	0.32	0.76	1.11		1.02	0.94	0.31	0.99	1.04	
Control Delay	47.6	46.1	7.1	68.2	97.5		125.7	47.9	1.6	142.9	74.2	
Queue Delay	0.0	0.0	0.0	0.0	0.2		0.0	0.0	0.0	0.0	0.0	
Total Delay	47.6	46.1	7.1	68.2	97.8		125.7	47.9	1.6	142.9	74.2	
LOS	D	D	A	E	F		F	D	A	F	E	
Approach Delay		29.5			86.8			47.8			79.2	
Approach LOS		C			F			D			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 63.9

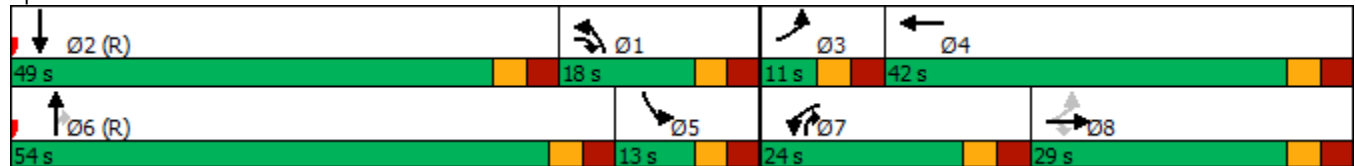
Intersection LOS: E

Intersection Capacity Utilization 98.7%

ICU Level of Service F

Analysis Period (min) 15

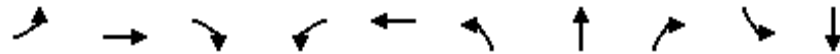
Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Queues

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	158	186	358	606	180	1325	305	102	1309
v/c Ratio	0.62	0.42	0.32	0.76	1.11	1.02	0.94	0.31	0.99	1.04
Control Delay	47.6	46.1	7.1	68.2	97.5	125.7	47.9	1.6	142.9	74.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	47.6	46.1	7.1	68.2	97.8	125.7	47.9	1.6	142.9	74.2
Queue Length 50th (ft)	41	109	18	139	~505	~145	510	0	80	~574
Queue Length 95th (ft)	#87	178	53	202	#733	#294	#662	24	#197	#715
Internal Link Dist (ft)		348			421		715			1001
Turn Bay Length (ft)	250			100		160			200	
Base Capacity (vph)	135	379	575	514	546	177	1415	1007	103	1258
Starvation Cap Reductn	0	0	0	0	17	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.42	0.32	0.70	1.15	1.02	0.94	0.30	0.99	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	158	186	358	330	276	180	1325	305	102	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	408	505	426	282	236	178	1421	830	104	1182	106
Arrive On Green	0.04	0.22	0.22	0.12	0.30	0.30	0.10	0.40	0.40	0.06	0.36	0.36
Sat Flow, veh/h	1781	1870	1585	3456	941	787	1781	3554	1585	1781	3298	296
Grp Volume(v), veh/h	84	158	186	358	0	606	180	1325	305	102	646	663
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1728	0	1729	1781	1777	1585	1781	1777	1817
Q Serve(g_s), s	4.4	8.7	2.8	12.2	0.0	36.0	12.0	42.8	7.7	6.9	43.0	43.0
Cycle Q Clear(g_c), s	4.4	8.7	2.8	12.2	0.0	36.0	12.0	42.8	7.7	6.9	43.0	43.0
Prop In Lane	1.00		1.00	1.00		0.46	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	134	408	505	426	0	519	178	1421	830	104	637	651
V/C Ratio(X)	0.63	0.39	0.37	0.84	0.00	1.17	1.01	0.93	0.37	0.98	1.01	1.02
Avail Cap(c_a), veh/h	134	408	505	518	0	519	178	1421	830	104	637	651
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.57	0.00	0.57	1.00	1.00	1.00	0.46	0.46	0.46
Uniform Delay (d), s/veh	37.3	40.0	13.4	51.4	0.0	42.0	54.0	34.4	6.2	56.4	38.5	38.5
Incr Delay (d2), s/veh	8.8	0.6	0.4	6.0	0.0	87.7	70.2	12.4	1.3	55.3	27.9	28.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	4.1	2.3	5.6	0.0	27.8	8.8	20.5	3.6	4.7	23.3	23.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.2	40.6	13.8	57.4	0.0	129.7	124.2	46.8	7.5	111.8	66.4	67.1
LnGrp LOS	D	D	B	E	A	F	F	D	A	F	F	F
Approach Vol, veh/h		428			964			1810			1411	
Approach Delay, s/veh		30.1			102.9			47.9			70.0	
Approach LOS		C			F			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.0	49.0	11.0	42.0	13.0	54.0	20.8	32.2				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	12.0	43.0	5.0	36.0	7.0	48.0	18.0	23.0				
Max Q Clear Time (g_c+I1), s	14.0	45.0	6.4	38.0	8.9	44.8	14.2	10.7				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.4	0.6	1.2				
Intersection Summary												
HCM 6th Ctrl Delay			64.5									
HCM 6th LOS			E									

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	158	186	358	330	276	180	1325	305	102	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	134	408	505	426	282	236	178	1421	830	104	1182	106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.04	0.22	0.22	0.12	0.30	0.30	0.10	0.40	0.40	0.06	0.36	0.36
Unsig. Movement Delay												
Ln Grp Delay, s/veh	46.2	40.6	13.8	57.4	0.0	129.7	124.2	46.8	7.5	111.8	66.4	67.1
Ln Grp LOS	D	D	B	E	A	F	F	D	A	F	F	F
Approach Vol, veh/h	428			964			1810			1411		
Approach Delay, s/veh	30.1			102.9			47.9			70.0		
Approach LOS	C			F			D			E		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	2		1	3	4	6	5	7	8			
Case No	4.0		2.0	1.1	4.0	3.0	2.0	2.0	3.0			
Phs Duration (G+Y+Rc), s	49.0		18.0	11.0	42.0	54.0	13.0	20.8	32.2			
Change Period (Y+Rc), s	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0			
Max Green (Gmax), s	43.0		12.0	5.0	36.0	48.0	7.0	18.0	23.0			
Max Allow Headway (MAH), s	4.5		4.6	4.6	4.6	4.5	4.6	4.6	4.7			
Max Q Clear (g_c+I1), s	45.0		14.0	6.4	38.0	44.8	8.9	14.2	10.7			
Green Ext Time (g_e), s	0.0		0.0	0.0	0.0	2.4	0.0	0.6	1.2			
Prob of Phs Call (p_c)	1.00		1.00	0.94	1.00	1.00	1.00	1.00	1.00			
Prob of Max Out (p_x)	0.00		0.00	1.00	1.00	0.00	0.00	1.00	0.04			
Left-Turn Movement Data												
Assigned Mvmt			1	3			5	7				
Mvmt Sat Flow, veh/h			1781	1781			1781	3456				
Through Movement Data												
Assigned Mvmt	2				4	6			8			
Mvmt Sat Flow, veh/h	3298				941	3554			1870			
Right-Turn Movement Data												
Assigned Mvmt	12				14	16			18			
Mvmt Sat Flow, veh/h	296				787	1585			1585			
Left Lane Group Data												
Assigned Mvmt	0	1	3	0	0	5	7	0				
Lane Assignment	L (Prot)L (Pr/Pm)				L (Prot) L (Prot)							

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

Lanes in Grp	0	1	1	0	0	1	2	0
Grp Vol (v), veh/h	0	180	84	0	0	102	358	0
Grp Sat Flow (s), veh/h/ln	0	1781	1781	0	0	1781	1728	0
Q Serve Time (g_s), s	0.0	12.0	4.4	0.0	0.0	6.9	12.2	0.0
Cycle Q Clear Time (g_c), s	0.0	12.0	4.4	0.0	0.0	6.9	12.2	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	814	0	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	26.2	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Lane Grp Cap (c), veh/h	0	178	134	0	0	104	426	0
V/C Ratio (X)	0.00	1.01	0.63	0.00	0.00	0.98	0.84	0.00
Avail Cap (c_a), veh/h	0	178	134	0	0	104	518	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	0.46	0.57	0.00
Uniform Delay (d1), s/veh	0.0	54.0	37.3	0.0	0.0	56.4	51.4	0.0
Incr Delay (d2), s/veh	0.0	70.2	8.8	0.0	0.0	55.3	6.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	124.2	46.2	0.0	0.0	111.8	57.4	0.0
1st-Term Q (Q1), veh/ln	0.0	5.4	1.9	0.0	0.0	3.1	5.3	0.0
2nd-Term Q (Q2), veh/ln	0.0	3.5	0.3	0.0	0.0	1.6	0.4	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	8.8	2.2	0.0	0.0	4.7	5.6	0.0
%ile Storage Ratio (RQ%)	0.00	1.40	0.23	0.00	0.00	0.59	1.43	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	2	0	0	4	6	0	0	8
Lane Assignment	T				T			T
Lanes in Grp	1	0	0	0	2	0	0	1
Grp Vol (v), veh/h	646	0	0	0	1325	0	0	158
Grp Sat Flow (s), veh/h/ln	1777	0	0	0	1777	0	0	1870
Q Serve Time (g_s), s	43.0	0.0	0.0	0.0	42.8	0.0	0.0	8.7
Cycle Q Clear Time (g_c), s	43.0	0.0	0.0	0.0	42.8	0.0	0.0	8.7
Lane Grp Cap (c), veh/h	637	0	0	0	1421	0	0	408
V/C Ratio (X)	1.01	0.00	0.00	0.00	0.93	0.00	0.00	0.39
Avail Cap (c_a), veh/h	637	0	0	0	1421	0	0	408
Upstream Filter (I)	0.46	0.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	38.5	0.0	0.0	0.0	34.4	0.0	0.0	40.0
Incr Delay (d2), s/veh	27.9	0.0	0.0	0.0	12.4	0.0	0.0	0.6
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	66.4	0.0	0.0	0.0	46.8	0.0	0.0	40.6
1st-Term Q (Q1), veh/ln	18.3	0.0	0.0	0.0	18.1	0.0	0.0	4.0
2nd-Term Q (Q2), veh/ln	4.9	0.0	0.0	0.0	2.4	0.0	0.0	0.1

HCM 6th Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

08/04/2022

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	23.3	0.0	0.0	0.0	20.5	0.0	0.0	4.1
%ile Storage Ratio (RQ%)	0.59	0.00	0.00	0.00	0.71	0.00	0.00	0.28
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data

Assigned Mvmt	12	0	0	14	16	0	0	18
Lane Assignment	T+R			T+R	R			R
Lanes in Grp	1	0	0	1	1	0	0	1
Grp Vol (v), veh/h	663	0	0	606	305	0	0	186
Grp Sat Flow (s), veh/h/ln	1817	0	0	1729	1585	0	0	1585
Q Serve Time (g_s), s	43.0	0.0	0.0	36.0	7.7	0.0	0.0	2.8
Cycle Q Clear Time (g_c), s	43.0	0.0	0.0	36.0	7.7	0.0	0.0	2.8
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	1585.1	0.0	0.0	1585.1
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	14.8	0.0	0.0	12.0
Prop RT Outside Lane (P_R)	0.16	0.00	0.00	0.46	1.00	0.00	0.00	1.00
Lane Grp Cap (c), veh/h	651	0	0	519	830	0	0	505
V/C Ratio (X)	1.02	0.00	0.00	1.17	0.37	0.00	0.00	0.37
Avail Cap (c_a), veh/h	651	0	0	519	830	0	0	505
Upstream Filter (I)	0.46	0.00	0.00	0.57	1.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	38.5	0.0	0.0	42.0	6.2	0.0	0.0	13.4
Incr Delay (d2), s/veh	28.6	0.0	0.0	87.7	1.3	0.0	0.0	0.4
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	67.1	0.0	0.0	129.7	7.5	0.0	0.0	13.8
1st-Term Q (Q1), veh/ln	18.8	0.0	0.0	15.1	3.3	0.0	0.0	2.3
2nd-Term Q (Q2), veh/ln	5.2	0.0	0.0	12.6	0.3	0.0	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	23.9	0.0	0.0	27.8	3.6	0.0	0.0	2.3
%ile Storage Ratio (RQ%)	0.61	0.00	0.00	1.71	0.12	0.00	0.00	0.16
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	3.0	0.0	0.0	21.9	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0

Intersection Summary

HCM 6th Ctrl Delay	64.5
HCM 6th LOS	E

Lanes, Volumes, Timings
6: BAXTER BLVD

08/04/2022

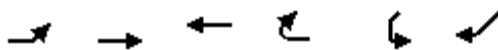


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	491	221	0	0	303
Future Volume (vph)	0	491	221	0	0	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	534	240	0	0	329
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	534	240	0	0	329
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	37.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

6: BAXTER BLVD

08/04/2022

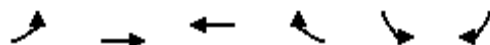


Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (veh/h)	0	491	221	0	0	303
Future Volume (Veh/h)	0	491	221	0	0	303
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	534	240	0	0	329
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	240				774	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240				774	240
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	59
cM capacity (veh/h)	1327				367	799
Direction, Lane #	EB 1	WB 1	SW 1			
Volume Total	534	240	329			
Volume Left	0	0	0			
Volume Right	0	0	329			
cSH	1700	1700	799			
Volume to Capacity	0.31	0.14	0.41			
Queue Length 95th (ft)	0	0	51			
Control Delay (s)	0.0	0.0	12.6			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	12.6			
Approach LOS			B			
Intersection Summary						
Average Delay			3.8			
Intersection Capacity Utilization			37.1%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

7: RAMPS

08/04/2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	226	265	221	84	211	0
Future Volume (vph)	226	265	221	84	211	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.963					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1794	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1794	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	288	240	91	229	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	246	288	331	0	229	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 51.0%				ICU Level of Service A		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis

7: RAMPS

08/04/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Traffic Volume (vph)	226	265	221	84	211	0
Future Volume (vph)	226	265	221	84	211	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	246	288	240	91	229	0
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total (vph)	246	288	331	229		
Volume Left (vph)	246	0	0	229		
Volume Right (vph)	0	0	91	0		
Hadj (s)	0.53	0.03	-0.13	0.23		
Departure Headway (s)	6.2	5.7	5.3	6.1		
Degree Utilization, x	0.42	0.46	0.49	0.39		
Capacity (veh/h)	561	615	653	541		
Control Delay (s)	12.5	12.2	13.3	13.0		
Approach Delay (s)	12.3		13.3	13.0		
Approach LOS	B		B	B		
Intersection Summary						
Delay			12.8			
Level of Service			B			
Intersection Capacity Utilization			51.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

8: BATES

08/04/2022



Lane Group	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	329	211	303
Future Volume (vph)	0	0	0	329	211	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t				0.865	0.920	
Fl _t Protected					0.980	
Satd. Flow (prot)	0	0	0	1611	1679	0
Fl _t Permitted					0.980	
Satd. Flow (perm)	0	0	0	1611	1679	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	300		173		428	
Travel Time (s)	6.8		3.9		9.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	358	229	329
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	358	558	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	0		0		24	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.6%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

8: BATES

08/04/2022

						
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	329	211	303
Future Volume (Veh/h)	0	0	0	329	211	303
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	358	229	329
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)					428	
pX, platoon unblocked						
vC, conflicting volume	752	394	558			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	752	394	558			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	378	655	1013			
Direction, Lane #	NB 1	SW 1				
Volume Total	358	558				
Volume Left	0	0				
Volume Right	0	329				
cSH	1700	1700				
Volume to Capacity	0.21	0.33				
Queue Length 95th (ft)	0	0				
Control Delay (s)	0.0	0.0				
Lane LOS						
Approach Delay (s)	0.0	0.0				
Approach LOS						
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			33.6%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (vph)	54	193	161	34	210	28	633	40	316	44	9	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.983			0.867			0.941	
Flt Protected	0.950			0.950			0.950				0.977	
Satd. Flow (prot)	1770	1863	1583	1770	1831	0	1770	1615	0	0	1713	0
Flt Permitted	0.314			0.427			0.950				0.977	
Satd. Flow (perm)	585	1863	1583	795	1831	0	1770	1615	0	0	1713	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175		6			343			27	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	210	175	37	228	30	688	43	343	48	10	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	59	210	175	37	258	0	688	386	0	0	103	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		36			36			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Split	NA		Split	NA	
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4		4	8								
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings

9: VERANDA & SHERWOOD

08/04/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	24.0	24.0	24.0	24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	40.0	40.0	40.0	40.0	40.0		56.0	56.0		24.0	24.0	
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%		46.7%	46.7%		20.0%	20.0%	
Maximum Green (s)	34.0	34.0	34.0	34.0	34.0		50.0	50.0		18.0	18.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		C-Max	C-Max		Max	Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	21.9	21.9	21.9	21.9	21.9		62.1	62.1			18.0	
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18		0.52	0.52			0.15	
v/c Ratio	0.56	0.62	0.41	0.26	0.76		0.75	0.39			0.37	
Control Delay	72.1	62.8	17.4	44.4	59.7		30.6	4.2			37.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.4	0.0			0.0	
Total Delay	72.1	62.8	17.4	44.4	59.7		31.0	4.2			37.9	
LOS	E	E	B	D	E		C	A			D	
Approach Delay		46.1			57.8			21.4			37.9	
Approach LOS		D			E			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 80 (67%), Referenced to phase 2:NBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 33.6

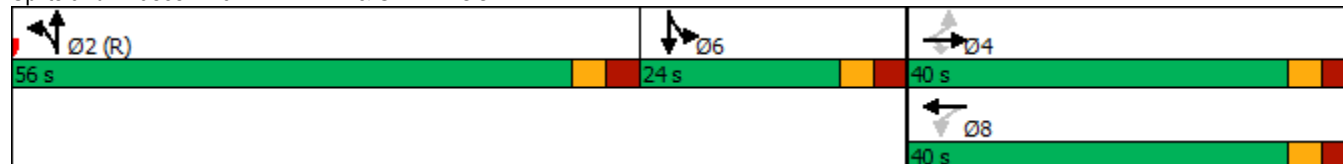
Intersection LOS: C

Intersection Capacity Utilization 76.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 9: VERANDA & SHERWOOD



Queues

9: VERANDA & SHERWOOD

08/04/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	59	210	175	37	258	688	386	103
v/c Ratio	0.56	0.62	0.41	0.26	0.76	0.75	0.39	0.37
Control Delay	72.1	62.8	17.4	44.4	59.7	30.6	4.2	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	72.1	62.8	17.4	44.4	59.7	31.0	4.2	37.9
Queue Length 50th (ft)	46	163	19	25	187	406	16	53
Queue Length 95th (ft)	m73	m200	m49	55	262	#690	78	109
Internal Link Dist (ft)		421			357		226	1274
Turn Bay Length (ft)								
Base Capacity (vph)	165	527	573	225	523	916	1001	279
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	33	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.40	0.31	0.16	0.49	0.78	0.39	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	210	175	37	228	30	688	43	343	48	10	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	150	392	333	170	340	45	873	88	702	119	25	111
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.49	0.49	0.49	0.15	0.15	0.15
Sat Flow, veh/h	1121	1870	1585	998	1619	213	1781	180	1433	791	165	742
Grp Volume(v), veh/h	59	210	175	37	0	258	688	0	386	103	0	0
Grp Sat Flow(s),veh/h/ln	1121	1870	1585	998	0	1832	1781	0	1612	1697	0	0
Q Serve(g_s), s	6.1	12.0	11.8	4.1	0.0	15.5	38.5	0.0	19.3	6.6	0.0	0.0
Cycle Q Clear(g_c), s	21.7	12.0	11.8	16.1	0.0	15.5	38.5	0.0	19.3	6.6	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.89	0.47		0.44
Lane Grp Cap(c), veh/h	150	392	333	170	0	384	873	0	790	255	0	0
V/C Ratio(X)	0.39	0.54	0.53	0.22	0.00	0.67	0.79	0.00	0.49	0.40	0.00	0.00
Avail Cap(c_a), veh/h	233	530	449	243	0	519	873	0	790	255	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.89	0.89	0.89	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	53.6	42.2	42.1	49.4	0.0	43.6	25.4	0.0	20.5	46.2	0.0	0.0
Incr Delay (d2), s/veh	1.5	1.0	1.1	0.6	0.0	2.0	7.1	0.0	2.2	4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	5.7	4.7	1.1	0.0	7.3	17.5	0.0	7.6	3.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.1	43.2	43.3	50.0	0.0	45.6	32.5	0.0	22.7	50.9	0.0	0.0
LnGrp LOS	E	D	D	D	A	D	C	A	C	D	A	A
Approach Vol, veh/h	444			295			1074			103		
Approach Delay, s/veh	44.8			46.2			29.0			50.9		
Approach LOS	D			D			C			D		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	64.8			31.2			24.0			31.2		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	50.0			34.0			18.0			34.0		
Max Q Clear Time (g_c+I1), s	40.5			23.7			8.6			18.1		
Green Ext Time (p_c), s	3.7			1.5			0.3			1.5		
Intersection Summary												
HCM 6th Ctrl Delay	36.5											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	210	175	37	228	30	688	43	343	48	10	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	150	392	333	170	340	45	873	88	702	119	25	111
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.49	0.49	0.49	0.15	0.15	0.15
Unsig. Movement Delay												
Ln Grp Delay, s/veh	55.1	43.2	43.3	50.0	0.0	45.6	32.5	0.0	22.7	50.9	0.0	0.0
Ln Grp LOS	E	D	D	D	A	D	C	A	C	D	A	A
Approach Vol, veh/h	444			295			1074			103		
Approach Delay, s/veh	44.8			46.2			29.0			50.9		
Approach LOS	D			D			C			D		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	6		2	4				8				
Case No	12.0		10.0	5.0				6.0				
Phs Duration (G+Y+Rc), s	24.0		64.8	31.2				31.2				
Change Period (Y+Rc), s	6.0		6.0	6.0				6.0				
Max Green (Gmax), s	18.0		50.0	34.0				34.0				
Max Allow Headway (MAH), s	5.4		4.4	4.7				5.2				
Max Q Clear (g_c+I1), s	8.6		40.5	23.7				18.1				
Green Ext Time (g_e), s	0.3		3.7	1.5				1.5				
Prob of Phs Call (p_c)	1.00		1.00	1.00				1.00				
Prob of Max Out (p_x)	0.00		0.00	0.14				0.02				
Left-Turn Movement Data												
Assigned Mvmt	1		5	7				3				
Mvmt Sat Flow, veh/h	791		1781	1121				998				
Through Movement Data												
Assigned Mvmt	6		2	4				8				
Mvmt Sat Flow, veh/h	165		180	1870				1619				
Right-Turn Movement Data												
Assigned Mvmt	16		12	14				18				
Mvmt Sat Flow, veh/h	742		1433	1585				213				
Left Lane Group Data												
Assigned Mvmt	1		5	0	7	0	0	0	3			
Lane Assignment	L+T+R		L		L				L			

HCM 6th Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

Lanes in Grp	1	1	0	1	0	0	0	1
Grp Vol (v), veh/h	103	688	0	59	0	0	0	37
Grp Sat Flow (s), veh/h/ln	1697	1781	0	1121	0	0	0	998
Q Serve Time (g_s), s	6.6	38.5	0.0	6.1	0.0	0.0	0.0	4.1
Cycle Q Clear Time (g_c), s	6.6	38.5	0.0	21.7	0.0	0.0	0.0	16.1
Perm LT Sat Flow (s_l), veh/h/ln	0	1781	0	1121	0	0	0	998
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	25.2	0.0	0.0	0.0	25.2
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	9.6	0.0	0.0	0.0	13.2
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	6.1	0.0	0.0	0.0	4.1
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.47	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Lane Grp Cap (c), veh/h	255	873	0	150	0	0	0	170
V/C Ratio (X)	0.40	0.79	0.00	0.39	0.00	0.00	0.00	0.22
Avail Cap (c_a), veh/h	255	873	0	233	0	0	0	243
Upstream Filter (I)	1.00	1.00	0.00	0.89	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	46.2	25.4	0.0	53.6	0.0	0.0	0.0	49.4
Incr Delay (d2), s/veh	4.7	7.1	0.0	1.5	0.0	0.0	0.0	0.6
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	50.9	32.5	0.0	55.1	0.0	0.0	0.0	50.0
1st-Term Q (Q1), veh/ln	2.8	15.8	0.0	1.7	0.0	0.0	0.0	1.0
2nd-Term Q (Q2), veh/ln	0.3	1.7	0.0	0.1	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	3.1	17.5	0.0	1.8	0.0	0.0	0.0	1.1
%ile Storage Ratio (RQ%)	0.06	1.80	0.00	0.11	0.00	0.00	0.00	0.07
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Middle Lane Group Data

Assigned Mvmt	6	2	0	4	0	0	0	8
Lane Assignment	T							
Lanes in Grp	0	0	0	1	0	0	0	0
Grp Vol (v), veh/h	0	0	0	210	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1870	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	392	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	530	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	42.2	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	43.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0

HCM 6th Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

08/04/2022

3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data

Assigned Mvmt	16	12	0	14	0	0	0	18
Lane Assignment	T+R		R				T+R	
Lanes in Grp	0	1	0	1	0	0	0	1
Grp Vol (v), veh/h	0	386	0	175	0	0	0	258
Grp Sat Flow (s), veh/h/ln	0	1612	0	1585	0	0	0	1832
Q Serve Time (g_s), s	0.0	19.3	0.0	11.8	0.0	0.0	0.0	15.5
Cycle Q Clear Time (g_c), s	0.0	19.3	0.0	11.8	0.0	0.0	0.0	15.5
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.44	0.89	0.00	1.00	0.00	0.00	0.00	0.12
Lane Grp Cap (c), veh/h	0	790	0	333	0	0	0	384
V/C Ratio (X)	0.00	0.49	0.00	0.53	0.00	0.00	0.00	0.67
Avail Cap (c_a), veh/h	0	790	0	449	0	0	0	519
Upstream Filter (I)	0.00	1.00	0.00	0.89	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	20.5	0.0	42.1	0.0	0.0	0.0	43.6
Incr Delay (d2), s/veh	0.0	2.2	0.0	1.1	0.0	0.0	0.0	2.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	22.7	0.0	43.3	0.0	0.0	0.0	45.6
1st-Term Q (Q1), veh/ln	0.0	7.2	0.0	4.6	0.0	0.0	0.0	7.0
2nd-Term Q (Q2), veh/ln	0.0	0.5	0.0	0.1	0.0	0.0	0.0	0.2
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	7.6	0.0	4.7	0.0	0.0	0.0	7.3
%ile Storage Ratio (RQ%)	0.00	0.78	0.00	0.29	0.00	0.00	0.00	0.46
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary

HCM 6th Ctrl Delay	36.5
HCM 6th LOS	D

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	46	164	138	72	51	103	669	74	36	1230	72
Future Volume (vph)	67	46	164	138	72	51	103	669	74	36	1230	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.883			0.938			0.985			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1645	0	1770	1747	0	1770	3486	0	1770	3511	0
Flt Permitted	0.672			0.209			0.950			0.950		
Satd. Flow (perm)	1252	1645	0	389	1747	0	1770	3486	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		127			26			14			7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	50	178	150	78	55	112	727	80	39	1337	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	228	0	150	133	0	112	807	0	39	1415	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	25.0		15.0	29.0		17.0	67.0		13.0	63.0	

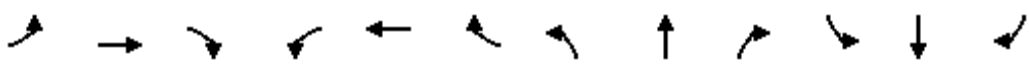
Short AM No Build 11:59 pm 03/15/2021 No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	20.8%		12.5%	24.2%		14.2%	55.8%		10.8%	52.5%	
Maximum Green (s)	5.0	19.0		9.0	23.0		11.0	61.0		7.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	17.9	12.9		26.3	19.1		11.0	67.1		7.0	63.1	
Actuated g/C Ratio	0.15	0.11		0.22	0.16		0.09	0.56		0.06	0.53	
v/c Ratio	0.35	0.79		0.80	0.44		0.69	0.41		0.38	0.76	
Control Delay	41.3	41.6		67.8	41.2		75.1	16.3		50.7	18.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	41.3	41.6		67.8	41.2		75.1	16.3		50.7	18.8	
LOS	D	D		E	D		E	B		D	B	
Approach Delay		41.5			55.3			23.5			19.7	
Approach LOS		D			E			C			B	
Queue Length 50th (ft)	45	76		98	77		86	177		30	319	
Queue Length 95th (ft)	81	159		#149	133		#169	251		m34	m353	
Internal Link Dist (ft)		348			421			715			1001	
Turn Bay Length (ft)	250			100			160			100		
Base Capacity (vph)	207	367		188	355		162	1956		103	1850	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.35	0.62		0.80	0.37		0.69	0.41		0.38	0.76	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 26.5

Intersection LOS: C

Intersection Capacity Utilization 82.2%

ICU Level of Service E

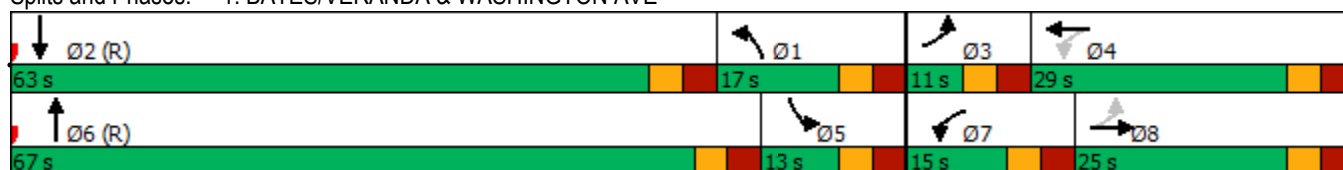
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Lanes, Volumes, Timings

2: WASHINGTON AVE & PRESUMPCOT

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	425	5	41	2	543	236	31	769	5
Future Volume (vph)	10	5	10	425	5	41	2	543	236	31	769	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.945				0.850			0.850		0.999	
Flt Protected		0.980			0.953					0.950		
Satd. Flow (prot)	0	1725	0	0	1775	1583	0	1863	1583	1770	1861	0
Flt Permitted		0.386			0.709			0.704		0.088		
Satd. Flow (perm)	0	679	0	0	1321	1583	0	1311	1583	164	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				136			215			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	462	5	45	2	590	257	34	836	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	467	45	0	592	257	34	841	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		37.0	37.0	37.0	46.0	46.0	46.0	11.0	57.0	

Short AM No Build 11:59 pm 03/15/2021 No Mitigation
VHB

Synchro 11 Report
Page 3

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

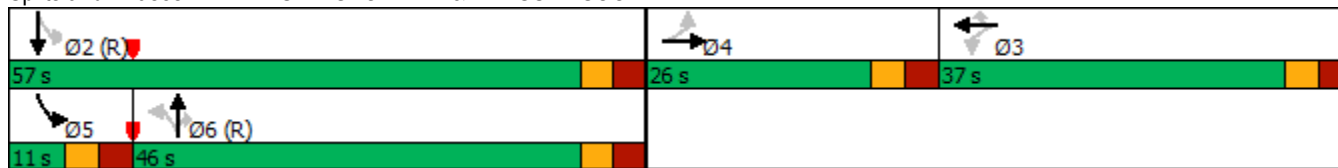
09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		30.8%	30.8%	30.8%	38.3%	38.3%	38.3%	9.2%	47.5%	
Maximum Green (s)	20.0	20.0		31.0	31.0	31.0	40.0	40.0	40.0	5.0	51.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effct Green (s)		9.6			46.1	46.1		44.4	44.4	51.0	51.0	
Actuated g/C Ratio		0.08			0.38	0.38		0.37	0.37	0.42	0.42	
v/c Ratio		0.42			0.92	0.07		1.22	0.36	0.25	1.06	
Control Delay		54.3			62.4	0.2		142.6	4.5	25.0	72.4	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		54.3			62.4	0.2		142.6	4.5	25.0	72.4	
LOS		D			E	A		F	A	C	E	
Approach Delay		54.3			57.0			100.8			70.5	
Approach LOS		D			E			F			E	
Queue Length 50th (ft)		12			~362	0		~609	2	12	~702	
Queue Length 95th (ft)		42			#651	0		#795	49	m24	#956	
Internal Link Dist (ft)		574			537			1001			2367	
Turn Bay Length (ft)						75				150		
Base Capacity (vph)		122			507	691		485	721	136	790	
Starvation Cap Reductn		0			0	0		0	0	0	0	
Spillback Cap Reductn		0			0	0		0	0	0	0	
Storage Cap Reductn		0			0	0		0	0	0	0	
Reduced v/c Ratio		0.22			0.92	0.07		1.22	0.36	0.25	1.06	
Intersection Summary												
Area Type: Other												
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 119 (99%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green												
Natural Cycle: 145												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.22												
Intersection Signal Delay: 78.6 Intersection LOS: E												
Intersection Capacity Utilization 81.3% ICU Level of Service D												
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												

Lanes, Volumes, Timings 2: WASHINGTON AVE & PRESUMPSCOT

09/02/2022

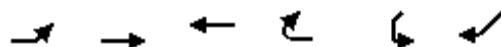
Splits and Phases: 2: WASHINGTON AVE & PRESUMPSCOT



Lanes, Volumes, Timings

6: BAXTER BLVD

09/02/2022

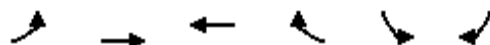


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	374	200	0	0	179
Future Volume (vph)	0	374	200	0	0	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)	30		30	30		
Link Distance (ft)	571		236	300		
Travel Time (s)	13.0		5.4	6.8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	407	217	0	0	195
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	407	217	0	0	195
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	0		0	0		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control	Free		Free	Yield		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 28.3%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings

7: RAMPS

09/02/2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	164	210	200	51	61	0
Future Volume (vph)	164	210	200	51	61	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1812	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1812	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	228	217	55	66	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	178	228	272	0	66	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 36.1%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	164	210	200	51	61	0
Future Vol, veh/h	164	210	200	51	61	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	178	228	217	55	66	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	272	0	0 829
Stage 1	-	-	- 245
Stage 2	-	-	- 584
Critical Hdwy	4.12	-	- 6.42
Critical Hdwy Stg 1	-	-	- 5.42
Critical Hdwy Stg 2	-	-	- 5.42
Follow-up Hdwy	2.218	-	- 3.518
Pot Cap-1 Maneuver	1291	-	- 340
Stage 1	-	-	- 796
Stage 2	-	-	- 557
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1291	-	- 293
Mov Cap-2 Maneuver	-	-	- 293
Stage 1	-	-	- 686
Stage 2	-	-	- 557

Approach	EB	WB	SB
HCM Control Delay, s	3.6	0	20.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1291	-	-	-	293
HCM Lane V/C Ratio	0.138	-	-	-	0.226
HCM Control Delay (s)	8.2	-	-	-	20.8
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	138	15	0	138	31	1	1	0	36	0	61
Future Volume (vph)	43	138	15	0	138	31	1	1	0	36	0	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.975						0.915	
Flt Protected		0.989						0.976			0.982	
Satd. Flow (prot)	0	1824	0	0	1816	0	0	1818	0	0	1674	0
Flt Permitted		0.989						0.976			0.982	
Satd. Flow (perm)	0	1824	0	0	1816	0	0	1818	0	0	1674	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	150	16	0	150	34	1	1	0	39	0	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	213	0	0	184	0	0	2	0	0	105	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	36.3%											
Analysis Period (min)	15											
	ICU Level of Service A											

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	138	15	0	138	31	1	1	0	36	0	61
Future Vol, veh/h	43	138	15	0	138	31	1	1	0	36	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	150	16	0	150	34	1	1	0	39	0	66
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	184	0	0	166	0	0	452	436	158	420	427	167
Stage 1	-	-	-	-	-	-	252	252	-	167	167	-
Stage 2	-	-	-	-	-	-	200	184	-	253	260	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1391	-	-	1412	-	-	518	514	887	544	520	877
Stage 1	-	-	-	-	-	-	752	698	-	835	760	-
Stage 2	-	-	-	-	-	-	802	747	-	751	693	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1391	-	-	1412	-	-	465	495	887	528	501	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	465	495	-	528	501	-
Stage 1	-	-	-	-	-	-	724	672	-	804	760	-
Stage 2	-	-	-	-	-	-	741	747	-	722	667	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			12.5			11		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	480	1391	-	-	1412	-	-	704				
HCM Lane V/C Ratio	0.005	0.034	-	-	-	-	-	0.15				
HCM Control Delay (s)	12.5	7.7	0	-	0	-	-	11				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5				

Queuing and Blocking Report

No Mitigation

09/02/2022

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	132	240	125	268	185	277	240	125	322	325
Average Queue (ft)	47	120	85	93	96	172	139	34	215	218
95th Queue (ft)	100	218	138	203	173	267	221	92	309	307
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		0	14	9	1	7		0	23	
Queuing Penalty (veh)		0	17	12	3	8		0	8	

Intersection: 2: WASHINGTON AVE & PRESUMPSCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	70	281	100	521	195	174	426
Average Queue (ft)	22	200	22	275	49	29	282
95th Queue (ft)	53	304	75	458	174	114	405
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		34	0			0	29
Queuing Penalty (veh)		14	2			0	9

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	77
Average Queue (ft)	24
95th Queue (ft)	61
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

No Mitigation

09/02/2022

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	62	8	79
Average Queue (ft)	29	0	34
95th Queue (ft)	59	4	64
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	52	4	24	65
Average Queue (ft)	8	0	2	34
95th Queue (ft)	34	3	15	54
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 73

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	97	159	77	99	62	154	1133	185	51	1026	92
Future Volume (vph)	72	97	159	77	99	62	154	1133	185	51	1026	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.907			0.943			0.979			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1690	0	1770	1757	0	1770	3465	0	1770	3497	0
Flt Permitted	0.489			0.221			0.950			0.950		
Satd. Flow (perm)	911	1690	0	412	1757	0	1770	3465	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61			23			22			10	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	105	173	84	108	67	167	1232	201	55	1115	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	278	0	84	175	0	167	1433	0	55	1215	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	29.0		11.0	29.0		23.0	67.0		13.0	57.0	

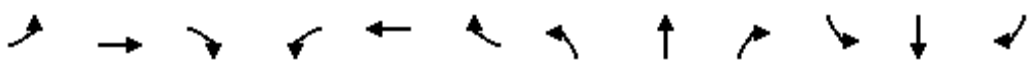
Short PM No Build 2:45 pm 08/31/2022 No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	24.2%		9.2%	24.2%		19.2%	55.8%		10.8%	47.5%	
Maximum Green (s)	5.0	23.0		5.0	23.0		17.0	61.0		7.0	51.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	23.7	19.7		23.7	19.7		17.0	66.5		7.0	56.5	
Actuated g/C Ratio	0.20	0.16		0.20	0.16		0.14	0.55		0.06	0.47	
v/c Ratio	0.36	0.85		0.61	0.57		0.67	0.74		0.53	0.74	
Control Delay	39.7	60.3		54.9	46.8		62.9	24.4		61.2	35.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.7	60.3		54.9	46.8		62.9	24.4		61.2	35.2	
LOS	D	E		D	D		E	C		E	D	
Approach Delay		55.8			49.4			28.4			36.3	
Approach LOS		E			D			C			D	
Queue Length 50th (ft)	46	164		50	107		124	452		40	420	
Queue Length 95th (ft)	86	#279		91	179		#205	565		m52	m473	
Internal Link Dist (ft)		348			421			715			1001	
Turn Bay Length (ft)	250			100			160			100		
Base Capacity (vph)	216	373		137	355		250	1928		103	1650	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.36	0.75		0.61	0.49		0.67	0.74		0.53	0.74	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 97 (81%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 35.6

Intersection LOS: D

Intersection Capacity Utilization 80.5%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

	02 (R)		01		03		04
57 s		23 s		11 s		29 s	
	06 (R)		05		07		08
67 s		13 s		11 s		29 s	

Lanes, Volumes, Timings

2: WASHINGTON AVE & PRESUMPCOT

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	282	5	46	2	820	436	21	748	15
Future Volume (vph)	10	5	10	282	5	46	2	820	436	21	748	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.945				0.850			0.850		0.997	
Flt Protected		0.980			0.953					0.950		
Satd. Flow (prot)	0	1725	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.386			0.710			0.827		0.078		
Satd. Flow (perm)	0	679	0	0	1323	1583	0	1540	1583	145	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				136			284		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	307	5	50	2	891	474	23	813	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	312	50	0	893	474	23	829	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

Short PM No Build 2:45 pm 08/31/2022 No Mitigation
VHB

Synchro 11 Report
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Lanes, Volumes, Timings

2: WASHINGTON AVE & PRESUMPCOT

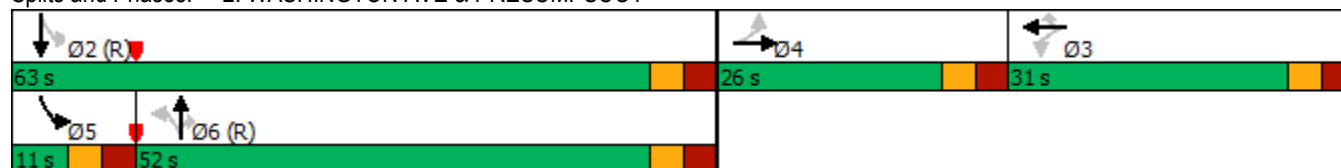
09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effct Green (s)		9.6			40.1	40.1		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.08			0.33	0.33		0.42	0.42	0.48	0.48	
v/c Ratio		0.42			0.71	0.08		1.38	0.57	0.17	0.94	
Control Delay		54.3			47.6	0.3		201.1	4.5	14.0	32.3	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		54.3			47.6	0.3		201.1	4.5	14.0	32.3	
LOS		D			D	A		F	A	B	C	
Approach Delay		54.3			41.1			132.9			31.8	
Approach LOS		D			D			F			C	
Queue Length 50th (ft)		12			221	0		~975	12	5	315	
Queue Length 95th (ft)		42			#427	0		#1200	75	m9	#858	
Internal Link Dist (ft)		574			537			1001			2367	
Turn Bay Length (ft)						75				150		
Base Capacity (vph)		122			442	619		646	829	136	882	
Starvation Cap Reductn		0			0	0		0	0	0	0	
Spillback Cap Reductn		0			0	0		0	0	0	0	
Storage Cap Reductn		0			0	0		0	0	0	0	
Reduced v/c Ratio		0.22			0.71	0.08		1.38	0.57	0.17	0.94	
Intersection Summary												
Area Type: Other												
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green												
Natural Cycle: 145												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.38												
Intersection Signal Delay: 86.3						Intersection LOS: F						
Intersection Capacity Utilization 86.4%						ICU Level of Service E						
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												

Lanes, Volumes, Timings 2: WASHINGTON AVE & PRESUMPSCOT

09/02/2022

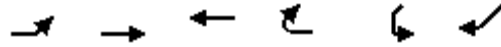
Splits and Phases: 2: WASHINGTON AVE & PRESUMPSCOT



Lanes, Volumes, Timings

6: BAXTER BLVD

09/02/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	446	205	0	0	236
Future Volume (vph)	0	446	205	0	0	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	485	223	0	0	257
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	485	223	0	0	257
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	32.1%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings

7: RAMPS

09/02/2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	200	246	205	51	58	0
Future Volume (vph)	200	246	205	51	58	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1812	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1812	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	267	223	55	63	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	217	267	278	0	63	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 38.3%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	200	246	205	51	58	0
Future Vol, veh/h	200	246	205	51	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	217	267	223	55	63	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	278	0	-	0	952	-
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	701	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1285	-	-	-	288	0
Stage 1	-	-	-	-	791	0
Stage 2	-	-	-	-	492	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1285	-	-	-	239	-
Mov Cap-2 Maneuver	-	-	-	-	239	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	492	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		25.4		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1285	-	-	-	239	
HCM Lane V/C Ratio	0.169	-	-	-	0.264	
HCM Control Delay (s)	8.4	-	-	-	25.4	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.6	-	-	-	1	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	179	0	0	195	26	1	0	0	41	0	38
Future Volume (vph)	51	179	0	0	195	26	1	0	0	41	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.984											0.936
Flt Protected	0.989											0.975
Satd. Flow (prot)	0	1842	0	0	1833	0	0	1770	0	0	1700	0
Flt Permitted	0.989											0.975
Satd. Flow (perm)	0	1842	0	0	1833	0	0	1770	0	0	1700	0
Link Speed (mph)	30											30
Link Distance (ft)	501											437
Travel Time (s)	11.4											9.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	195	0	0	212	28	1	0	0	45	0	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	250	0	0	240	0	0	1	0	0	86	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12											12
Link Offset(ft)	0											0
Crosswalk Width(ft)	16											16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control	Free											
Free												
Stop												
Stop												
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization 38.2%												
ICU Level of Service A												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	51	179	0	0	195	26	1	0	0	41	0	38
Future Vol, veh/h	51	179	0	0	195	26	1	0	0	41	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	195	0	0	212	28	1	0	0	45	0	41
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	240	0	0	195	0	0	552	545	195	531	531	226
Stage 1	-	-	-	-	-	-	305	305	-	226	226	-
Stage 2	-	-	-	-	-	-	247	240	-	305	305	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1327	-	-	1378	-	-	444	446	846	459	454	813
Stage 1	-	-	-	-	-	-	705	662	-	777	717	-
Stage 2	-	-	-	-	-	-	757	707	-	705	662	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1327	-	-	1378	-	-	407	425	846	443	433	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	407	425	-	443	433	-
Stage 1	-	-	-	-	-	-	673	632	-	741	717	-
Stage 2	-	-	-	-	-	-	719	707	-	673	632	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			13.9			12.5		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	407	1327	-	-	1378	-	-	567				
HCM Lane V/C Ratio	0.003	0.042	-	-	-	-	-	0.151				
HCM Control Delay (s)	13.9	7.8	0	-	0	-	-	12.5				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5				

Queuing and Blocking Report

No Mitigation

09/02/2022

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	214	301	125	238	185	751	728	124	398	403
Average Queue (ft)	55	156	67	103	158	601	583	59	267	279
95th Queue (ft)	130	266	124	193	231	957	958	124	373	384
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)						33	30			
Queuing Penalty (veh)						0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	3	16	3	55		1	40	
Queuing Penalty (veh)		2	4	12	16	85		6	20	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	73	276	100	1038	1054	174	508
Average Queue (ft)	26	144	37	918	728	21	341
95th Queue (ft)	62	248	102	1295	1340	95	504
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				11	2		
Queuing Penalty (veh)				71	14		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		26	1			0	32
Queuing Penalty (veh)		12	3			0	7

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	99
Average Queue (ft)	32
95th Queue (ft)	73
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report

No Mitigation

09/02/2022

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	81	16	79
Average Queue (ft)	32	1	33
95th Queue (ft)	64	8	63
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	61	9	18	64
Average Queue (ft)	13	0	1	32
95th Queue (ft)	44	6	11	55
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 252

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	77	164	153	83	62	103	669	135	65	1230	72
Future Volume (vph)	67	77	164	153	83	62	103	669	135	65	1230	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.898			0.936			0.975			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1673	0	1770	1744	0	1770	3451	0	1770	3511	0
Flt Permitted	0.657			0.169			0.950			0.950		
Satd. Flow (perm)	1224	1673	0	315	1744	0	1770	3451	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		76			28			26			6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	84	178	166	90	67	112	727	147	71	1337	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	73	262	0	166	157	0	112	874	0	71	1415	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	25.0		17.0	31.0		17.0	62.0		16.0	61.0	

Short AM Build 2:45 pm 08/31/2022 No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	20.8%		14.2%	25.8%		14.2%	51.7%		13.3%	50.8%	
Maximum Green (s)	5.0	19.0		11.0	25.0		11.0	56.0		10.0	55.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	22.0	17.0		34.0	25.2		11.0	58.0		10.0	57.0	
Actuated g/C Ratio	0.18	0.14		0.28	0.21		0.09	0.48		0.08	0.48	
v/c Ratio	0.30	0.87		0.75	0.40		0.69	0.52		0.48	0.85	
Control Delay	36.1	62.5		55.2	37.2		75.1	22.5		49.1	22.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.1	62.5		55.2	37.2		75.1	22.5		49.1	22.9	
LOS	D	E		E	D		E	C		D	C	
Approach Delay		56.7			46.5			28.4			24.2	
Approach LOS		E			D			C			C	
Queue Length 50th (ft)	41	142		99	86		86	240		56	380	
Queue Length 95th (ft)	79	#274		#171	153		#169	301		m59	m365	
Internal Link Dist (ft)		348			421			715			1001	
Turn Bay Length (ft)	250			100			160			100		
Base Capacity (vph)	247	328		222	395		162	1680		147	1670	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.30	0.80		0.75	0.40		0.69	0.52		0.48	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 31.3

Intersection LOS: C

Intersection Capacity Utilization 84.6%

ICU Level of Service E

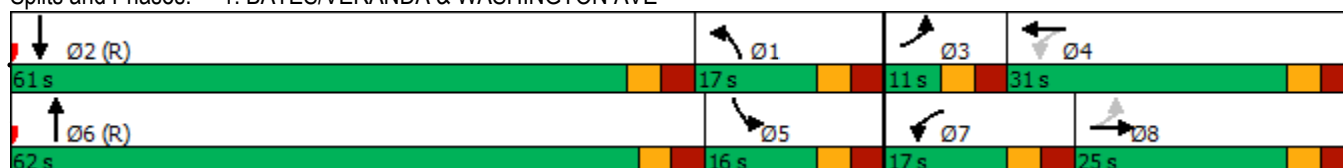
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Lanes, Volumes, Timings

2: WASHINGTON AVE & PRESUMPCOT

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	425	5	41	2	555	236	31	798	5
Future Volume (vph)	10	5	10	425	5	41	2	555	236	31	798	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.945				0.850			0.850		0.999	
Flt Protected		0.980			0.953					0.950		
Satd. Flow (prot)	0	1725	0	0	1775	1583	0	1863	1583	1770	1861	0
Flt Permitted		0.386			0.709			0.704		0.088		
Satd. Flow (perm)	0	679	0	0	1321	1583	0	1311	1583	164	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				136			210			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	462	5	45	2	603	257	34	867	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	467	45	0	605	257	34	872	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		37.0	37.0	37.0	46.0	46.0	46.0	11.0	57.0	

Short AM Build 2:45 pm 08/31/2022 No Mitigation
VHB

Synchro 11 Report
Page 3

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

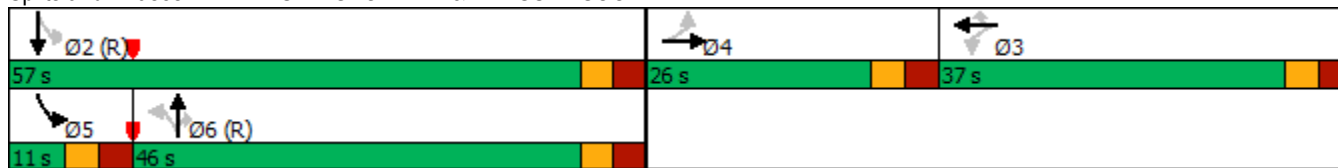
09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		30.8%	30.8%	30.8%	38.3%	38.3%	38.3%	9.2%	47.5%	
Maximum Green (s)	20.0	20.0		31.0	31.0	31.0	40.0	40.0	40.0	5.0	51.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effct Green (s)		9.6			46.1	46.1		44.4	44.4	51.0	51.0	
Actuated g/C Ratio		0.08			0.38	0.38		0.37	0.37	0.42	0.42	
v/c Ratio		0.42			0.92	0.07		1.25	0.36	0.25	1.10	
Control Delay		54.3			62.4	0.2		158.2	9.7	21.1	82.8	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		54.3			62.4	0.2		158.2	9.7	21.1	82.8	
LOS		D			E	A		F	A	C	F	
Approach Delay		54.3			57.0			113.9			80.5	
Approach LOS		D			E			F			F	
Queue Length 50th (ft)		12			~362	0		~590	23	9	~753	
Queue Length 95th (ft)		42			#651	0		#824	82	m19	#1009	
Internal Link Dist (ft)		574			537			1001			2367	
Turn Bay Length (ft)						75				150		
Base Capacity (vph)		122			507	691		485	717	136	790	
Starvation Cap Reductn		0			0	0		0	0	0	0	
Spillback Cap Reductn		0			0	0		0	0	0	0	
Storage Cap Reductn		0			0	0		0	0	0	0	
Reduced v/c Ratio		0.22			0.92	0.07		1.25	0.36	0.25	1.10	
Intersection Summary												
Area Type: Other												
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 4 (3%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green												
Natural Cycle: 145												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.25												
Intersection Signal Delay: 87.4 Intersection LOS: F												
Intersection Capacity Utilization 82.8% ICU Level of Service E												
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												

Lanes, Volumes, Timings 2: WASHINGTON AVE & PRESUMPSCOT

09/02/2022

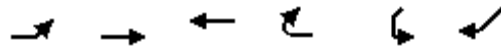
Splits and Phases: 2: WASHINGTON AVE & PRESUMPSCOT



Lanes, Volumes, Timings

6: BAXTER BLVD

09/02/2022

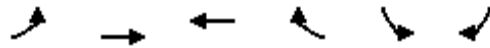


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	382	200	0	0	182
Future Volume (vph)	0	382	200	0	0	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)	30		30	30		
Link Distance (ft)	571		236	300		
Travel Time (s)	13.0		5.4	6.8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	415	217	0	0	198
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	415	217	0	0	198
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	0		0	0		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free	Yield		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 28.5%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings

7: RAMPS

09/02/2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	172	210	200	74	65	0
Future Volume (vph)	172	210	200	74	65	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.964					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1796	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1796	0	1770	0
Link Speed (mph)	30		30	30		
Link Distance (ft)	236		727	173		
Travel Time (s)	5.4		16.5	3.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	228	217	80	71	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	228	297	0	71	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	12		12	12		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15				15	9
Sign Control	Free		Free	Stop		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 38.2%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	172	210	200	74	65	0
Future Vol, veh/h	172	210	200	74	65	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	228	217	80	71	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	297	0	-	0	859	-
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	602	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1264	-	-	-	327	0
Stage 1	-	-	-	-	786	0
Stage 2	-	-	-	-	547	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1264	-	-	-	279	-
Mov Cap-2 Maneuver	-	-	-	-	279	-
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	547	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		22.2		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1264	-	-	-	279	
HCM Lane V/C Ratio	0.148	-	-	-	0.253	
HCM Control Delay (s)	8.3	-	-	-	22.2	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	1	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	138	136	26	138	31	39	3	19	36	6	61
Future Volume (vph)	43	138	136	26	138	31	39	3	19	36	6	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.942			0.978			0.957			0.920	
Flt Protected		0.993			0.993			0.969			0.983	
Satd. Flow (prot)	0	1742	0	0	1809	0	0	1727	0	0	1685	0
Flt Permitted		0.993			0.993			0.969			0.983	
Satd. Flow (perm)	0	1742	0	0	1809	0	0	1727	0	0	1685	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	150	148	28	150	34	42	3	21	39	7	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	345	0	0	212	0	0	66	0	0	112	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	37.0%											
Analysis Period (min)	15											
	ICU Level of Service A											

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	43	138	136	26	138	31	39	3	19	36	6	61
Future Vol, veh/h	43	138	136	26	138	31	39	3	19	36	6	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	150	148	28	150	34	42	3	21	39	7	66
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	184	0	0	298	0	0	578	558	224	553	615	167
Stage 1	-	-	-	-	-	-	318	318	-	223	223	-
Stage 2	-	-	-	-	-	-	260	240	-	330	392	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1391	-	-	1263	-	-	427	438	815	444	407	877
Stage 1	-	-	-	-	-	-	693	654	-	780	719	-
Stage 2	-	-	-	-	-	-	745	707	-	683	606	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1391	-	-	1263	-	-	370	410	815	409	381	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	370	410	-	409	381	-
Stage 1	-	-	-	-	-	-	665	627	-	748	701	-
Stage 2	-	-	-	-	-	-	665	689	-	635	581	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			1.1			14.4			12.5		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	448	1391	-	-	1263	-	-	594				
HCM Lane V/C Ratio	0.148	0.034	-	-	0.022	-	-	0.188				
HCM Control Delay (s)	14.4	7.7	0	-	7.9	0	-	12.5				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0.1	-	-	0.7				

Queuing and Blocking Report

No Mitigation

09/02/2022

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	206	289	125	272	185	331	306	125	296	311
Average Queue (ft)	48	143	90	109	97	202	176	54	214	218
95th Queue (ft)	126	255	144	224	178	304	274	118	288	292
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		0								
Queuing Penalty (veh)		0								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		2	16	13	0	11		1	26	
Queuing Penalty (veh)		1	23	19	2	11		6	17	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	53	281	100	562	153	174	458
Average Queue (ft)	19	195	27	292	43	31	285
95th Queue (ft)	47	310	90	476	94	125	419
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		32	0			0	26
Queuing Penalty (veh)		13	1			0	8

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	100
Average Queue (ft)	28
95th Queue (ft)	70
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report No Mitigation

09/02/2022

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	72	4	87
Average Queue (ft)	29	0	35
95th Queue (ft)	64	3	71
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	70	70	62	70
Average Queue (ft)	10	10	29	35
95th Queue (ft)	42	41	55	58
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 101

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	123	159	129	141	101	154	1133	236	75	1026	92
Future Volume (vph)	72	123	159	129	141	101	154	1133	236	75	1026	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.915			0.937			0.974			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1704	0	1770	1745	0	1770	3447	0	1770	3497	0
Flt Permitted	0.470			0.178			0.950			0.950		
Satd. Flow (perm)	875	1704	0	332	1745	0	1770	3447	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			28			27			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	134	173	140	153	110	167	1232	257	82	1115	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	307	0	140	263	0	167	1489	0	82	1215	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	29.0		15.0	33.0		21.0	62.0		14.0	55.0	

Short PM Build 2:45 pm 08/31/2022 No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings

1: BATES/VERANDA & WASHINGTON AVE

09/02/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	24.2%		12.5%	27.5%		17.5%	51.7%		11.7%	45.8%	
Maximum Green (s)	5.0	23.0		9.0	27.0		15.0	56.0		8.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	26.4	21.4		34.8	27.6		15.0	57.6		8.0	50.6	
Actuated g/C Ratio	0.22	0.18		0.29	0.23		0.12	0.48		0.07	0.42	
v/c Ratio	0.34	0.90		0.69	0.62		0.76	0.89		0.69	0.82	
Control Delay	35.5	68.7		49.8	44.6		72.6	36.5		71.2	44.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	35.5	68.7		49.8	44.6		72.6	36.5		71.2	44.0	
LOS	D	E		D	D		E	D		E	D	
Approach Delay		61.9			46.4			40.1			45.7	
Approach LOS		E			D			D			D	
Queue Length 50th (ft)	43	197		80	166		127	544		60	464	
Queue Length 95th (ft)	82	#350		#147	259		#233	#707		m75	m495	
Internal Link Dist (ft)		348			421			715			1001	
Turn Bay Length (ft)	250			100			160			100		
Base Capacity (vph)	230	365		204	427		221	1668		118	1479	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.84		0.69	0.62		0.76	0.89		0.69	0.82	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 45.0

Intersection LOS: D

Intersection Capacity Utilization 86.4%

ICU Level of Service E

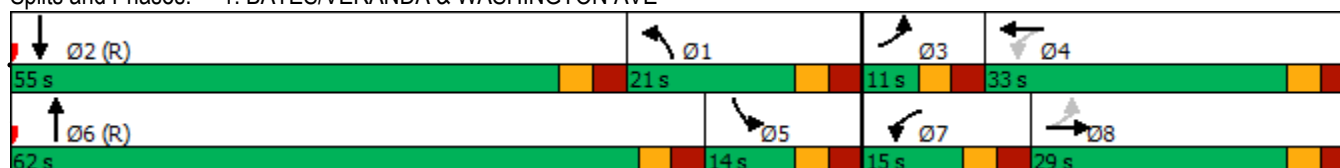
Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE



Lanes, Volumes, Timings

2: WASHINGTON AVE & PRESUMPCOT

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	282	5	46	2	860	436	32	773	15
Future Volume (vph)	10	5	10	282	5	46	2	860	436	32	773	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.945				0.850			0.850		0.997	
Flt Protected		0.980			0.953					0.950		
Satd. Flow (prot)	0	1725	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.386			0.710			0.752		0.078		
Satd. Flow (perm)	0	679	0	0	1323	1583	0	1401	1583	145	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				136			271		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	307	5	50	2	935	474	35	840	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	27	0	0	312	50	0	937	474	35	856	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

Short PM Build 2:45 pm 08/31/2022 No Mitigation
VHB

Synchro 11 Report
Page 3

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

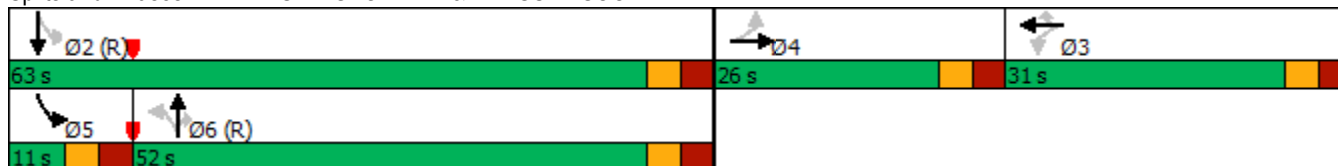
09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effct Green (s)		9.6			40.1	40.1		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.08			0.33	0.33		0.42	0.42	0.48	0.48	
v/c Ratio		0.42			0.71	0.08		1.59	0.58	0.26	0.97	
Control Delay		54.3			47.6	0.3		291.2	2.6	14.9	36.6	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		54.3			47.6	0.3		291.2	2.6	14.9	36.6	
LOS		D			D	A		F	A	B	D	
Approach Delay		54.3			41.1			194.2			35.7	
Approach LOS		D			D			F			D	
Queue Length 50th (ft)		12			221	0		~1069	2	8	360	
Queue Length 95th (ft)		42			#427	0		m#1259	m15	m13	#905	
Internal Link Dist (ft)		574			537			1001			2367	
Turn Bay Length (ft)						75				150		
Base Capacity (vph)		122			442	619		588	821	136	882	
Starvation Cap Reductn		0			0	0		0	0	0	0	
Spillback Cap Reductn		0			0	0		0	0	0	0	
Storage Cap Reductn		0			0	0		0	0	0	0	
Reduced v/c Ratio		0.22			0.71	0.08		1.59	0.58	0.26	0.97	
Intersection Summary												
Area Type: Other												
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green												
Natural Cycle: 145												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 1.59												
Intersection Signal Delay: 119.8 Intersection LOS: F												
Intersection Capacity Utilization 87.8% ICU Level of Service E												
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												
m Volume for 95th percentile queue is metered by upstream signal.												

Lanes, Volumes, Timings 2: WASHINGTON AVE & PRESUMPSCOT

09/02/2022

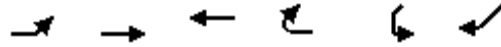
Splits and Phases: 2: WASHINGTON AVE & PRESUMPSCOT



Lanes, Volumes, Timings

6: BAXTER BLVD

09/02/2022

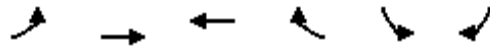


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	452	205	0	0	246
Future Volume (vph)	0	452	205	0	0	246
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)	30		30	30		
Link Distance (ft)	571		236	300		
Travel Time (s)	13.0		5.4	6.8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	491	223	0	0	267
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	491	223	0	0	267
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	0		0	0		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control	Free		Free	Yield		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 32.7%						
ICU Level of Service A						
Analysis Period (min) 15						

Lanes, Volumes, Timings

7: RAMPS

09/02/2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	206	246	205	70	90	0
Future Volume (vph)	206	246	205	70	90	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.966			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1799	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1799	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	224	267	223	76	98	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	224	267	299	0	98	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	41.4%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	206	246	205	70	90	0
Future Vol, veh/h	206	246	205	70	90	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	224	267	223	76	98	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	299	0	-	0	976	-
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	715	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1262	-	-	-	279	0
Stage 1	-	-	-	-	783	0
Stage 2	-	-	-	-	485	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1262	-	-	-	230	-
Mov Cap-2 Maneuver	-	-	-	-	230	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	485	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.9	0		31.8		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1262	-	-	-	230	
HCM Lane V/C Ratio	0.177	-	-	-	0.425	
HCM Control Delay (s)	8.5	-	-	-	31.8	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.6	-	-	-	2	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

09/02/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	179	101	22	195	26	135	9	67	41	5	38
Future Volume (vph)	51	179	101	22	195	26	135	9	67	41	5	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.959			0.986			0.957			0.939	
Flt Protected		0.992			0.995			0.969			0.976	
Satd. Flow (prot)	0	1772	0	0	1827	0	0	1727	0	0	1707	0
Flt Permitted		0.992			0.995			0.969			0.976	
Satd. Flow (perm)	0	1772	0	0	1827	0	0	1727	0	0	1707	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	195	110	24	212	28	147	10	73	45	5	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	360	0	0	264	0	0	230	0	0	91	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 52.7%												
ICU Level of Service A												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	8.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	51	179	101	22	195	26	135	9	67	41	5	38
Future Vol, veh/h	51	179	101	22	195	26	135	9	67	41	5	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	195	110	24	212	28	147	10	73	45	5	41
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	240	0	0	305	0	0	657	648	250	676	689	226
Stage 1	-	-	-	-	-	-	360	360	-	274	274	-
Stage 2	-	-	-	-	-	-	297	288	-	402	415	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1327	-	-	1256	-	-	378	389	789	367	369	813
Stage 1	-	-	-	-	-	-	658	626	-	732	683	-
Stage 2	-	-	-	-	-	-	712	674	-	625	592	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1327	-	-	1256	-	-	335	361	789	308	342	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	335	361	-	308	342	-
Stage 1	-	-	-	-	-	-	624	594	-	695	668	-
Stage 2	-	-	-	-	-	-	656	659	-	530	562	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.2			0.7			24.3			15.6		
HCM LOS							C			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	411	1327	-	-	1256	-	-	432				
HCM Lane V/C Ratio	0.558	0.042	-	-	0.019	-	-	0.211				
HCM Control Delay (s)	24.3	7.8	0	-	7.9	0	-	15.6				
HCM Lane LOS	C	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	3.3	0.1	-	-	0.1	-	-	0.8				

Queuing and Blocking Report

No Mitigation

09/02/2022

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	207	317	125	376	185	806	803	125	427	434
Average Queue (ft)	56	176	89	165	153	718	711	71	293	305
95th Queue (ft)	143	291	144	299	240	947	958	141	397	409
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		1		0		55	52			
Queuing Penalty (veh)		2		0		0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		4	8	29	3	62		4	44	
Queuing Penalty (veh)		3	20	37	16	96		20	33	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	73	268	100	1046	1066	174	480
Average Queue (ft)	22	137	34	968	810	36	336
95th Queue (ft)	59	245	96	1238	1328	129	461
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				14	5		
Queuing Penalty (veh)				91	32		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		25	1			0	32
Queuing Penalty (veh)		11	2			0	10

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	89
Average Queue (ft)	31
95th Queue (ft)	69
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report No Mitigation

09/02/2022

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	94	9	97
Average Queue (ft)	35	1	42
95th Queue (ft)	71	6	75
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	57	59	101	68
Average Queue (ft)	11	7	55	32
95th Queue (ft)	42	34	88	56
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 373

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	47	168	142	73	53	105	686	76	37	1261	73
Future Volume (vph)	68	47	168	142	73	53	105	686	76	37	1261	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.883			0.936			0.985			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1645	0	1770	1744	0	1770	3486	0	1770	3511	0
Flt Permitted	0.669			0.200			0.950			0.950		
Satd. Flow (perm)	1246	1645	0	373	1744	0	1770	3486	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		125			27			14			7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	51	183	154	79	58	114	746	83	40	1371	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	234	0	154	137	0	114	829	0	40	1450	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	23.0		17.0	29.0		17.0	67.0		13.0	63.0	

AM No Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Medium Term) No Mitigation

09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	19.2%		14.2%	24.2%		14.2%	55.8%		10.8%	52.5%	
Maximum Green (s)	5.0	17.0		11.0	23.0		11.0	61.0		7.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	17.8	12.8		29.6	20.8		11.0	65.4		7.0	61.4	
Actuated g/C Ratio	0.15	0.11		0.25	0.17		0.09	0.54		0.06	0.51	
v/c Ratio	0.36	0.82		0.71	0.42		0.70	0.43		0.39	0.81	
Control Delay	40.6	45.6		54.7	39.4		76.2	17.5		50.8	22.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.6	45.6		54.7	39.4		76.2	17.5		50.8	22.5	
LOS	D	D		D	D		E	B		D	C	
Approach Delay		44.4			47.5			24.6			23.2	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 115 (96%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 28.1

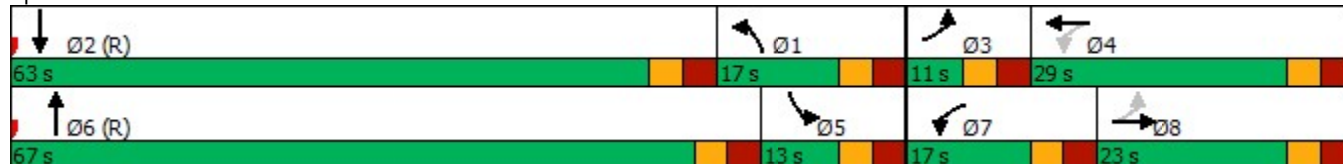
Intersection LOS: C

Intersection Capacity Utilization 83.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

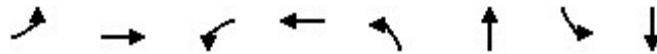


Queues

AM No Build (Medium Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/01/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	234	154	137	114	829	40	1450
v/c Ratio	0.36	0.82	0.71	0.42	0.70	0.43	0.39	0.81
Control Delay	40.6	45.6	54.7	39.4	76.2	17.5	50.8	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	45.6	54.7	39.4	76.2	17.5	50.8	22.5
Queue Length 50th (ft)	45	82	97	77	87	194	30	348
Queue Length 95th (ft)	83	171	#158	137	#174	260	m35	m418
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	206	340	220	356	162	1906	103	1799
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.69	0.70	0.38	0.70	0.43	0.39	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	47	168	142	73	53	105	686	76	37	1261	73
Future Volume (vph)	68	47	168	142	73	53	105	686	76	37	1261	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88		1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1644		1770	1744		1770	3486		1770	3510	
Flt Permitted	0.67	1.00		0.20	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1247	1644		373	1744		1770	3486		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	51	183	154	79	58	114	746	83	40	1371	79
RTOR Reduction (vph)	0	110	0	0	22	0	0	7	0	0	3	0
Lane Group Flow (vph)	74	124	0	154	115	0	114	822	0	40	1447	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	18.0	14.0		30.8	20.8		11.0	64.2		7.0	60.2	
Effective Green, g (s)	18.0	14.0		30.8	20.8		11.0	64.2		7.0	60.2	
Actuated g/C Ratio	0.15	0.12		0.26	0.17		0.09	0.54		0.06	0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	204	191		221	302		162	1865		103	1760	
v/s Ratio Prot	0.01	0.08		c0.06	0.07		c0.06	0.24		0.02	c0.41	
v/s Ratio Perm	0.04			c0.12								
v/c Ratio	0.36	0.65		0.70	0.38		0.70	0.44		0.39	0.82	
Uniform Delay, d1	45.3	50.6		37.5	43.9		52.9	17.0		54.4	25.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.83	0.80	
Incremental Delay, d2	1.1	7.3		9.2	0.8		22.6	0.8		4.9	2.1	
Delay (s)	46.4	58.0		46.6	44.7		75.5	17.7		50.2	22.5	
Level of Service	D	E		D	D		E	B		D	C	
Approach Delay (s)		55.2			45.7			24.7			23.2	
Approach LOS		E			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			29.1				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			83.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	47	168	142	73	53	105	686	76	37	1261	73
Future Volume (veh/h)	68	47	168	142	73	53	105	686	76	37	1261	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	51	183	154	79	58	114	746	83	40	1371	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	283	51	182	217	188	138	170	1639	182	110	1622	93
Arrive On Green	0.04	0.14	0.14	0.09	0.19	0.19	0.10	0.51	0.51	0.06	0.47	0.47
Sat Flow, veh/h	1781	357	1282	1781	1002	736	1781	3224	359	1781	3416	196
Grp Volume(v), veh/h	74	0	234	154	0	137	114	411	418	40	712	738
Grp Sat Flow(s),veh/h/ln	1781	0	1640	1781	0	1738	1781	1777	1806	1781	1777	1835
Q Serve(g_s), s	4.2	0.0	17.0	8.6	0.0	8.3	7.4	17.8	17.8	2.6	42.1	42.4
Cycle Q Clear(g_c), s	4.2	0.0	17.0	8.6	0.0	8.3	7.4	17.8	17.8	2.6	42.1	42.4
Prop In Lane	1.00		0.78	1.00		0.42	1.00		0.20	1.00		0.11
Lane Grp Cap(c), veh/h	283	0	232	217	0	327	170	903	918	110	844	872
V/C Ratio(X)	0.26	0.00	1.01	0.71	0.00	0.42	0.67	0.46	0.46	0.36	0.84	0.85
Avail Cap(c_a), veh/h	283	0	232	223	0	333	170	903	918	110	844	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	41.8	0.0	51.5	39.1	0.0	42.9	52.5	18.9	18.9	54.0	27.6	27.7
Incr Delay (d2), s/veh	0.5	0.0	61.0	9.7	0.0	0.9	19.2	1.7	1.6	0.8	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	10.9	4.4	0.0	3.7	4.2	7.6	7.8	1.2	17.6	18.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	0.0	112.5	48.8	0.0	43.8	71.6	20.5	20.5	54.8	28.6	28.7
LnGrp LOS	D	A	F	D	A	D	E	C	C	D	C	C
Approach Vol, veh/h		308			291			943			1490	
Approach Delay, s/veh		95.6			46.5			26.7			29.3	
Approach LOS		F			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.4	63.0	11.0	28.6	13.4	67.0	16.6	23.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	57.0	5.0	23.0	7.0	61.0	11.0	17.0				
Max Q Clear Time (g_c+l1), s	9.4	44.4	6.2	10.3	4.6	19.8	10.6	19.0				
Green Ext Time (p_c), s	0.1	6.3	0.0	0.4	0.0	4.3	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			36.9									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	553	238	29	786	3
Future Volume (vph)	7	2	7	435	4	41	2	553	238	29	786	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940				0.850			0.850		0.999	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1712	0	0	1775	1583	0	1863	1583	1770	1861	0
Flt Permitted		0.657			0.715			0.707		0.086		
Satd. Flow (perm)	0	1150	0	0	1332	1583	0	1317	1583	160	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				136			218			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	601	259	32	854	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	477	45	0	603	259	32	857	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		35.0	35.0	35.0	48.0	48.0	48.0	11.0	59.0	

AM No Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Medium Term) No Mitigation

09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		29.2%	29.2%	29.2%	40.0%	40.0%	40.0%	9.2%	49.2%	
Maximum Green (s)	20.0	20.0		29.0	29.0	29.0	42.0	42.0	42.0	5.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.0			48.2	48.2		46.4	46.4	53.0	53.0	
Actuated g/C Ratio		0.07			0.40	0.40		0.39	0.39	0.44	0.44	
v/c Ratio		0.21			0.89	0.06		1.19	0.35	0.23	1.04	
Control Delay		41.8			55.4	0.2		127.2	3.1	23.2	76.9	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.8			55.4	0.2		127.2	3.1	23.2	76.9	
LOS		D			E	A		F	A	C	E	
Approach Delay		41.8			50.7			89.9			75.0	
Approach LOS		D			D			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.19

Intersection Signal Delay: 74.8

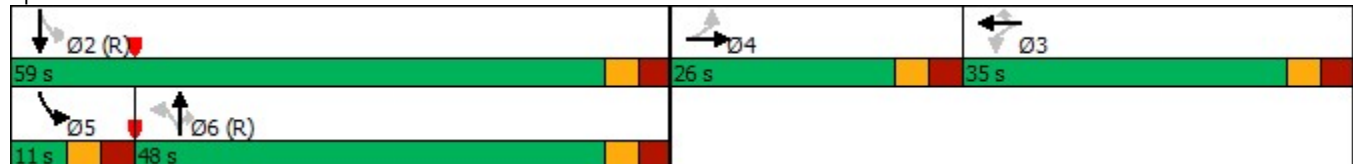
Intersection LOS: E

Intersection Capacity Utilization 82.5%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

AM No Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	18	477	45	603	259	32	857
v/c Ratio	0.21	0.89	0.06	1.19	0.35	0.23	1.04
Control Delay	41.8	55.4	0.2	127.2	3.1	23.2	76.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	55.4	0.2	127.2	3.1	23.2	76.9
Queue Length 50th (ft)	8	305	0	~609	1	14	~719
Queue Length 95th (ft)	31	#652	0	#795	34	33	#964
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	198	535	717	508	745	137	821
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.89	0.06	1.19	0.35	0.23	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

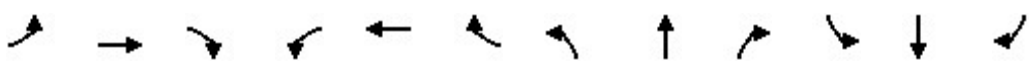
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Medium Term) No Mitigation

09/01/2022

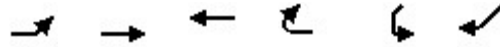
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔	↔	↔	↔	
Traffic Volume (vph)	7	2	7	435	4	41	2	553	238	29	786	3
Future Volume (vph)	7	2	7	435	4	41	2	553	238	29	786	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1713			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.66			0.72	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1150			1332	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	601	259	32	854	3
RTOR Reduction (vph)	0	8	0	0	0	27	0	0	145	0	0	0
Lane Group Flow (vph)	0	10	0	0	477	18	0	603	114	32	857	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			535	635		443	532	106	766	
v/s Ratio Prot										0.01	c0.46	
v/s Ratio Perm		c0.01			c0.36	0.01		c0.46	0.07	0.12		
v/c Ratio		0.25			0.89	0.03		1.36	0.22	0.30	1.12	
Uniform Delay, d1		56.2			33.5	21.7		39.8	28.5	28.0	35.3	
Progression Factor		1.00			1.00	1.00		0.65	0.32	1.00	1.00	
Incremental Delay, d2		3.0			19.7	0.1		175.6	0.9	1.6	70.3	
Delay (s)		59.2			53.2	21.8		201.4	10.0	29.6	105.6	
Level of Service		E			D	C		F	B	C	F	
Approach Delay (s)		59.2			50.5			143.9			102.9	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay		106.0			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.11										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			24.0				
Intersection Capacity Utilization		82.5%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

AM No Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	215	205	0	0	184
Future Volume (vph)	0	215	205	0	0	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	234	223	0	0	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	234	223	0	0	200
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 28.8%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
7: RAMPS

AM No Build (Medium Term) No Mitigation

09/01/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	168	215	205	53	58	0
Future Volume (vph)	168	215	205	53	58	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.972					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1811	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1811	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	234	223	58	63	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	183	234	281	0	63	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	36.7%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	168	215	205	53	58	0
Future Vol, veh/h	168	215	205	53	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	183	234	223	58	63	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	281	0	-	0	852	-
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	600	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1282	-	-	-	330	0
Stage 1	-	-	-	-	790	0
Stage 2	-	-	-	-	548	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1282	-	-	-	283	-
Mov Cap-2 Maneuver	-	-	-	-	283	-
Stage 1	-	-	-	-	677	-
Stage 2	-	-	-	-	548	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.6	0		21.3		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1282	-	-	-	283	
HCM Lane V/C Ratio	0.142	-	-	-	0.223	
HCM Control Delay (s)	8.3	-	-	-	21.3	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.8	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	142	16	0	142	32	1	1	0	37	0	62
Future Volume (vph)	44	142	16	0	142	32	1	1	0	37	0	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.975						0.915	
Flt Protected		0.989						0.976			0.982	
Satd. Flow (prot)	0	1824	0	0	1816	0	0	1818	0	0	1674	0
Flt Permitted		0.989						0.976			0.982	
Satd. Flow (perm)	0	1824	0	0	1816	0	0	1818	0	0	1674	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	154	17	0	154	35	1	1	0	40	0	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	219	0	0	189	0	0	2	0	0	107	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type: Unsignalized												
Intersection Capacity Utilization 37.0%												
ICU Level of Service A												
Analysis Period (min) 15												

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	44	142	16	0	142	32	1	1	0	37	0	62
Future Vol, veh/h	44	142	16	0	142	32	1	1	0	37	0	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	154	17	0	154	35	1	1	0	40	0	67
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	171	0	0	464	448	163	431	439	172
Stage 1	-	-	-	-	-	-	259	259	-	172	172	-
Stage 2	-	-	-	-	-	-	205	189	-	259	267	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1385	-	-	1406	-	-	508	506	882	535	512	872
Stage 1	-	-	-	-	-	-	746	694	-	830	756	-
Stage 2	-	-	-	-	-	-	797	744	-	746	688	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1385	-	-	1406	-	-	455	487	882	518	493	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	455	487	-	518	493	-
Stage 1	-	-	-	-	-	-	718	668	-	798	756	-
Stage 2	-	-	-	-	-	-	735	744	-	716	662	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			12.7			11.1		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	470	1385	-	-	1406	-	-	695				
HCM Lane V/C Ratio	0.005	0.035	-	-	-	-	-	0.155				
HCM Control Delay (s)	12.7	7.7	0	-	0	-	-	11.1				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	200	273	125	250	184	305	272	124	358	351
Average Queue (ft)	52	120	91	97	98	174	147	41	224	229
95th Queue (ft)	134	233	143	205	176	270	239	110	323	328
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		0								
Queuing Penalty (veh)		0								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)	0	1	15	10	1	8		1	25	
Queuing Penalty (veh)	0	1	19	15	4	8		8	9	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	52	282	100	572	92	143	496
Average Queue (ft)	16	206	27	255	31	24	309
95th Queue (ft)	45	319	87	497	65	102	478
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		34	0			0	27
Queuing Penalty (veh)		14	0			0	8

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	70
Average Queue (ft)	26
95th Queue (ft)	60
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	86	8	82
Average Queue (ft)	30	0	32
95th Queue (ft)	65	5	64
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	45	18	66
Average Queue (ft)	9	1	34
95th Queue (ft)	34	11	55
Link Distance (ft)	427	271	1268
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 86

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	100	163	79	102	63	158	1161	190	53	1052	95
Future Volume (vph)	73	100	163	79	102	63	158	1161	190	53	1052	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.907			0.943			0.979			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1690	0	1770	1757	0	1770	3465	0	1770	3497	0
Flt Permitted	0.484			0.213			0.950			0.950		
Satd. Flow (perm)	902	1690	0	397	1757	0	1770	3465	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		60			23			23			10	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	109	177	86	111	68	172	1262	207	58	1143	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	286	0	86	179	0	172	1469	0	58	1246	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	29.0		11.0	29.0		22.0	68.0		12.0	58.0	

PM No Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Medium Term) No Mitigation

09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	24.2%		9.2%	24.2%		18.3%	56.7%		10.0%	48.3%	
Maximum Green (s)	5.0	23.0		5.0	23.0		16.0	62.0		6.0	52.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	24.2	20.2		24.2	20.2		16.0	67.0		6.0	57.0	
Actuated g/C Ratio	0.20	0.17		0.20	0.17		0.13	0.56		0.05	0.48	
v/c Ratio	0.36	0.86		0.63	0.57		0.73	0.76		0.66	0.75	
Control Delay	39.6	61.7		56.5	46.7		68.6	24.4		73.0	35.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	39.6	61.7		56.5	46.7		68.6	24.4		73.0	35.4	
LOS	D	E		E	D		E	C		E	D	
Approach Delay		56.9			49.9			29.0			37.1	
Approach LOS		E			D			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 97 (81%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 36.4

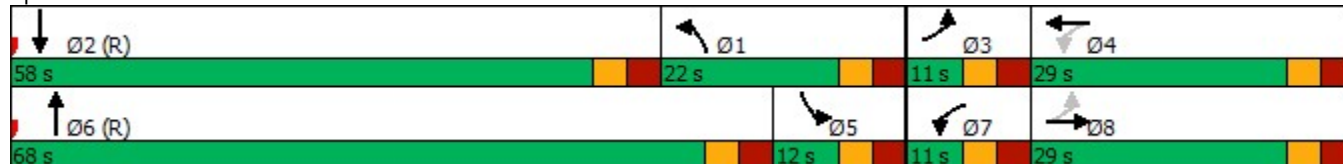
Intersection LOS: D

Intersection Capacity Utilization 82.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

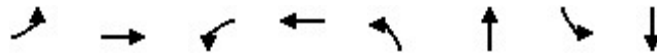


Queues

PM No Build (Medium Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/01/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	79	286	86	179	172	1469	58	1246
v/c Ratio	0.36	0.86	0.63	0.57	0.73	0.76	0.66	0.75
Control Delay	39.6	61.7	56.5	46.7	68.6	24.4	73.0	35.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	61.7	56.5	46.7	68.6	24.4	73.0	35.4
Queue Length 50th (ft)	46	170	51	110	130	470	43	428
Queue Length 95th (ft)	86	#295	#96	183	#231	577	m56	m470
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	217	372	136	355	236	1945	88	1667
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.77	0.63	0.50	0.73	0.76	0.66	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	100	163	79	102	63	158	1161	190	53	1052	95
Future Volume (vph)	73	100	163	79	102	63	158	1161	190	53	1052	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.91		1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1690		1770	1757		1770	3464		1770	3495	
Flt Permitted	0.48	1.00		0.21	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	902	1690		396	1757		1770	3464		1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	109	177	86	111	68	172	1262	207	58	1143	103
RTOR Reduction (vph)	0	50	0	0	19	0	0	10	0	0	5	0
Lane Group Flow (vph)	79	236	0	86	160	0	172	1459	0	58	1241	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	24.2	20.2		24.2	20.2		16.0	65.8		6.0	55.8	
Effective Green, g (s)	24.2	20.2		24.2	20.2		16.0	65.8		6.0	55.8	
Actuated g/C Ratio	0.20	0.17		0.20	0.17		0.13	0.55		0.05	0.46	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	210	284		125	295		236	1899		88	1625	
v/s Ratio Prot	0.01	c0.14		c0.02	0.09		c0.10	c0.42		0.03	0.35	
v/s Ratio Perm	0.06			0.12								
v/c Ratio	0.38	0.83		0.69	0.54		0.73	0.77		0.66	0.76	
Uniform Delay, d1	40.6	48.3		43.0	45.7		49.9	21.1		56.0	26.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.91	1.23	
Incremental Delay, d2	1.1	18.3		14.6	2.0		17.9	3.1		21.3	2.1	
Delay (s)	41.7	66.6		57.6	47.7		67.8	24.2		71.9	35.0	
Level of Service	D	E		E	D		E	C		E	C	
Approach Delay (s)		61.2			50.9			28.8			36.6	
Approach LOS		E			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			36.6			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			82.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	100	163	79	102	63	158	1161	190	53	1052	95
Future Volume (veh/h)	73	100	163	79	102	63	158	1161	190	53	1052	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	79	109	177	86	111	68	172	1262	207	58	1143	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	245	118	192	154	201	123	250	1581	257	101	1429	129
Arrive On Green	0.04	0.18	0.18	0.04	0.18	0.18	0.14	0.52	0.52	0.02	0.14	0.14
Sat Flow, veh/h	1781	641	1042	1781	1086	665	1781	3059	498	1781	3297	297
Grp Volume(v), veh/h	79	0	286	86	0	179	172	729	740	58	615	631
Grp Sat Flow(s),veh/h/ln	1781	0	1683	1781	0	1751	1781	1777	1781	1781	1777	1817
Q Serve(g_s), s	4.3	0.0	20.0	4.7	0.0	11.1	11.0	40.4	41.2	3.9	40.2	40.3
Cycle Q Clear(g_c), s	4.3	0.0	20.0	4.7	0.0	11.1	11.0	40.4	41.2	3.9	40.2	40.3
Prop In Lane	1.00		0.62	1.00		0.38	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	245	0	311	154	0	323	250	918	920	101	770	787
V/C Ratio(X)	0.32	0.00	0.92	0.56	0.00	0.55	0.69	0.79	0.80	0.57	0.80	0.80
Avail Cap(c_a), veh/h	245	0	323	154	0	336	250	918	920	101	770	787
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.17	0.17	0.17
Uniform Delay (d), s/veh	38.1	0.0	48.0	39.5	0.0	44.4	49.1	23.8	24.0	57.4	46.4	46.4
Incr Delay (d2), s/veh	0.8	0.0	29.9	4.5	0.0	1.8	14.4	7.0	7.4	3.9	1.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	11.0	2.3	0.0	5.0	5.9	18.1	18.6	1.9	19.5	20.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.9	0.0	78.0	44.1	0.0	46.3	63.5	30.8	31.4	61.4	47.9	47.9
LnGrp LOS	D	A	E	D	A	D	E	C	C	E	D	D
Approach Vol, veh/h		365			265			1641			1304	
Approach Delay, s/veh		69.5			45.5			34.5			48.5	
Approach LOS		E			D			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	58.0	11.0	28.2	12.8	68.0	11.0	28.2				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	16.0	52.0	5.0	23.0	6.0	62.0	5.0	23.0				
Max Q Clear Time (g_c+I1), s	13.0	42.3	6.3	13.1	5.9	43.2	6.7	22.0				
Green Ext Time (p_c), s	0.2	4.5	0.0	0.5	0.0	8.1	0.0	0.1				
Intersection Summary												
HCM 6th Ctrl Delay			44.0									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	838	443	20	767	16
Future Volume (vph)	8	2	8	288	2	44	1	838	443	20	767	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850		0.997	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.630			0.713			0.769		0.079		
Satd. Flow (perm)	0	1102	0	0	1328	1583	0	1432	1583	147	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				136			283		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	911	482	22	834	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	315	48	0	912	482	22	851	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

PM No Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.3			44.0	44.0		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.07			0.37	0.37		0.42	0.42	0.48	0.48	
v/c Ratio		0.24			0.65	0.07		1.52	0.58	0.16	0.96	
Control Delay		41.6			41.5	0.2		261.3	5.0	19.4	54.1	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6			41.5	0.2		261.3	5.0	19.4	54.1	
LOS		D			D	A		F	A	B	D	
Approach Delay		41.6			36.1			172.7			53.3	
Approach LOS		D			D			F			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.52

Intersection Signal Delay: 113.6

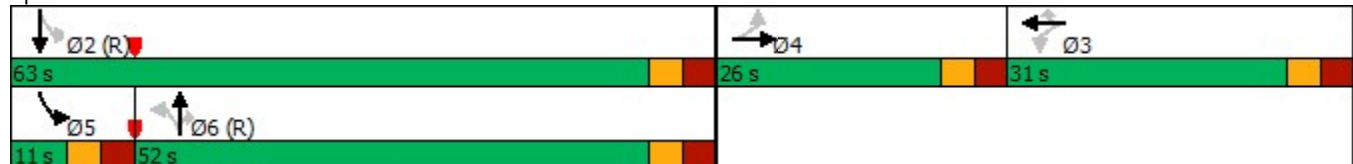
Intersection LOS: F

Intersection Capacity Utilization 87.9%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

PM No Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	315	48	912	482	22	851
v/c Ratio	0.24	0.65	0.07	1.52	0.58	0.16	0.96
Control Delay	41.6	41.5	0.2	261.3	5.0	19.4	54.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	41.5	0.2	261.3	5.0	19.4	54.1
Queue Length 50th (ft)	8	181	0	~1039	14	9	621
Queue Length 95th (ft)	33	#406	0	#1268	82	24	#908
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	191	486	666	601	829	137	882
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.65	0.07	1.52	0.58	0.16	0.96

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Medium Term) No Mitigation

09/01/2022

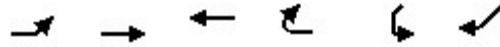
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	838	443	20	767	16
Future Volume (vph)	8	2	8	288	2	44	1	838	443	20	767	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.63			0.71	1.00		0.77	1.00	0.08	1.00	
Satd. Flow (perm)		1103			1328	1583		1432	1583	148	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	911	482	22	834	17
RTOR Reduction (vph)	0	9	0	0	0	30	0	0	178	0	1	0
Lane Group Flow (vph)	0	11	0	0	315	18	0	912	304	22	850	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.6			44.0	44.0		44.4	44.4	53.4	53.4	
Effective Green, g (s)		4.6			44.0	44.0		44.4	44.4	53.4	53.4	
Actuated g/C Ratio		0.04			0.37	0.37		0.37	0.37	0.44	0.44	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			486	580		529	585	106	826	
v/s Ratio Prot										0.01	c0.46	
v/s Ratio Perm		c0.01			c0.24	0.01		c0.64	0.19	0.09		
v/c Ratio		0.27			0.65	0.03		1.72	0.52	0.21	1.03	
Uniform Delay, d1		56.1			31.6	24.3		37.8	29.5	27.8	33.3	
Progression Factor		1.00			1.00	1.00		0.60	0.26	1.00	1.00	
Incremental Delay, d2		3.5			6.6	0.1		331.2	2.2	1.0	39.1	
Delay (s)		59.5			38.1	24.4		353.8	10.0	28.8	72.4	
Level of Service		E			D	C		F	B	C	E	
Approach Delay (s)		59.5			36.3			235.0			71.3	
Approach LOS		E			D			F			E	
Intersection Summary												
HCM 2000 Control Delay		152.5			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.18										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			24.0				
Intersection Capacity Utilization		87.9%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

PM No Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	252	210	0	0	242
Future Volume (vph)	0	252	210	0	0	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr t						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	274	228	0	0	263
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	274	228	0	0	263
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 32.7%						
ICU Level of Service A						
Analysis Period (min) 15						

Lanes, Volumes, Timings
7: RAMPS

PM No Build (Medium Term) No Mitigation

09/01/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	205	252	210	52	60	0
Future Volume (vph)	205	252	210	52	60	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.973					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1812	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1812	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	274	228	57	65	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	223	274	285	0	65	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	38.9%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	205	252	210	52	60	0
Future Vol, veh/h	205	252	210	52	60	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	223	274	228	57	65	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	285	0	-	0	977	-
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	720	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1277	-	-	-	278	0
Stage 1	-	-	-	-	786	0
Stage 2	-	-	-	-	482	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1277	-	-	-	229	-
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	648	-
Stage 2	-	-	-	-	482	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		26.9		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1277	-	-	-	229	
HCM Lane V/C Ratio	0.174	-	-	-	0.285	
HCM Control Delay (s)	8.4	-	-	-	26.9	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.6	-	-	-	1.1	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM No Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	184	1	0	200	26	1	0	0	42	0	39
Future Volume (vph)	52	184	1	0	200	26	1	0	0	42	0	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.985						0.936	
Flt Protected		0.989						0.950			0.975	
Satd. Flow (prot)	0	1840	0	0	1835	0	0	1770	0	0	1700	0
Flt Permitted		0.989						0.950			0.975	
Satd. Flow (perm)	0	1840	0	0	1835	0	0	1770	0	0	1700	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	200	1	0	217	28	1	0	0	46	0	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	258	0	0	245	0	0	1	0	0	88	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	38.9%											
Analysis Period (min)	15											
ICU Level of Service A												

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	184	1	0	200	26	1	0	0	42	0	39
Future Vol, veh/h	52	184	1	0	200	26	1	0	0	42	0	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	200	1	0	217	28	1	0	0	46	0	42
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	245	0	0	201	0	0	567	560	201	546	546	231
Stage 1	-	-	-	-	-	-	315	315	-	231	231	-
Stage 2	-	-	-	-	-	-	252	245	-	315	315	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1321	-	-	1371	-	-	434	437	840	448	445	808
Stage 1	-	-	-	-	-	-	696	656	-	772	713	-
Stage 2	-	-	-	-	-	-	752	703	-	696	656	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1321	-	-	1371	-	-	396	416	840	431	423	808
Mov Cap-2 Maneuver	-	-	-	-	-	-	396	416	-	431	423	-
Stage 1	-	-	-	-	-	-	662	624	-	734	713	-
Stage 2	-	-	-	-	-	-	713	703	-	662	624	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			14.1			12.7		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	396	1321	-	-	1371	-	-	556				
HCM Lane V/C Ratio	0.003	0.043	-	-	-	-	-	0.158				
HCM Control Delay (s)	14.1	7.8	0	-	0	-	-	12.7				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	182	297	125	251	185	816	812	125	390	408
Average Queue (ft)	54	152	65	111	166	708	692	60	282	295
95th Queue (ft)	116	274	127	202	232	962	968	132	388	403
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		0				45	39			
Queuing Penalty (veh)		1				0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	3	18	4	63		2	40	
Queuing Penalty (veh)		2	5	15	25	99		9	21	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	73	271	100	1055	1054	148	633
Average Queue (ft)	20	148	35	1000	836	19	363
95th Queue (ft)	56	256	97	1154	1296	80	554
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				13	3		
Queuing Penalty (veh)				87	23		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		29	1				30
Queuing Penalty (veh)		13	1				6

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	111
Average Queue (ft)	32
95th Queue (ft)	77
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	81	14	70
Average Queue (ft)	33	1	32
95th Queue (ft)	71	7	61
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	62	9	18	65
Average Queue (ft)	11	0	1	33
95th Queue (ft)	40	4	9	53
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 308

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.904			0.935			0.970			0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1684	0	1770	1742	0	1770	3433	0	1770	3511	0
Flt Permitted	0.648			0.176			0.950			0.950		
Satd. Flow (perm)	1207	1684	0	328	1742	0	1770	3433	0	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		65			30			32			6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	104	183	177	98	75	114	746	189	90	1371	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	287	0	177	173	0	114	935	0	90	1450	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	28.0		16.0	33.0		15.0	56.0		20.0	61.0	

AM Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) No Mitigation

09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	23.3%		13.3%	27.5%		12.5%	46.7%		16.7%	50.8%	
Maximum Green (s)	5.0	22.0		10.0	27.0		9.0	50.0		14.0	55.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	24.7	19.7		34.9	26.9		9.0	52.3		14.0	57.3	
Actuated g/C Ratio	0.21	0.16		0.29	0.22		0.08	0.44		0.12	0.48	
v/c Ratio	0.27	0.87		0.82	0.42		0.86	0.62		0.44	0.86	
Control Delay	34.0	62.8		63.0	36.4		103.8	27.8		43.6	29.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.0	62.8		63.0	36.4		103.8	27.8		43.6	29.6	
LOS	C	E		E	D		F	C		D	C	
Approach Delay		56.9			49.8			36.1			30.4	
Approach LOS		E			D			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 109 (91%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 37.2

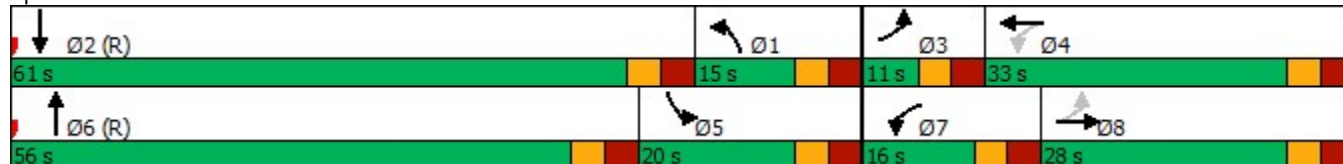
Intersection LOS: D

Intersection Capacity Utilization 87.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

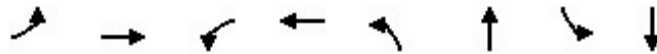


Queues

AM Build (Medium Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/01/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	287	177	173	114	935	90	1450
v/c Ratio	0.27	0.87	0.82	0.42	0.86	0.62	0.44	0.86
Control Delay	34.0	62.8	63.0	36.4	103.8	27.8	43.6	29.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	62.8	63.0	36.4	103.8	27.8	43.6	29.6
Queue Length 50th (ft)	41	168	104	94	89	289	61	420
Queue Length 95th (ft)	78	#303	#191	164	#198	361	m66	m411
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	272	361	215	423	132	1513	206	1678
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.80	0.82	0.41	0.86	0.62	0.44	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.93		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1685		1770	1742		1770	3432		1770	3510	
Flt Permitted	0.65	1.00		0.18	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1207	1685		328	1742		1770	3432		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	104	183	177	98	75	114	746	189	90	1371	79
RTOR Reduction (vph)	0	54	0	0	23	0	0	18	0	0	3	0
Lane Group Flow (vph)	74	233	0	177	150	0	114	917	0	90	1447	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	24.9	20.9		36.9	26.9		9.0	51.1		14.0	56.1	
Effective Green, g (s)	24.9	20.9		36.9	26.9		9.0	51.1		14.0	56.1	
Actuated g/C Ratio	0.21	0.17		0.31	0.22		0.08	0.43		0.12	0.47	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	269	293		221	390		132	1461		206	1640	
v/s Ratio Prot	0.01	0.14		c0.07	0.09		c0.06	0.27		c0.05	c0.41	
v/s Ratio Perm	0.05			c0.18								
v/c Ratio	0.28	0.80		0.80	0.38		0.86	0.63		0.44	0.88	
Uniform Delay, d1	39.3	47.5		33.7	39.5		54.9	27.0		49.3	29.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.82	0.94	
Incremental Delay, d2	0.6	13.9		18.5	0.6		48.3	2.0		2.5	2.9	
Delay (s)	39.9	61.4		52.2	40.1		103.2	29.0		43.0	30.2	
Level of Service	D	E		D	D		F	C		D	C	
Approach Delay (s)		57.0			46.2			37.1			30.9	
Approach LOS		E			D			D			C	
Intersection Summary												
HCM 2000 Control Delay	37.4			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.88											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			24.0					
Intersection Capacity Utilization	87.4%			ICU Level of Service			E					
Analysis Period (min)	15											
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	104	183	177	98	75	114	746	189	90	1371	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	303	111	196	225	221	169	134	1170	296	208	1565	90
Arrive On Green	0.04	0.18	0.18	0.08	0.22	0.22	0.08	0.42	0.42	0.08	0.31	0.31
Sat Flow, veh/h	1781	608	1070	1781	983	752	1781	2808	711	1781	3416	196
Grp Volume(v), veh/h	74	0	287	177	0	173	114	472	463	90	712	738
Grp Sat Flow(s),veh/h/ln	1781	0	1678	1781	0	1735	1781	1777	1742	1781	1777	1835
Q Serve(g_s), s	4.0	0.0	20.2	9.6	0.0	10.3	7.6	25.3	25.3	5.8	45.5	45.8
Cycle Q Clear(g_c), s	4.0	0.0	20.2	9.6	0.0	10.3	7.6	25.3	25.3	5.8	45.5	45.8
Prop In Lane	1.00		0.64	1.00		0.43	1.00		0.41	1.00		0.11
Lane Grp Cap(c), veh/h	303	0	308	225	0	390	134	740	726	208	814	841
V/C Ratio(X)	0.24	0.00	0.93	0.79	0.00	0.44	0.85	0.64	0.64	0.43	0.87	0.88
Avail Cap(c_a), veh/h	303	0	308	225	0	390	134	740	726	208	814	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	37.7	0.0	48.3	37.1	0.0	40.0	54.8	27.8	27.8	51.5	38.3	38.4
Incr Delay (d2), s/veh	0.4	0.0	34.2	16.9	0.0	0.8	46.1	4.2	4.3	0.6	1.3	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	11.3	5.2	0.0	4.5	5.1	11.5	11.3	2.7	20.9	21.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.1	0.0	82.5	54.0	0.0	40.8	101.0	32.0	32.1	52.1	39.6	39.7
LnGrp LOS	D	A	F	D	A	D	F	C	C	D	D	D
Approach Vol, veh/h		361			350			1049			1540	
Approach Delay, s/veh		73.4			47.5			39.5			40.4	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	61.0	11.0	33.0	20.0	56.0	16.0	28.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	55.0	5.0	27.0	14.0	50.0	10.0	22.0				
Max Q Clear Time (g_c+l1), s	9.6	47.8	6.0	12.3	7.8	27.3	11.6	22.2				
Green Ext Time (p_c), s	0.0	4.3	0.0	0.6	0.1	4.7	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			44.5									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Future Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940				0.850			0.850			
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1712	0	0	1775	1583	0	1863	1583	1770	1863	0
Flt Permitted		0.657			0.715			0.707		0.086		
Satd. Flow (perm)	0	1150	0	0	1332	1583	0	1317	1583	160	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				136			212			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	618	259	32	905	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	477	45	0	620	259	32	908	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		35.0	35.0	35.0	48.0	48.0	48.0	11.0	59.0	

AM Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) No Mitigation

09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		29.2%	29.2%	29.2%	40.0%	40.0%	40.0%	9.2%	49.2%	
Maximum Green (s)	20.0	20.0		29.0	29.0	29.0	42.0	42.0	42.0	5.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.0			48.2	48.2		46.4	46.4	53.0	53.0	
Actuated g/C Ratio		0.07			0.40	0.40		0.39	0.39	0.44	0.44	
v/c Ratio		0.21			0.89	0.06		1.22	0.35	0.23	1.10	
Control Delay		41.8			55.4	0.2		136.0	2.8	23.2	96.8	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.8			55.4	0.2		136.0	2.8	23.2	96.8	
LOS		D			E	A		F	A	C	F	
Approach Delay		41.8			50.7			96.7			94.3	
Approach LOS		D			D			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 85.1

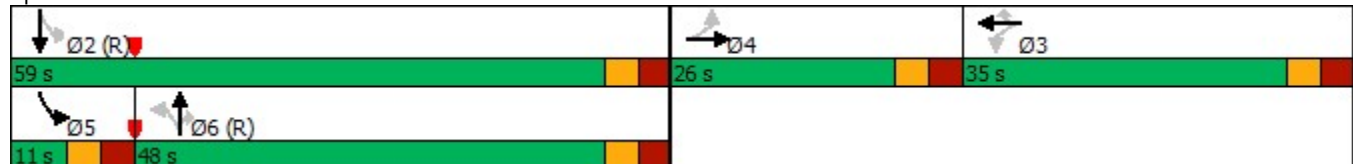
Intersection LOS: F

Intersection Capacity Utilization 85.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

AM Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	18	477	45	620	259	32	908
v/c Ratio	0.21	0.89	0.06	1.22	0.35	0.23	1.10
Control Delay	41.8	55.4	0.2	136.0	2.8	23.2	96.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	55.4	0.2	136.0	2.8	23.2	96.8
Queue Length 50th (ft)	8	305	0	~628	1	14	~800
Queue Length 95th (ft)	31	#652	0	#831	37	33	#1047
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	198	535	717	508	741	137	822
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.89	0.06	1.22	0.35	0.23	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) No Mitigation

09/01/2022

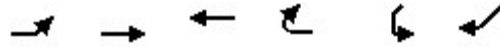
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Future Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1713			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.66			0.72	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1150			1332	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	618	259	32	905	3
RTOR Reduction (vph)	0	8	0	0	0	27	0	0	141	0	0	0
Lane Group Flow (vph)	0	10	0	0	477	18	0	620	118	32	908	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			535	635		443	532	106	766	
v/s Ratio Prot										0.01	c0.49	
v/s Ratio Perm		c0.01			c0.36	0.01		c0.47	0.07	0.12		
v/c Ratio		0.25			0.89	0.03		1.40	0.22	0.30	1.19	
Uniform Delay, d1		56.2			33.5	21.7		39.8	28.5	28.6	35.3	
Progression Factor		1.00			1.00	1.00		0.52	0.26	1.00	1.00	
Incremental Delay, d2		3.0			19.7	0.1		190.9	0.8	1.6	96.4	
Delay (s)		59.2			53.2	21.8		211.4	8.2	30.2	131.7	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		59.2			50.5			151.6			128.3	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay			119.2				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			85.0%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

AM Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	215	205	0	0	188
Future Volume (vph)	0	215	205	0	0	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	234	223	0	0	204
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	234	223	0	0	204
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	29.1%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

AM Build (Medium Term) No Mitigation

09/01/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	180	215	205	89	71	0
Future Volume (vph)	180	215	205	89	71	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959					
Flt Protected	0.950			0.950		
Satd. Flow (prot)	1770	1863	1786	0	1770	0
Flt Permitted	0.950			0.950		
Satd. Flow (perm)	1770	1863	1786	0	1770	0
Link Speed (mph)	30		30	30		
Link Distance (ft)	236		727	173		
Travel Time (s)	5.4		16.5	3.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	234	223	97	77	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	196	234	320	0	77	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	12		12	12		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control	Free		Free	Stop		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 40.1%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	180	215	205	89	71	0
Future Vol, veh/h	180	215	205	89	71	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	234	223	97	77	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	320	0	-	0	898	-
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	626	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1240	-	-	-	310	0
Stage 1	-	-	-	-	774	0
Stage 2	-	-	-	-	533	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1240	-	-	-	261	-
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	533	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		24.5		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1240	-	-	-	261	
HCM Lane V/C Ratio	0.158	-	-	-	0.296	
HCM Control Delay (s)	8.4	-	-	-	24.5	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.6	-	-	-	1.2	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	142	210	42	142	32	56	4	28	37	10	62
Future Volume (vph)	44	142	210	42	142	32	56	4	28	37	10	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.928			0.980			0.957			0.923	
Flt Protected		0.994			0.990			0.969			0.983	
Satd. Flow (prot)	0	1718	0	0	1807	0	0	1727	0	0	1690	0
Flt Permitted		0.994			0.990			0.969			0.983	
Satd. Flow (perm)	0	1718	0	0	1807	0	0	1727	0	0	1690	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	154	228	46	154	35	61	4	30	40	11	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	430	0	0	235	0	0	95	0	0	118	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	42.3%											
Analysis Period (min)	15											
ICU Level of Service A												

Intersection												
Int Delay, s/veh	4.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	44	142	210	42	142	32	56	4	28	37	10	62
Future Vol, veh/h	44	142	210	42	142	32	56	4	28	37	10	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	154	228	46	154	35	61	4	30	40	11	67
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	382	0	0	667	645	268	645	742	172
Stage 1	-	-	-	-	-	-	364	364	-	264	264	-
Stage 2	-	-	-	-	-	-	303	281	-	381	478	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1385	-	-	1176	-	-	372	391	771	385	344	872
Stage 1	-	-	-	-	-	-	655	624	-	741	690	-
Stage 2	-	-	-	-	-	-	706	678	-	641	556	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1385	-	-	1176	-	-	312	357	771	342	314	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	312	357	-	342	314	-
Stage 1	-	-	-	-	-	-	626	596	-	708	660	-
Stage 2	-	-	-	-	-	-	613	648	-	584	531	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			1.6			17.3			14		
HCM LOS							C			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	388	1385	-	-	1176	-	-	516				
HCM Lane V/C Ratio	0.247	0.035	-	-	0.039	-	-	0.23				
HCM Control Delay (s)	17.3	7.7	0	-	8.2	0	-	14				
HCM Lane LOS	C	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	1	0.1	-	-	0.1	-	-	0.9				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	207	308	125	298	185	422	394	125	393	404
Average Queue (ft)	56	164	95	116	109	241	217	67	264	266
95th Queue (ft)	147	277	147	234	199	401	367	131	370	374
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		1								
Queuing Penalty (veh)		2								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	16	13	2	20		1	33	
Queuing Penalty (veh)		2	25	21	8	21		7	27	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	56	296	100	720	358	174	566
Average Queue (ft)	16	209	26	273	80	30	357
95th Queue (ft)	45	314	85	645	404	115	518
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				1	0		
Queuing Penalty (veh)				3	2		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		36	0			0	32
Queuing Penalty (veh)		15	0			0	9

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	84
Average Queue (ft)	26
95th Queue (ft)	65
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	90	28	79
Average Queue (ft)	36	2	35
95th Queue (ft)	76	17	68
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	58	87	79	64
Average Queue (ft)	10	19	37	35
95th Queue (ft)	39	59	62	57
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 143

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.918			0.936			0.973			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1710	0	1770	1744	0	1770	3444	0	1770	3497	0
Flt Permitted	0.417			0.141			0.950			0.950		
Satd. Flow (perm)	777	1710	0	263	1744	0	1770	3444	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			29			30			9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	146	177	178	185	139	172	1262	280	92	1143	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	323	0	178	324	0	172	1542	0	92	1246	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	60	60		60	60		60	60		60	60	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	60	60		60	60		60	60		60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	29.0		11.0	29.0		11.0	29.0	
Total Split (s)	11.0	27.0		18.0	34.0		20.0	62.0		13.0	55.0	

PM Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	22.5%		15.0%	28.3%		16.7%	51.7%		10.8%	45.8%	
Maximum Green (s)	5.0	21.0		12.0	28.0		14.0	56.0		7.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	C-Max		Max	C-Max	
Walk Time (s)					5.0			5.0			5.0	
Flash Dont Walk (s)					18.0			18.0			18.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effect Green (s)	26.1	21.1		39.0	30.2		14.0	56.0		7.0	49.0	
Actuated g/C Ratio	0.22	0.18		0.32	0.25		0.12	0.47		0.06	0.41	
v/c Ratio	0.38	0.96		0.76	0.70		0.83	0.95		0.89	0.87	
Control Delay	36.2	82.4		52.3	47.4		83.7	43.8		99.7	47.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.2	82.4		52.3	47.4		83.7	43.8		99.7	47.5	
LOS	D	F		D	D		F	D		F	D	
Approach Delay		73.3			49.1			47.8			51.1	
Approach LOS		E			D			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 51.7

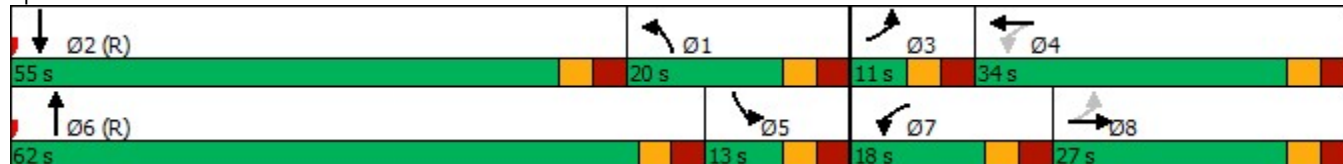
Intersection LOS: D

Intersection Capacity Utilization 91.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

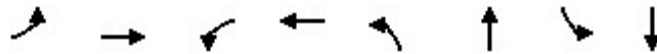


Queues

PM Build (Medium Term) No Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/01/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	79	323	178	324	172	1542	92	1246
v/c Ratio	0.38	0.96	0.76	0.70	0.83	0.95	0.89	0.87
Control Delay	36.2	82.4	52.3	47.4	83.7	43.8	99.7	47.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.2	82.4	52.3	47.4	83.7	43.8	99.7	47.5
Queue Length 50th (ft)	43	220	103	215	132	579	70	479
Queue Length 95th (ft)	81	#407	#193	#340	#254	#753	m#96	m496
Internal Link Dist (ft)		348		421		715		1001
Turn Bay Length (ft)	250		100		160		100	
Base Capacity (vph)	210	337	236	460	206	1623	103	1433
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.96	0.75	0.70	0.83	0.95	0.89	0.87

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	0.94		1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1710		1770	1743		1770	3443		1770	3495	
Flt Permitted	0.42	1.00		0.14	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	777	1710		263	1743		1770	3443		1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	146	177	178	185	139	172	1262	280	92	1143	103
RTOR Reduction (vph)	0	36	0	0	22	0	0	16	0	0	5	0
Lane Group Flow (vph)	79	287	0	178	302	0	172	1526	0	92	1241	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)	26.3	22.3		40.2	30.2		14.0	54.8		7.0	47.8	
Effective Green, g (s)	26.3	22.3		40.2	30.2		14.0	54.8		7.0	47.8	
Actuated g/C Ratio	0.22	0.19		0.34	0.25		0.12	0.46		0.06	0.40	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	317		237	438		206	1572		103	1392	
v/s Ratio Prot	0.01	c0.17		c0.07	c0.17		c0.10	c0.44		0.05	0.35	
v/s Ratio Perm	0.07			0.18								
v/c Ratio	0.39	0.91		0.75	0.69		0.83	0.97		0.89	0.89	
Uniform Delay, d1	38.9	47.8		31.8	40.7		51.9	31.8		56.1	33.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.32	
Incremental Delay, d2	1.2	27.7		12.6	4.6		31.1	16.7		43.5	5.4	
Delay (s)	40.1	75.6		44.3	45.3		83.0	48.5		99.1	49.9	
Level of Service	D	E		D	D		F	D		F	D	
Approach Delay (s)		68.6			45.0			52.0			53.2	
Approach LOS		E			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			53.2			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			91.2%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	79	146	177	178	185	139	172	1262	280	92	1143	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	135	163	231	227	171	215	1352	296	111	1346	121
Arrive On Green	0.04	0.18	0.18	0.10	0.23	0.23	0.12	0.47	0.47	0.02	0.13	0.13
Sat Flow, veh/h	1781	770	933	1781	991	745	1781	2898	635	1781	3297	297
Grp Volume(v), veh/h	79	0	323	178	0	324	172	767	775	92	615	631
Grp Sat Flow(s),veh/h/ln	1781	0	1702	1781	0	1736	1781	1777	1756	1781	1777	1817
Q Serve(g_s), s	4.4	0.0	21.0	9.5	0.0	21.2	11.3	48.7	50.5	6.2	40.6	40.7
Cycle Q Clear(g_c), s	4.4	0.0	21.0	9.5	0.0	21.2	11.3	48.7	50.5	6.2	40.6	40.7
Prop In Lane	1.00		0.55	1.00		0.43	1.00		0.36	1.00		0.16
Lane Grp Cap(c), veh/h	189	0	298	231	0	398	215	829	820	111	726	742
V/C Ratio(X)	0.42	0.00	1.08	0.77	0.00	0.81	0.80	0.93	0.95	0.83	0.85	0.85
Avail Cap(c_a), veh/h	189	0	298	238	0	405	215	829	820	111	726	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	39.5	0.0	49.5	36.0	0.0	43.8	51.3	30.0	30.5	58.1	48.3	48.3
Incr Delay (d2), s/veh	1.5	0.0	76.4	14.0	0.0	11.9	25.8	17.7	20.6	6.4	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	15.2	5.0	0.0	10.4	6.6	24.2	25.3	3.1	19.6	20.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.0	0.0	125.9	50.1	0.0	55.8	77.2	47.7	51.2	64.5	49.5	49.5
LnGrp LOS	D	A	F	D	A	E	E	D	D	E	D	D
Approach Vol, veh/h		402			502			1714			1338	
Approach Delay, s/veh		109.2			53.7			52.2			50.6	
Approach LOS		F			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	20.5	55.0	11.0	33.5	13.5	62.0	17.5	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	14.0	49.0	5.0	28.0	7.0	56.0	12.0	21.0				
Max Q Clear Time (g_c+I1), s	13.3	42.7	6.4	23.2	8.2	52.5	11.5	23.0				
Green Ext Time (p_c), s	0.0	3.3	0.0	0.6	0.0	2.5	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			57.6									
HCM 6th LOS			E									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Future Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850		0.997	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.630			0.713			0.769		0.079		
Satd. Flow (perm)	0	1102	0	0	1328	1583	0	1432	1583	147	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				136			262		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	982	482	22	870	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	315	48	0	983	482	22	887	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

PM Build (Medium Term) No Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) No Mitigation

09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.3			44.0	44.0		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.07			0.37	0.37		0.42	0.42	0.48	0.48	
v/c Ratio		0.24			0.65	0.07		1.64	0.59	0.16	1.01	
Control Delay		41.6			41.5	0.2		309.4	2.8	19.4	63.7	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6			41.5	0.2		309.4	2.8	19.4	63.7	
LOS		D			D	A		F	A	B	E	
Approach Delay		41.6			36.1			208.5			62.6	
Approach LOS		D			D			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.64

Intersection Signal Delay: 136.5

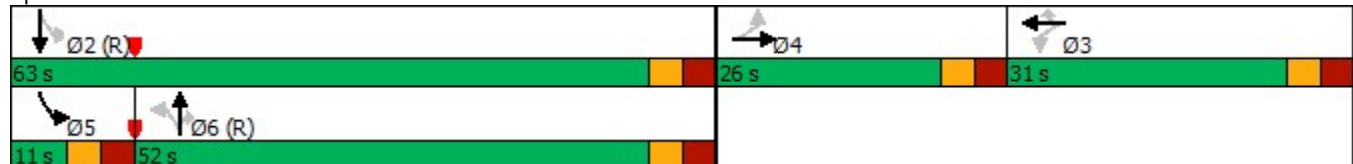
Intersection LOS: F

Intersection Capacity Utilization 89.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

PM Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	315	48	983	482	22	887
v/c Ratio	0.24	0.65	0.07	1.64	0.59	0.16	1.01
Control Delay	41.6	41.5	0.2	309.4	2.8	19.4	63.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	41.5	0.2	309.4	2.8	19.4	63.7
Queue Length 50th (ft)	8	181	0	~1130	11	9	~679
Queue Length 95th (ft)	33	#406	0	m#1242	m14	24	#969
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	191	486	666	601	816	137	882
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.65	0.07	1.64	0.59	0.16	1.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) No Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Future Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.63			0.71	1.00		0.77	1.00	0.08	1.00	
Satd. Flow (perm)		1103			1328	1583		1432	1583	148	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	982	482	22	870	17
RTOR Reduction (vph)	0	9	0	0	0	30	0	0	165	0	1	0
Lane Group Flow (vph)	0	11	0	0	315	18	0	983	317	22	886	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.6			44.0	44.0		44.4	44.4	53.4	53.4	
Effective Green, g (s)		4.6			44.0	44.0		44.4	44.4	53.4	53.4	
Actuated g/C Ratio		0.04			0.37	0.37		0.37	0.37	0.44	0.44	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			486	580		529	585	106	826	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.01			c0.24	0.01		c0.69	0.20	0.09		
v/c Ratio		0.27			0.65	0.03		1.86	0.54	0.21	1.07	
Uniform Delay, d1		56.1			31.6	24.3		37.8	29.8	27.8	33.3	
Progression Factor		1.00			1.00	1.00		0.44	0.12	1.00	1.00	
Incremental Delay, d2		3.5			6.6	0.1		389.3	1.5	1.0	52.8	
Delay (s)		59.5			38.1	24.4		405.9	5.0	28.8	86.1	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		59.5			36.3			274.0			84.8	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay		178.8		HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio		1.24										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)					24.0			
Intersection Capacity Utilization		89.7%		ICU Level of Service					E			
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

PM Build (Medium Term) No Mitigation

09/01/2022

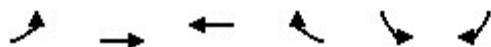


Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	252	210	0	0	259
Future Volume (vph)	0	252	210	0	0	259
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	274	228	0	0	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	274	228	0	0	282
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 33.8%				ICU Level of Service A		
Analysis Period (min) 15						

Lanes, Volumes, Timings
7: RAMPS

PM Build (Medium Term) No Mitigation

09/01/2022



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	213	252	210	78	111	0
Future Volume (vph)	213	252	210	78	111	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.963					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1794	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1794	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	274	228	85	121	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	232	274	313	0	121	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 43.7%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection						
Int Delay, s/veh	7.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	213	252	210	78	111	0
Future Vol, veh/h	213	252	210	78	111	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	232	274	228	85	121	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	313	0	-	0	1009	-
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	738	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1247	-	-	-	266	0
Stage 1	-	-	-	-	775	0
Stage 2	-	-	-	-	473	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1247	-	-	-	217	-
Mov Cap-2 Maneuver	-	-	-	-	217	-
Stage 1	-	-	-	-	631	-
Stage 2	-	-	-	-	473	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.9	0		40.6		
HCM LOS	E					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1247	-	-	-	217	
HCM Lane V/C Ratio	0.186	-	-	-	0.556	
HCM Control Delay (s)	8.5	-	-	-	40.6	
HCM Lane LOS	A	-	-	-	E	
HCM 95th %tile Q(veh)	0.7	-	-	-	3	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM Build (Medium Term) No Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	184	135	29	200	26	221	14	110	42	7	39
Future Volume (vph)	52	184	135	29	200	26	221	14	110	42	7	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.986			0.957			0.941	
Flt Protected		0.993			0.994			0.969			0.977	
Satd. Flow (prot)	0	1759	0	0	1826	0	0	1727	0	0	1713	0
Flt Permitted		0.993			0.994			0.969			0.977	
Satd. Flow (perm)	0	1759	0	0	1826	0	0	1727	0	0	1713	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	200	147	32	217	28	240	15	120	46	8	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	404	0	0	277	0	0	375	0	0	96	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	62.6%						ICU Level of Service B					
Analysis Period (min)	15											

Intersection												
Int Delay, s/veh	27.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	184	135	29	200	26	221	14	110	42	7	39
Future Vol, veh/h	52	184	135	29	200	26	221	14	110	42	7	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	200	147	32	217	28	240	15	120	46	8	42
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	245	0	0	347	0	0	708	697	274	750	756	231
Stage 1	-	-	-	-	-	-	388	388	-	295	295	-
Stage 2	-	-	-	-	-	-	320	309	-	455	461	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1321	-	-	1212	-	-	350	365	765	328	337	808
Stage 1	-	-	-	-	-	-	636	609	-	713	669	-
Stage 2	-	-	-	-	-	-	692	660	-	585	565	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1321	-	-	1212	-	-	305	334	765	250	309	808
Mov Cap-2 Maneuver	-	-	-	-	-	-	305	334	-	250	309	-
Stage 1	-	-	-	-	-	-	601	576	-	674	648	-
Stage 2	-	-	-	-	-	-	628	640	-	454	534	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.1			0.9			77.2			18.2		
HCM LOS							F			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	379	1321	-	-	1212	-	-	368				
HCM Lane V/C Ratio	0.989	0.043	-	-	0.026	-	-	0.26				
HCM Control Delay (s)	77.2	7.8	0	-	8.1	0	-	18.2				
HCM Lane LOS	F	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	11.6	0.1	-	-	0.1	-	-	1				

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	247	361	125	411	185	805	816	125	459	483
Average Queue (ft)	70	198	105	241	152	754	753	85	327	341
95th Queue (ft)	185	344	152	415	237	920	931	146	431	447
Link Distance (ft)		364		427		762	762		1015	1015
Upstream Blk Time (%)		1		1		61	60			
Queuing Penalty (veh)		4		6		0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		10	17	38	2	60		11	45	
Queuing Penalty (veh)		8	50	62	12	95		60	38	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	52	276	100	1056	1056	147	599
Average Queue (ft)	15	143	25	976	756	19	391
95th Queue (ft)	42	247	84	1210	1281	87	579
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				9	2		
Queuing Penalty (veh)				61	12		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		27	0				32
Queuing Penalty (veh)		12	1				6

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	94
Average Queue (ft)	34
95th Queue (ft)	71
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	84	47	104
Average Queue (ft)	37	2	48
95th Queue (ft)	72	29	83
Link Distance (ft)	181	693	96
Upstream Blk Time (%)			1
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	67	74	236	81
Average Queue (ft)	11	13	101	34
95th Queue (ft)	41	48	189	60
Link Distance (ft)	427	407	271	1268
Upstream Blk Time (%)				1
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 427

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850		0.935				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1742	0	1770	3539	1583	1770	3511	0
Flt Permitted	0.648			0.455			0.950			0.950		
Satd. Flow (perm)	1207	1863	1583	848	1742	0	1770	3539	1583	1770	3511	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			183		30				189		6	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	104	183	177	98	75	114	746	189	90	1371	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	104	183	177	173	0	114	746	189	90	1450	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60	60	60	60		60	60	60	60	60	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	60	60	60	60	60		60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	29.0		11.0	29.0	29.0	11.0	29.0	
Total Split (s)	11.0	28.0	28.0	16.0	33.0		15.0	56.0	56.0	20.0	61.0	

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) Mitigation
09/01/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	23.3%	23.3%	13.3%	27.5%		12.5%	46.7%	46.7%	16.7%	50.8%	
Maximum Green (s)	5.0	22.0	22.0	10.0	27.0		9.0	50.0	50.0	14.0	55.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Max	C-Max	C-Max	Max	C-Max	
Walk Time (s)					5.0			5.0	5.0		5.0	
Flash Dont Walk (s)					18.0			18.0	18.0		18.0	
Pedestrian Calls (#/hr)					0			0	0		0	
Act Effect Green (s)	17.0	12.0	12.0	27.2	19.2		9.0	60.0	60.0	14.0	65.0	
Actuated g/C Ratio	0.14	0.10	0.10	0.23	0.16		0.08	0.50	0.50	0.12	0.54	
v/c Ratio	0.38	0.56	0.57	0.66	0.57		0.86	0.42	0.21	0.44	0.76	
Control Delay	43.2	62.2	14.0	51.3	46.4		103.8	20.5	3.2	43.6	22.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	43.2	62.2	14.0	51.3	46.4		103.8	20.5	3.2	43.6	22.6	
LOS	D	E	B	D	D		F	C	A	D	C	
Approach Delay		33.9			48.9			26.4			23.9	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 109 (91%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 28.4

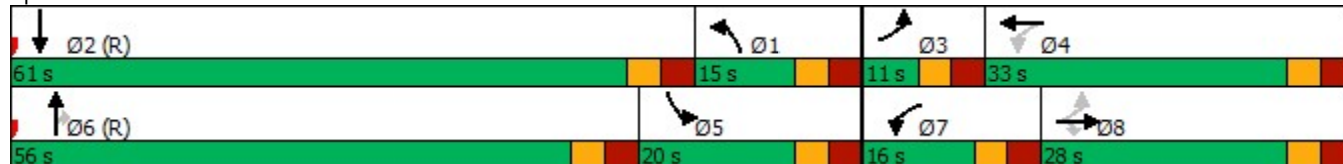
Intersection LOS: C

Intersection Capacity Utilization 77.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE

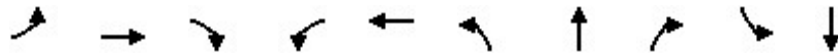


Queues

AM Build (Medium Term) Mitigation

1: BATES/VERANDA & WASHINGTON AVE

09/01/2022



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	74	104	183	177	173	114	746	189	90	1450
v/c Ratio	0.38	0.56	0.57	0.66	0.57	0.86	0.42	0.21	0.44	0.76
Control Delay	43.2	62.2	14.0	51.3	46.4	103.8	20.5	3.2	43.6	22.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	62.2	14.0	51.3	46.4	103.8	20.5	3.2	43.6	22.6
Queue Length 50th (ft)	46	78	0	118	106	89	186	0	61	391
Queue Length 95th (ft)	84	131	66	178	175	#198	256	40	m66	m397
Internal Link Dist (ft)		348			421		715			1001
Turn Bay Length (ft)	250			100		160			200	
Base Capacity (vph)	194	341	439	269	415	132	1768	885	206	1903
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.30	0.42	0.66	0.42	0.86	0.42	0.21	0.44	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (vph)	68	96	168	163	90	69	105	686	174	83	1261	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1742		1770	3539	1583	1770	3510	
Flt Permitted	0.65	1.00	1.00	0.45	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1207	1863	1583	847	1742		1770	3539	1583	1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	104	183	177	98	75	114	746	189	90	1371	79
RTOR Reduction (vph)	0	0	163	0	25	0	0	0	96	0	3	0
Lane Group Flow (vph)	74	104	20	177	148	0	114	746	93	90	1447	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Actuated Green, G (s)	17.2	13.2	13.2	29.2	19.2		9.0	58.8	58.8	14.0	63.8	
Effective Green, g (s)	17.2	13.2	13.2	29.2	19.2		9.0	58.8	58.8	14.0	63.8	
Actuated g/C Ratio	0.14	0.11	0.11	0.24	0.16		0.08	0.49	0.49	0.12	0.53	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	204	174	283	278		132	1734	775	206	1866	
v/s Ratio Prot	0.01	0.06		c0.05	0.08		c0.06	0.21		c0.05	c0.41	
v/s Ratio Perm	0.04		0.01	c0.10					0.06			
v/c Ratio	0.39	0.51	0.12	0.63	0.53		0.86	0.43	0.12	0.44	0.78	
Uniform Delay, d1	46.0	50.3	48.1	38.4	46.3		54.9	19.8	16.6	49.3	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.82	0.96	
Incremental Delay, d2	1.3	2.0	0.3	4.3	2.0		48.3	0.8	0.3	2.5	1.2	
Delay (s)	47.3	52.4	48.4	42.7	48.2		103.2	20.6	16.9	43.0	22.8	
Level of Service	D	D	D	D	D		F	C	B	D	C	
Approach Delay (s)		49.3			45.4			28.9			23.9	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			30.6			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			77.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	104	183	177	98	75	114	746	189	90	1371	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	170	158	134	242	124	95	309	1481	660	384	1565	90
Arrive On Green	0.04	0.08	0.08	0.08	0.13	0.13	0.17	0.42	0.42	0.22	0.46	0.46
Sat Flow, veh/h	1781	1870	1585	1781	983	752	1781	3554	1585	1781	3416	196
Grp Volume(v), veh/h	74	104	183	177	0	173	114	746	189	90	712	738
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1735	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	4.5	6.5	7.1	10.0	0.0	11.6	6.8	18.6	6.5	5.0	43.4	43.8
Cycle Q Clear(g_c), s	4.5	6.5	7.1	10.0	0.0	11.6	6.8	18.6	6.5	5.0	43.4	43.8
Prop In Lane	1.00		1.00	1.00		0.43	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	170	158	134	242	0	219	309	1481	660	384	814	841
V/C Ratio(X)	0.43	0.66	1.36	0.73	0.00	0.79	0.37	0.50	0.29	0.23	0.87	0.88
Avail Cap(c_a), veh/h	170	343	291	242	0	390	309	1481	660	384	814	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.90	0.00	0.90	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	48.0	53.2	27.0	46.1	0.0	50.9	43.8	25.8	10.9	38.9	29.4	29.5
Incr Delay (d2), s/veh	1.7	4.6	182.6	9.7	0.0	5.6	3.4	1.2	1.1	0.1	1.3	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	3.2	9.5	5.5	0.0	5.4	3.3	8.1	3.6	2.2	18.3	19.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.7	57.8	209.6	55.8	0.0	56.5	47.1	27.1	12.0	39.0	30.7	30.8
LnGrp LOS	D	E	F	E	A	E	D	C	B	D	C	C
Approach Vol, veh/h		361			350			1049			1540	
Approach Delay, s/veh		133.1			56.2			26.5			31.2	
Approach LOS		F			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.8	61.0	11.0	21.2	31.8	56.0	16.0	16.2				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	55.0	5.0	27.0	14.0	50.0	10.0	22.0				
Max Q Clear Time (g_c+I1), s	8.8	45.8	6.5	13.6	7.0	20.6	12.0	9.1				
Green Ext Time (p_c), s	0.0	5.1	0.0	0.5	0.1	5.4	0.0	1.0				
Intersection Summary												
HCM 6th Ctrl Delay			43.5									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Future Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940				0.850			0.850			
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1712	0	0	1775	1583	0	1863	1583	1770	1863	0
Flt Permitted		0.657			0.715			0.707		0.086		
Satd. Flow (perm)	0	1150	0	0	1332	1583	0	1317	1583	160	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				136			212			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	618	259	32	905	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	0	0	477	45	0	620	259	32	908	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		35.0	35.0	35.0	48.0	48.0	48.0	11.0	59.0	

AM Build (Medium Term) Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		29.2%	29.2%	29.2%	40.0%	40.0%	40.0%	9.2%	49.2%	
Maximum Green (s)	20.0	20.0		29.0	29.0	29.0	42.0	42.0	42.0	5.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.0			48.2	48.2		46.4	46.4	53.0	53.0	
Actuated g/C Ratio		0.07			0.40	0.40		0.39	0.39	0.44	0.44	
v/c Ratio		0.21			0.89	0.06		1.22	0.35	0.23	1.10	
Control Delay		41.8			55.4	0.2		138.4	1.9	23.2	96.8	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.8			55.4	0.2		138.4	1.9	23.2	96.8	
LOS		D			E	A		F	A	C	F	
Approach Delay		41.8			50.7			98.2			94.3	
Approach LOS		D			D			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 85.7

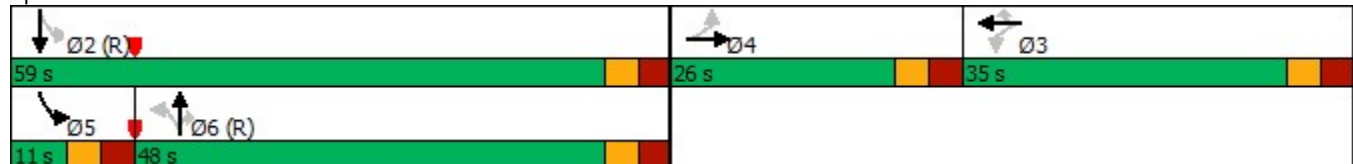
Intersection LOS: F

Intersection Capacity Utilization 85.0%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

AM Build (Medium Term) Mitigation

09/01/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	18	477	45	620	259	32	908
v/c Ratio	0.21	0.89	0.06	1.22	0.35	0.23	1.10
Control Delay	41.8	55.4	0.2	138.4	1.9	23.2	96.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	55.4	0.2	138.4	1.9	23.2	96.8
Queue Length 50th (ft)	8	305	0	~636	1	14	~800
Queue Length 95th (ft)	31	#652	0	#866	11	33	#1047
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	198	535	717	508	741	137	822
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.89	0.06	1.22	0.35	0.23	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) Mitigation

09/01/2022

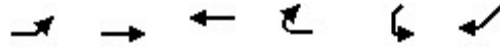
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Future Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1713			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.66			0.72	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1150			1332	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	618	259	32	905	3
RTOR Reduction (vph)	0	8	0	0	0	27	0	0	141	0	0	0
Lane Group Flow (vph)	0	10	0	0	477	18	0	620	118	32	908	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			535	635		443	532	106	766	
v/s Ratio Prot										0.01	c0.49	
v/s Ratio Perm		c0.01			c0.36	0.01		c0.47	0.07	0.12		
v/c Ratio		0.25			0.89	0.03		1.40	0.22	0.30	1.19	
Uniform Delay, d1		56.2			33.5	21.7		39.8	28.5	28.6	35.3	
Progression Factor		1.00			1.00	1.00		0.56	0.10	1.00	1.00	
Incremental Delay, d2		3.0			19.7	0.1		192.1	0.9	1.6	96.4	
Delay (s)		59.2			53.2	21.8		214.4	3.9	30.2	131.7	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		59.2			50.5			152.4			128.3	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay			119.5				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			85.0%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

AM Build (Medium Term) Mitigation

09/01/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	215	205	0	0	188
Future Volume (vph)	0	215	205	0	0	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		30	
Link Distance (ft)		571	236		300	
Travel Time (s)		13.0	5.4		6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	234	223	0	0	204
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	234	223	0	0	204
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Yield	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 29.1%						
ICU Level of Service A						
Analysis Period (min) 15						

Lanes, Volumes, Timings
7: RAMPS

AM Build (Medium Term) Mitigation
09/01/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	180	215	205	89	71	0
Future Volume (vph)	180	215	205	89	71	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1786	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1786	0	1770	0
Link Speed (mph)	30		30	30		
Link Distance (ft)	236		727	173		
Travel Time (s)	5.4		16.5	3.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	234	223	97	77	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	196	234	320	0	77	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	12		12	12		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control	Stop		Stop	Stop		
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 40.1%				ICU Level of Service A		
Analysis Period (min) 15						

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	180	215	205	89	71	0
Future Vol, veh/h	180	215	205	89	71	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	234	223	97	77	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	10.3	10.6	9.6
HCM LOS	B	B	A

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	70%	0%
Vol Right, %	0%	0%	30%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	215	294	71
LT Vol	180	0	0	71
Through Vol	0	215	205	0
RT Vol	0	0	89	0
Lane Flow Rate	196	234	320	77
Geometry Grp	7	7	5	2
Degree of Util (X)	0.299	0.324	0.401	0.123
Departure Headway (Hd)	5.497	4.994	4.522	5.736
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	653	720	796	623
Service Time	3.233	2.73	2.556	3.791
HCM Lane V/C Ratio	0.3	0.325	0.402	0.124
HCM Control Delay	10.6	10.1	10.6	9.6
HCM Lane LOS	B	B	B	A
HCM 95th-tile Q	1.3	1.4	1.9	0.4

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	142	210	42	142	32	56	4	28	37	10	62
Future Volume (vph)	44	142	210	42	142	32	56	4	28	37	10	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.928			0.980			0.868			0.923	
Flt Protected		0.994			0.990		0.950				0.983	
Satd. Flow (prot)	0	1718	0	0	1807	0	1770	1617	0	0	1690	0
Flt Permitted		0.937			0.859		0.364				0.983	
Satd. Flow (perm)	0	1620	0	0	1568	0	678	1617	0	0	1690	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		51			8			30			43	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	154	228	46	154	35	61	4	30	40	11	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	430	0	0	235	0	61	34	0	0	118	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

AM Build (Medium Term) Mitigation
09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	55.0	55.0		55.0	55.0		50.0	50.0		24.0	24.0	
Total Split (%)	42.6%	42.6%		42.6%	42.6%		38.8%	38.8%		18.6%	18.6%	
Maximum Green (s)	49.0	49.0		49.0	49.0		44.0	44.0		18.0	18.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		21.5			21.5		12.9	12.9			9.2	
Actuated g/C Ratio		0.34			0.34		0.20	0.20			0.15	
v/c Ratio		0.74			0.44		0.44	0.10			0.42	
Control Delay		25.3			19.4		35.9	11.6			25.2	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		25.3			19.4		35.9	11.6			25.2	
LOS		C			B		D	B			C	
Approach Delay		25.3			19.4			27.2			25.2	
Approach LOS		C			B			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 129

Actuated Cycle Length: 63.1

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 23.9

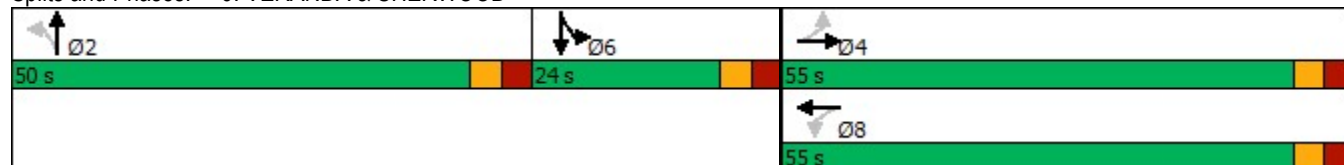
Intersection LOS: C

Intersection Capacity Utilization 49.7%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 9: VERANDA & SHERWOOD





Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	430	235	61	34	118
v/c Ratio	0.74	0.44	0.44	0.10	0.42
Control Delay	25.3	19.4	35.9	11.6	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	19.4	35.9	11.6	25.2
Queue Length 50th (ft)	115	60	19	1	24
Queue Length 95th (ft)	284	156	69	25	92
Internal Link Dist (ft)	421	357		226	1274
Turn Bay Length (ft)					
Base Capacity (vph)	1311	1260	519	1245	553
Starvation Cap Reductn	5	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.33	0.19	0.12	0.03	0.21
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

AM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	142	210	42	142	32	56	4	28	37	10	62
Future Volume (vph)	44	142	210	42	142	32	56	4	28	37	10	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.93			0.98		1.00	0.87			0.92	
Flt Protected		0.99			0.99		0.95	1.00			0.98	
Satd. Flow (prot)		1720			1808		1770	1616			1691	
Flt Permitted		0.94			0.86		0.36	1.00			0.98	
Satd. Flow (perm)		1620			1568		678	1616			1691	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	154	228	46	154	35	61	4	30	40	11	67
RTOR Reduction (vph)	0	33	0	0	5	0	0	24	0	0	37	0
Lane Group Flow (vph)	0	397	0	0	230	0	61	10	0	0	81	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)		21.5			21.5		12.9	12.9			9.2	
Effective Green, g (s)		21.5			21.5		12.9	12.9			9.2	
Actuated g/C Ratio		0.35			0.35		0.21	0.21			0.15	
Clearance Time (s)		6.0			6.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		565			547		141	338			252	
v/s Ratio Prot								0.01			c0.05	
v/s Ratio Perm		c0.25			0.15		c0.09					
v/c Ratio		0.70			0.42		0.43	0.03			0.32	
Uniform Delay, d1		17.3			15.3		21.2	19.4			23.4	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		3.9			0.5		2.1	0.0			0.7	
Delay (s)		21.2			15.8		23.3	19.4			24.2	
Level of Service		C			B		C	B			C	
Approach Delay (s)		21.2			15.8			21.9			24.2	
Approach LOS		C			B			C			C	
Intersection Summary												
HCM 2000 Control Delay		20.3			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		61.6			Sum of lost time (s)			18.0				
Intersection Capacity Utilization		49.7%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

AM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	142	210	42	142	32	56	4	28	37	10	62
Future Volume (veh/h)	44	142	210	42	142	32	56	4	28	37	10	62
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	154	228	46	154	35	61	4	30	40	11	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	233	304	165	448	90	205	22	164	70	19	117
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	106	670	876	191	1289	259	1781	190	1424	567	156	949
Grp Volume(v), veh/h	430	0	0	235	0	0	61	0	34	118	0	0
Grp Sat Flow(s),veh/h/ln	1653	0	0	1738	0	0	1781	0	1614	1671	0	0
Q Serve(g_s), s	3.6	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.8	2.9	0.0	0.0
Cycle Q Clear(g_c), s	9.8	0.0	0.0	4.2	0.0	0.0	1.4	0.0	0.8	2.9	0.0	0.0
Prop In Lane	0.11		0.53	0.20		0.15	1.00		0.88	0.34		0.57
Lane Grp Cap(c), veh/h	666	0	0	703	0	0	205	0	186	206	0	0
V/C Ratio(X)	0.65	0.00	0.00	0.33	0.00	0.00	0.30	0.00	0.18	0.57	0.00	0.00
Avail Cap(c_a), veh/h	1927	0	0	1924	0	0	1805	0	1635	693	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.4	0.0	0.0	10.6	0.0	0.0	17.6	0.0	17.4	18.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.3	0.0	0.0	0.8	0.0	0.5	2.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	0.0	1.4	0.0	0.0	0.5	0.0	0.3	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	0.0	0.0	10.9	0.0	0.0	18.4	0.0	17.8	20.5	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	B	C	A	A
Approach Vol, veh/h		430			235			95			118	
Approach Delay, s/veh		13.4			10.9			18.2			20.5	
Approach LOS		B			B			B			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.0		21.1		11.3		21.1				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		44.0		49.0		18.0		49.0				
Max Q Clear Time (g_c+I1), s		3.4		11.8		4.9		6.2				
Green Ext Time (p_c), s		0.4		3.3		0.4		1.6				
Intersection Summary												
HCM 6th Ctrl Delay				14.2								
HCM 6th LOS				B								

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	100	168	122	124	284	184	324	288	79	184	338	356
Average Queue (ft)	43	70	61	97	116	90	168	129	29	61	220	235
95th Queue (ft)	87	139	107	148	231	172	275	240	60	143	329	342
Link Distance (ft)		364	364		410		750	750	750		1015	1015
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	250			100		160				200		
Storage Blk Time (%)				16	11	0	9				9	
Queuing Penalty (veh)				25	18	1	9				7	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	70	285	100	613	260	174	543
Average Queue (ft)	17	208	27	241	67	22	342
95th Queue (ft)	50	315	90	577	325	95	509
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				0			
Queuing Penalty (veh)				2			
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		36	0			0	31
Queuing Penalty (veh)		15	1			0	9

Intersection: 6: BAXTER BLVD

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	19	64
Average Queue (ft)	1	20
95th Queue (ft)	10	51
Link Distance (ft)	181	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	100	95	100	71
Average Queue (ft)	48	50	57	33
95th Queue (ft)	80	80	86	57
Link Distance (ft)	181	181	693	65
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	222	159	69	52	114
Average Queue (ft)	116	73	33	18	49
95th Queue (ft)	197	127	64	46	91
Link Distance (ft)	410	400	269	269	1268
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 87

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	100		0	160		0	200		0
Storage Lanes	1		1	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850		0.936				0.850		0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1744	0	1770	3539	1583	1770	3497	0
Flt Permitted	0.352			0.420			0.950			0.950		
Satd. Flow (perm)	656	1863	1583	782	1744	0	1770	3539	1583	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			245		29				261		9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		428			501			795			1081	
Travel Time (s)		9.7			11.4			18.1			24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	146	177	178	185	139	172	1262	280	92	1143	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	79	146	177	178	324	0	172	1262	280	92	1246	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60	60	60	60		60	60	60	60	60	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	
Detector 1 Size(ft)	60	60	60	60	60		60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Detector Phase	3	8	8	7	4		1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	29.0		11.0	29.0	29.0	11.0	29.0	
Total Split (s)	11.0	27.0	27.0	18.0	34.0		20.0	62.0	62.0	13.0	55.0	

PM Build (Medium Term) Mitigation
VHB

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	9.2%	22.5%	22.5%	15.0%	28.3%		16.7%	51.7%	51.7%	10.8%	45.8%	
Maximum Green (s)	5.0	21.0	21.0	12.0	28.0		14.0	56.0	56.0	7.0	49.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lag	Lead	Lead	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None		Max	C-Max	C-Max	Max	C-Max	
Walk Time (s)					5.0			5.0	5.0		5.0	
Flash Dont Walk (s)					18.0			18.0	18.0		18.0	
Pedestrian Calls (#/hr)					0			0	0		0	
Act Effect Green (s)	22.2	17.2	17.2	34.9	26.1		14.0	60.1	60.1	7.0	53.1	
Actuated g/C Ratio	0.18	0.14	0.14	0.29	0.22		0.12	0.50	0.50	0.06	0.44	
v/c Ratio	0.47	0.55	0.41	0.55	0.81		0.83	0.71	0.30	0.89	0.80	
Control Delay	41.7	54.8	4.0	39.5	56.7		83.7	26.9	3.8	99.7	42.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	41.7	54.8	4.0	39.5	56.7		83.7	26.9	3.8	99.7	42.8	
LOS	D	D	A	D	E		F	C	A	F	D	
Approach Delay		29.8			50.6			28.8			46.7	
Approach LOS		C			D			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 37.7

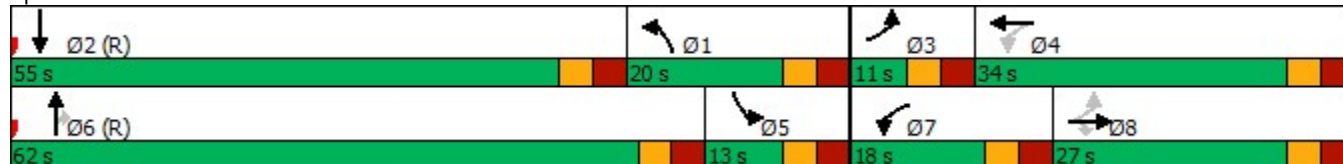
Intersection LOS: D

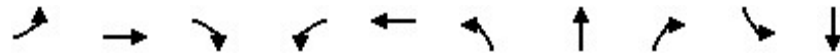
Intersection Capacity Utilization 81.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: BATES/VERANDA & WASHINGTON AVE





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	79	146	177	178	324	172	1262	280	92	1246
v/c Ratio	0.47	0.55	0.41	0.55	0.81	0.83	0.71	0.30	0.89	0.80
Control Delay	41.7	54.8	4.0	39.5	56.7	83.7	26.9	3.8	99.7	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	54.8	4.0	39.5	56.7	83.7	26.9	3.8	99.7	42.8
Queue Length 50th (ft)	44	104	0	106	220	132	401	8	70	476
Queue Length 95th (ft)	81	170	14	165	#340	#254	505	56	m#96	m496
Internal Link Dist (ft)		348			421		715			1001
Turn Bay Length (ft)	250			100		160			200	
Base Capacity (vph)	167	326	479	325	429	206	1772	922	103	1552
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.45	0.37	0.55	0.76	0.83	0.71	0.30	0.89	0.80

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (vph)	73	134	163	164	170	128	158	1161	258	85	1052	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	1743		1770	3539	1583	1770	3495	
Flt Permitted	0.35	1.00	1.00	0.42	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	656	1863	1583	782	1743		1770	3539	1583	1770	3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	146	177	178	185	139	172	1262	280	92	1143	103
RTOR Reduction (vph)	0	0	150	0	23	0	0	0	133	0	5	0
Lane Group Flow (vph)	79	146	27	178	301	0	172	1262	147	92	1241	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8	4					6			
Actuated Green, G (s)	22.4	18.4	18.4	36.1	26.1		14.0	58.9	58.9	7.0	51.9	
Effective Green, g (s)	22.4	18.4	18.4	36.1	26.1		14.0	58.9	58.9	7.0	51.9	
Actuated g/C Ratio	0.19	0.15	0.15	0.30	0.22		0.12	0.49	0.49	0.06	0.43	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	159	285	242	331	379		206	1737	776	103	1511	
v/s Ratio Prot	0.02	0.08		c0.05	c0.17		c0.10	0.36		0.05	c0.36	
v/s Ratio Perm	0.08		0.02	0.11					0.09			
v/c Ratio	0.50	0.51	0.11	0.54	0.80		0.83	0.73	0.19	0.89	0.82	
Uniform Delay, d1	42.5	46.7	43.8	33.0	44.4		51.9	24.2	17.2	56.1	30.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	0.99	1.34	
Incremental Delay, d2	2.4	1.6	0.2	1.7	11.0		31.1	2.7	0.5	43.5	3.0	
Delay (s)	45.0	48.2	44.0	34.7	55.4		83.0	26.9	17.7	99.1	43.3	
Level of Service	D	D	D	C	E		F	C	B	F	D	
Approach Delay (s)		45.7			48.0			31.0			47.1	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			40.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			81.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	79	146	177	178	185	139	172	1262	280	92	1143	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	275	233	315	202	152	260	1658	740	156	1346	121
Arrive On Green	0.04	0.15	0.15	0.10	0.20	0.20	0.15	0.47	0.47	0.03	0.13	0.13
Sat Flow, veh/h	1781	1870	1585	1781	991	745	1781	3554	1585	1781	3297	297
Grp Volume(v), veh/h	79	146	177	178	0	324	172	1262	280	92	615	631
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1736	1781	1777	1585	1781	1777	1817
Q Serve(g_s), s	4.5	8.7	9.2	9.8	0.0	21.9	11.0	35.2	8.6	6.1	40.6	40.7
Cycle Q Clear(g_c), s	4.5	8.7	9.2	9.8	0.0	21.9	11.0	35.2	8.6	6.1	40.6	40.7
Prop In Lane	1.00		1.00	1.00		0.43	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	157	275	233	315	0	354	260	1658	740	156	726	742
V/C Ratio(X)	0.50	0.53	0.76	0.57	0.00	0.91	0.66	0.76	0.38	0.59	0.85	0.85
Avail Cap(c_a), veh/h	157	327	277	317	0	405	260	1658	740	156	726	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.73	0.00	0.73	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	42.3	47.3	24.9	36.8	0.0	46.7	48.4	26.5	8.2	56.1	48.3	48.3
Incr Delay (d2), s/veh	2.6	1.6	9.6	1.7	0.0	18.5	12.5	3.4	1.5	1.5	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	4.2	4.1	4.4	0.0	11.2	5.8	15.3	3.1	2.9	19.6	20.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.9	48.9	34.5	38.5	0.0	65.2	60.9	29.8	9.6	57.6	49.5	49.5
LnGrp LOS	D	D	C	D	A	E	E	C	A	E	D	D
Approach Vol, veh/h		402			502			1714			1338	
Approach Delay, s/veh		41.8			55.7			29.6			50.1	
Approach LOS		D			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.5	55.0	11.0	30.5	16.5	62.0	17.8	23.7				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	14.0	49.0	5.0	28.0	7.0	56.0	12.0	21.0				
Max Q Clear Time (g_c+I1), s	13.0	42.7	6.5	23.9	8.1	37.2	11.8	11.2				
Green Ext Time (p_c), s	0.1	3.3	0.0	0.6	0.0	8.7	0.0	1.0				
Intersection Summary												
HCM 6th Ctrl Delay			41.1									
HCM 6th LOS			D									

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Future Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	60		0	150		0
Storage Lanes	0		0	0		1	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.939				0.850			0.850		0.997	
Flt Protected		0.978			0.953					0.950		
Satd. Flow (prot)	0	1711	0	0	1775	1583	0	1863	1583	1770	1857	0
Flt Permitted		0.630			0.713			0.769		0.079		
Satd. Flow (perm)	0	1102	0	0	1328	1583	0	1432	1583	147	1857	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				136			262		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		654			617			1081			2447	
Travel Time (s)		14.9			14.0			24.6			55.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	982	482	22	870	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	0	315	48	0	983	482	22	887	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1	1	1	1	1	1	1	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	60	60		60	60	60	60	60	60	60	60	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	60	60		60	60	60	60	60	60	60	60	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Detector Phase	4	4		3	3	3	6	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	26.0	26.0		31.0	31.0	31.0	35.0	35.0	35.0	11.0	20.0	
Total Split (s)	26.0	26.0		31.0	31.0	31.0	52.0	52.0	52.0	11.0	63.0	

PM Build (Medium Term) Mitigation
VHB

Synchro 11 Report
Page 6

Lanes, Volumes, Timings
2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	21.7%	21.7%		25.8%	25.8%	25.8%	43.3%	43.3%	43.3%	9.2%	52.5%	
Maximum Green (s)	20.0	20.0		25.0	25.0	25.0	46.0	46.0	46.0	5.0	57.0	
Yellow Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lost Time Adjust (s)		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag	Lag	Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		Max	Max	Max	C-Max	C-Max	C-Max	None	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	13.0	13.0		18.0	18.0	18.0	24.0	24.0	24.0		9.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	
Act Effect Green (s)		8.3			44.0	44.0		50.4	50.4	57.0	57.0	
Actuated g/C Ratio		0.07			0.37	0.37		0.42	0.42	0.48	0.48	
v/c Ratio		0.24			0.65	0.07		1.64	0.59	0.16	1.01	
Control Delay		41.6			41.5	0.2		312.3	2.9	19.4	63.7	
Queue Delay		0.0			0.0	0.0		0.0	0.0	0.0	0.0	
Total Delay		41.6			41.5	0.2		312.3	2.9	19.4	63.7	
LOS		D			D	A		F	A	B	E	
Approach Delay		41.6			36.1			210.5			62.6	
Approach LOS		D			D			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 145

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.64

Intersection Signal Delay: 137.5

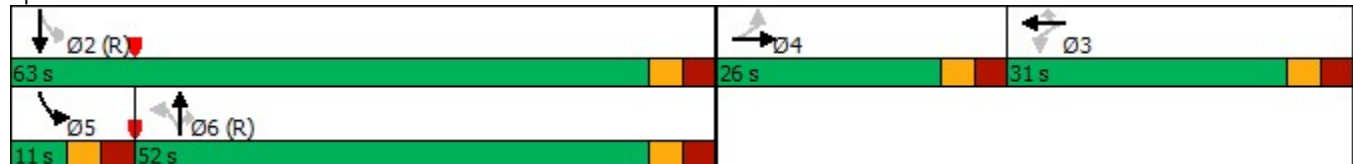
Intersection LOS: F

Intersection Capacity Utilization 89.7%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 2: WASHINGTON AVE & PRESUMPCOT



Queues
2: WASHINGTON AVE & PRESUMPSCOT

PM Build (Medium Term) Mitigation

09/01/2022



Lane Group	EBT	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	315	48	983	482	22	887
v/c Ratio	0.24	0.65	0.07	1.64	0.59	0.16	1.01
Control Delay	41.6	41.5	0.2	312.3	2.9	19.4	63.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	41.5	0.2	312.3	2.9	19.4	63.7
Queue Length 50th (ft)	8	181	0	~1159	3	9	~679
Queue Length 95th (ft)	33	#406	0	#1387	9	24	#969
Internal Link Dist (ft)	574	537		1001			2367
Turn Bay Length (ft)			75			150	
Base Capacity (vph)	191	486	666	601	816	137	882
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.65	0.07	1.64	0.59	0.16	1.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Future Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.63			0.71	1.00		0.77	1.00	0.08	1.00	
Satd. Flow (perm)		1103			1328	1583		1432	1583	148	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	982	482	22	870	17
RTOR Reduction (vph)	0	9	0	0	0	30	0	0	165	0	1	0
Lane Group Flow (vph)	0	11	0	0	315	18	0	983	317	22	886	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.6			44.0	44.0		44.4	44.4	53.4	53.4	
Effective Green, g (s)		4.6			44.0	44.0		44.4	44.4	53.4	53.4	
Actuated g/C Ratio		0.04			0.37	0.37		0.37	0.37	0.44	0.44	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			486	580		529	585	106	826	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.01			c0.24	0.01		c0.69	0.20	0.09		
v/c Ratio		0.27			0.65	0.03		1.86	0.54	0.21	1.07	
Uniform Delay, d1		56.1			31.6	24.3		37.8	29.8	27.8	33.3	
Progression Factor		1.00			1.00	1.00		0.50	0.05	1.00	1.00	
Incremental Delay, d2		3.5			6.6	0.1		391.3	2.5	1.0	52.8	
Delay (s)		59.5			38.1	24.4		410.3	4.1	28.8	86.1	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		59.5			36.3			276.6			84.8	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay		180.2			HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio		1.24										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		89.7%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

HCM 6th Edition methodology expects strict NEMA phasing.

Lanes, Volumes, Timings
6: BAXTER BLVD

PM Build (Medium Term) Mitigation
09/01/2022



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑	↑			↗
Traffic Volume (vph)	0	252	210	0	0	259
Future Volume (vph)	0	252	210	0	0	259
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865					
Flt Protected						
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)	30		30	30		
Link Distance (ft)	571		236	300		
Travel Time (s)	13.0		5.4	6.8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	274	228	0	0	282
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	274	228	0	0	282
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)	0		0	0		
Link Offset(ft)	0		0	0		
Crosswalk Width(ft)	16		16	16		
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control	Free		Free	Yield		
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	33.8%			ICU Level of Service A		
Analysis Period (min)	15					

Lanes, Volumes, Timings
7: RAMPS

PM Build (Medium Term) Mitigation
09/01/2022

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	213	252	210	78	111	0
Future Volume (vph)	213	252	210	78	111	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.963					
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1794	0	1770	0
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1794	0	1770	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		236	727		173	
Travel Time (s)		5.4	16.5		3.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	274	228	85	121	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	232	274	313	0	121	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Stop	Stop		Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	43.7%			ICU Level of Service A		
Analysis Period (min)	15					

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	213	252	210	78	111	0
Future Vol, veh/h	213	252	210	78	111	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	232	274	228	85	121	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	11.4	11.2	10.4
HCM LOS	B	B	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	73%	0%
Vol Right, %	0%	0%	27%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	213	252	288	111
LT Vol	213	0	0	111
Through Vol	0	252	210	0
RT Vol	0	0	78	0
Lane Flow Rate	232	274	313	121
Geometry Grp	7	7	5	2
Degree of Util (X)	0.363	0.392	0.414	0.197
Departure Headway (Hd)	5.652	5.149	4.762	5.878
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	634	696	751	606
Service Time	3.411	2.907	2.818	3.957
HCM Lane V/C Ratio	0.366	0.394	0.417	0.2
HCM Control Delay	11.6	11.2	11.2	10.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.7	1.9	2	0.7

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM Build (Medium Term) Mitigation

09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	184	135	29	200	26	221	14	110	42	7	39
Future Volume (vph)	52	184	135	29	200	26	221	14	110	42	7	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.986			0.867			0.941	
Flt Protected		0.993			0.994		0.950				0.977	
Satd. Flow (prot)	0	1759	0	0	1826	0	1770	1615	0	0	1713	0
Flt Permitted		0.909			0.917		0.479				0.977	
Satd. Flow (perm)	0	1610	0	0	1684	0	892	1615	0	0	1713	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			5			120			25	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		501			437			306			1354	
Travel Time (s)		11.4			9.9			7.0			30.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	200	147	32	217	28	240	15	120	46	8	42
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	404	0	0	277	0	240	135	0	0	96	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Lanes, Volumes, Timings
9: VERANDA & SHERWOOD

PM Build (Medium Term) Mitigation
09/01/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	55.0	55.0		55.0	55.0		50.0	50.0		24.0	24.0	
Total Split (%)	42.6%	42.6%		42.6%	42.6%		38.8%	38.8%		18.6%	18.6%	
Maximum Green (s)	49.0	49.0		49.0	49.0		44.0	44.0		18.0	18.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0			6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)		27.7			27.7		29.9	29.9			9.8	
Actuated g/C Ratio		0.32			0.32		0.34	0.34			0.11	
v/c Ratio		0.76			0.51		0.78	0.21			0.45	
Control Delay		36.7			29.0		47.0	7.0			40.3	
Queue Delay		0.0			0.0		0.0	0.0			0.0	
Total Delay		36.7			29.0		47.0	7.0			40.3	
LOS		D			C		D	A			D	
Approach Delay		36.7			29.0			32.6			40.3	
Approach LOS		D			C			C			D	

Intersection Summary

Area Type: Other

Cycle Length: 129

Actuated Cycle Length: 87

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 33.8

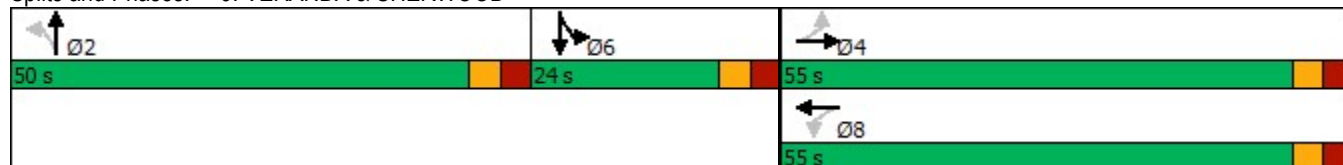
Intersection LOS: C

Intersection Capacity Utilization 61.9%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 9: VERANDA & SHERWOOD





Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	404	277	240	135	96
v/c Ratio	0.76	0.51	0.78	0.21	0.45
Control Delay	36.7	29.0	47.0	7.0	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.7	29.0	47.0	7.0	40.3
Queue Length 50th (ft)	180	117	112	5	36
Queue Length 95th (ft)	365	242	#295	51	108
Internal Link Dist (ft)	421	357		226	1274
Turn Bay Length (ft)					
Base Capacity (vph)	996	1033	490	942	404
Starvation Cap Reductn	26	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.42	0.27	0.49	0.14	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

9: VERANDA & SHERWOOD

PM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	184	135	29	200	26	221	14	110	42	7	39
Future Volume (vph)	52	184	135	29	200	26	221	14	110	42	7	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0			6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00			1.00	
Frt		0.95			0.99		1.00	0.87			0.94	
Flt Protected		0.99			0.99		0.95	1.00			0.98	
Satd. Flow (prot)		1759			1827		1770	1614			1712	
Flt Permitted		0.91			0.92		0.48	1.00			0.98	
Satd. Flow (perm)		1610			1685		893	1614			1712	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	200	147	32	217	28	240	15	120	46	8	42
RTOR Reduction (vph)	0	18	0	0	3	0	0	78	0	0	22	0
Lane Group Flow (vph)	0	386	0	0	274	0	240	57	0	0	74	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Split	NA	
Protected Phases		4			8			2		6	6	
Permitted Phases	4			8			2					
Actuated Green, G (s)		27.7			27.7		29.9	29.9			9.8	
Effective Green, g (s)		27.7			27.7		29.9	29.9			9.8	
Actuated g/C Ratio		0.32			0.32		0.35	0.35			0.11	
Clearance Time (s)		6.0			6.0		6.0	6.0			6.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		522			546		312	565			196	
v/s Ratio Prot								0.04			c0.04	
v/s Ratio Perm		c0.24			0.16		c0.27					
v/c Ratio		0.74			0.50		0.77	0.10			0.38	
Uniform Delay, d1		25.7			23.3		24.7	18.7			35.0	
Progression Factor		1.00			1.00		1.00	1.00			1.00	
Incremental Delay, d2		5.6			0.7		10.9	0.1			1.2	
Delay (s)		31.2			24.0		35.5	18.8			36.2	
Level of Service		C			C		D	B			D	
Approach Delay (s)		31.2			24.0			29.5			36.2	
Approach LOS		C			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			29.3				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			85.4				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			61.9%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

PM Build (Medium Term) Mitigation

09/01/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	184	135	29	200	26	221	14	110	42	7	39
Future Volume (veh/h)	52	184	135	29	200	26	221	14	110	42	7	39
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	57	200	147	32	217	28	240	15	120	46	8	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	133	291	193	118	478	57	357	36	287	85	15	78
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.20	0.20	0.20	0.10	0.10	0.10
Sat Flow, veh/h	148	916	608	106	1503	181	1781	179	1433	813	141	742
Grp Volume(v), veh/h	404	0	0	277	0	0	240	0	135	96	0	0
Grp Sat Flow(s),veh/h/ln	1672	0	0	1790	0	0	1781	0	1612	1696	0	0
Q Serve(g_s), s	4.4	0.0	0.0	0.0	0.0	0.0	5.9	0.0	3.5	2.6	0.0	0.0
Cycle Q Clear(g_c), s	10.1	0.0	0.0	5.8	0.0	0.0	5.9	0.0	3.5	2.6	0.0	0.0
Prop In Lane	0.14		0.36	0.12		0.10	1.00		0.89	0.48		0.44
Lane Grp Cap(c), veh/h	617	0	0	653	0	0	357	0	323	178	0	0
V/C Ratio(X)	0.65	0.00	0.00	0.42	0.00	0.00	0.67	0.00	0.42	0.54	0.00	0.00
Avail Cap(c_a), veh/h	1764	0	0	1846	0	0	1643	0	1487	640	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.5	0.0	0.0	13.1	0.0	0.0	17.6	0.0	16.7	20.3	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.4	0.0	0.0	2.2	0.0	0.9	2.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	0.0	2.1	0.0	0.0	2.4	0.0	1.2	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.7	0.0	0.0	13.5	0.0	0.0	19.8	0.0	17.5	22.8	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	B	C	A	A
Approach Vol, veh/h		404			277			375			96	
Approach Delay, s/veh		15.7			13.5			19.0			22.8	
Approach LOS		B			B			B			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		15.6		21.2		11.0		21.2				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		44.0		49.0		18.0		49.0				
Max Q Clear Time (g_c+I1), s		7.9		12.1		4.6		7.8				
Green Ext Time (p_c), s		1.6		3.0		0.3		1.9				
Intersection Summary												
HCM 6th Ctrl Delay				16.8								
HCM 6th LOS				B								

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	115	176	125	124	418	185	791	783	778	224	414	429
Average Queue (ft)	47	88	57	107	229	155	678	660	512	112	297	315
95th Queue (ft)	91	154	103	154	394	239	963	977	1081	244	392	410
Link Distance (ft)		364	364		410		750	750	750		1015	1015
Upstream Blk Time (%)					1		56	48	24			
Queuing Penalty (veh)					5		0	0	0			
Storage Bay Dist (ft)	250			100		160				200		
Storage Blk Time (%)				11	33	4	66			0	30	
Queuing Penalty (veh)				33	54	26	104			1	25	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	66	283	100	1052	1072	147	521
Average Queue (ft)	16	144	35	992	932	17	362
95th Queue (ft)	46	246	101	1185	1322	81	509
Link Distance (ft)	607	509		1015	1015		2348
Upstream Blk Time (%)				19	9		
Queuing Penalty (veh)				132	61		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		25	0			30	
Queuing Penalty (veh)		11	1			6	

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	85
Average Queue (ft)	28
95th Queue (ft)	64
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	89	110	101	85
Average Queue (ft)	49	56	57	42
95th Queue (ft)	80	91	89	72
Link Distance (ft)	181	181	693	65
Upstream Blk Time (%)				1
Queuing Penalty (veh)				1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	342	234	236	109	108
Average Queue (ft)	135	97	108	41	46
95th Queue (ft)	255	176	182	78	87
Link Distance (ft)	410	400	269	269	1268
Upstream Blk Time (%)	0		0		
Queuing Penalty (veh)	0		0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 461

Intersection	
Intersection Delay, s/veh	9.1
Intersection LOS	A

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑			↑	↑	
Traffic Vol, veh/h	212	0	0	141	0	212
Future Vol, veh/h	212	0	0	141	0	212
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	230	0	0	153	0	230
Number of Lanes	1	0	0	1	1	0

Approach	SE	NW	NE
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left		NE	SE
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NE		NW
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.6	8.9	8.8
HCM LOS	A	A	A

Lane	NELn1	NWLn1	SELn1
Vol Left, %	0%	0%	0%
Vol Thru, %	0%	100%	100%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	212	141	212
LT Vol	0	0	0
Through Vol	0	141	212
RT Vol	212	0	0
Lane Flow Rate	230	153	230
Geometry Grp	1	1	1
Degree of Util (X)	0.271	0.2	0.296
Departure Headway (Hd)	4.228	4.706	4.619
Convergence, Y/N	Yes	Yes	Yes
Cap	848	760	777
Service Time	2.258	2.749	2.658
HCM Lane V/C Ratio	0.271	0.201	0.296
HCM Control Delay	8.8	8.9	9.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	1.1	0.7	1.2

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:50	6:50	6:50	6:50	6:50	6:50
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	1452	1559	1541	1473	1454	1496
Vehs Exited	1449	1554	1545	1480	1458	1497
Starting Vehs	12	11	18	17	17	14
Ending Vehs	15	16	14	10	13	13
Travel Distance (mi)	335	354	356	338	331	343
Travel Time (hr)	13.1	13.9	13.9	13.2	13.0	13.4
Total Delay (hr)	1.4	1.6	1.5	1.5	1.5	1.5
Total Stops	538	595	541	554	560	558
Fuel Used (gal)	11.4	12.1	11.9	11.5	11.2	11.6

Interval #0 Information Seeding

Start Time	6:50
End Time	7:00
Total Time (min)	10
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1452	1559	1541	1473	1454	1496
Vehs Exited	1449	1554	1545	1480	1458	1497
Starting Vehs	12	11	18	17	17	14
Ending Vehs	15	16	14	10	13	13
Travel Distance (mi)	335	354	356	338	331	343
Travel Time (hr)	13.1	13.9	13.9	13.2	13.0	13.4
Total Delay (hr)	1.4	1.6	1.5	1.5	1.5	1.5
Total Stops	538	595	541	554	560	558
Fuel Used (gal)	11.4	12.1	11.9	11.5	11.2	11.6

11: Ramp Diverge Performance by movement

Movement	NBT	NBR	All
Denied Del/Veh (s)	0.2	0.3	0.2
Total Del/Veh (s)	0.5	0.5	0.5

13: Ramp to Sherwood & Sherwood St Performance by movement

Movement	SET	NWT	NER	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.1
Total Del/Veh (s)	6.9	6.4	4.1	5.7

Intersection: 13: Ramp to Sherwood & Sherwood St

Movement	SE	NW	NE
Directions Served	T	T	LR
Maximum Queue (ft)	92	73	89
Average Queue (ft)	47	39	46
95th Queue (ft)	75	60	72
Link Distance (ft)	254	312	534
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection	
Intersection Delay, s/veh	14.1
Intersection LOS	B

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations	↑			↑	↑	
Traffic Vol, veh/h	109	0	0	520	0	109
Future Vol, veh/h	109	0	0	520	0	109
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	118	0	0	565	0	118
Number of Lanes	1	0	0	1	1	0

Approach	SE	NW	NE
Opposing Approach	NW	SE	
Opposing Lanes	1	1	0
Conflicting Approach Left		NE	SE
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NE		NW
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.8	16.3	8.8
HCM LOS	A	C	A

Lane	NELn1	NWLn1	SELn1
Vol Left, %	0%	0%	0%
Vol Thru, %	0%	100%	100%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	109	520	109
LT Vol	0	0	0
Through Vol	0	520	109
RT Vol	109	0	0
Lane Flow Rate	118	565	118
Geometry Grp	1	1	1
Degree of Util (X)	0.16	0.684	0.159
Departure Headway (Hd)	4.852	4.359	4.819
Convergence, Y/N	Yes	Yes	Yes
Cap	737	825	742
Service Time	2.899	2.393	2.866
HCM Lane V/C Ratio	0.16	0.685	0.159
HCM Control Delay	8.8	16.3	8.8
HCM Lane LOS	A	C	A
HCM 95th-tile Q	0.6	5.5	0.6

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:50	3:50	3:50	3:50	3:50	3:50
End Time	5:00	5:00	5:00	5:00	5:00	5:00
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	2315	2377	2244	2315	2262	2302
Vehs Exited	2321	2374	2251	2323	2257	2304
Starting Vehs	24	19	28	25	20	24
Ending Vehs	18	22	21	17	25	21
Travel Distance (mi)	509	517	496	511	495	505
Travel Time (hr)	20.3	20.7	19.6	20.3	19.7	20.1
Total Delay (hr)	3.0	3.2	2.9	2.9	2.9	3.0
Total Stops	720	776	692	717	705	721
Fuel Used (gal)	17.5	17.7	17.0	17.5	16.9	17.3

Interval #0 Information Seeding

Start Time	3:50
End Time	4:00
Total Time (min)	10
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	4:00
End Time	5:00
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	2315	2377	2244	2315	2262	2302
Vehs Exited	2321	2374	2251	2323	2257	2304
Starting Vehs	24	19	28	25	20	24
Ending Vehs	18	22	21	17	25	21
Travel Distance (mi)	509	517	496	511	495	505
Travel Time (hr)	20.3	20.7	19.6	20.3	19.7	20.1
Total Delay (hr)	3.0	3.2	2.9	2.9	2.9	3.0
Total Stops	720	776	692	717	705	721
Fuel Used (gal)	17.5	17.7	17.0	17.5	16.9	17.3

11: Ramp Diverge Performance by movement

Movement	NBT	NBR	All
Denied Del/Veh (s)	0.3	0.4	0.3
Total Del/Veh (s)	0.7	0.9	0.7

13: Ramp to Sherwood & Sherwood St Performance by movement

Movement	SET	NWT	NER	All
Denied Del/Veh (s)	0.2	0.6	0.0	0.4
Total Del/Veh (s)	6.1	9.2	3.1	7.8

Intersection: 13: Ramp to Sherwood & Sherwood St

Movement	SE	NW	NE
Directions Served	T	T	LR
Maximum Queue (ft)	67	185	63
Average Queue (ft)	35	81	34
95th Queue (ft)	56	135	54
Link Distance (ft)	254	312	534
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Site Land Uses, Descriptions and Data													AM Peak Hour								Midday Peak Hour								PM Peak Hour							
Code	Land Use Group	Size	Unit	Type	# of Studies	Avg. Rate	Std. Dev.	Total by Avg.	r ²	Total by Eq'n	Method Chosen	Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking
710	General Office Building	10	1000 Sq. Ft.	Office	148	2.39	0.69	24	0.9	56	average	24	48%	8AM	11	90%	10	10%	1	9	100%	11AM	24	90%	22	10%	2	19	85%	4PM	20	90%	18	10%	2	16
820	Shopping Center	0	1000 Sq. Ft.	Retail	46	1.95	0.75	0	1	100	average	0	24%	8AM	0	80%	0	50%	0	0	76%	11AM	0	80%	0	80%	0	0	81%	4PM	0	80%	0	50%	0	0
850	Supermarket	0	1000 Sq. Ft.	Retail	19	2.93	0.73	0	0.9	0	average	0	30%	8AM	0	80%	0	20%	0	0	67%	11AM	0	80%	0	80%	0	0	97%	4PM	0	80%	0	20%	0	0
932	High-Turnover (Sit Down) Restaurant	10	1000 Sq. Ft.	Restaurant	51	9.44	5.38	94	N/A	N/A	average	94	68%	8AM	64	80%	51	50%	26	26	83%	11AM	78	80%	63	80%	50	13	42%	4PM	40	80%	32	50%	16	16
222	Multifamily Housing (Mid Rise)	235	Dwellings	Residential	73	1.31	0.22	308	1	306	average	308	56%	8AM	172	80%	138	50%	69	69	37%	11AM	114	80%	91	50%	46	46	45%	4PM	139	100%	139	50%	69	69
310	Hotel	125	Rooms	Hotel	22	0.74	0.22	93	0.7	100	average	93	90%	8AM	83	100%	83	20%	17	67	89%	11AM	82	100%	82	20%	16	66	74%	4PM	68	100%	68	20%	14	55
	Roux Institute			Other								564		8AM	165	80%	132		0	132		11AM	451	80%	361		0	361		4PM	559	80%	447		0	447
760	Research and Development	50	1000 Sq. Ft.	Lab	13	2.58	0.56	129	0.9	123	average	129	91%	8AM	117	80%	94	20%	19	75	93%	11AM	120	80%	96	20%	19	77	75%	4PM	97	80%	77	20%	15	62
															Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking
															614		509		131	378			869		714		134	581			923		782		116	665
													AM Peak Hour Total Parking Demand								Midday Peak Hour Total Parking Demand								PM Peak Hour Total Parking Demand							

Site Land Uses, Descriptions and Data												
Code	Land Use Group	Size	Unit	Type	# of Studies	Avg. Rate	Std. Dev.	Total by Avg.	r ²	Total by Eq'n	Method Chosen	Parking
710	General Office Building	50	1000 Sq. Ft.	Office	148	2.39	0.69	120	0.9	142	average	120
820	Shopping Center	5	1000 Sq. Ft.	Retail	46	1.95	0.75	10	1	108	average	10
850	Supermarket	0	1000 Sq. Ft.	Retail	19	2.93	0.73	0	0.9	0	average	0
932	High-Turnover (Sit Down) Restaurant	10	1000 Sq. Ft.	Restaurant	51	9.44	5.38	94	N/A	N/A	average	94
222	Multifamily Housing (Mid Rise)	415	Dwellings	Residential	73	1.31	0.22	544	1	547	average	544
310	Hotel	125	Rooms	Hotel	22	0.74	0.22	93	0.7	100	average	93
	Roux Institute			Other								1145
760	Research and Development	50	1000 Sq. Ft.	Lab	13	2.58	0.56	129	0.9	123	average	129

AM Peak Hour								
Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	
48%	8AM	57	90%	52	10%	5	46	
24%	8AM	2	80%	2	50%	1	1	
30%	8AM	0	80%	0	20%	0	0	
68%	8AM	64	80%	51	50%	26	26	
56%	8AM	304	80%	244	50%	122	122	
90%	8AM	83	100%	83	20%	17	67	
	8AM	277	80%	222		0	222	
91%	8AM	117	80%	94	20%	19	75	
		Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking	
		906		747		189	558	
AM Peak Hour Total Parking Demand								

Midday Peak Hour								
Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	
100%	11AM	120	90%	108	10%	11	97	
76%	11AM	7	80%	6	80%	5	1	
67%	11AM	0	80%	0	80%	0	0	
83%	11AM	78	80%	63	80%	50	13	
37%	11AM	201	80%	161	50%	80	80	
89%	11AM	82	100%	82	20%	16	66	
	11AM	867	80%	694		0	694	
93%	11AM	120	80%	96	20%	19	77	
		Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking	
		1476		1209		182	1027	
Midday Peak Hour Total Parking Demand								

PM Peak Hour								
Peak Hour %	Peak Hour	Peak Hour Parking	Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	
85%	4PM	102	90%	91	10%	9	82	
81%	4PM	8	80%	6	50%	3	3	
97%	4PM	0	80%	0	20%	0	0	
42%	4PM	40	80%	32	50%	16	16	
45%	4PM	245	100%	245	50%	122	122	
74%	4PM	68	100%	68	20%	14	55	
	4PM	1136	80%	909		0	909	
75%	4PM	97	80%	77	20%	15	62	
		Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking	
		1695		1429		180	1249	
PM Peak Hour Total Parking Demand								

Site Land Uses, Descriptions and Data												
Code	Land Use Group	Size	Unit	Type	# of Studies	Avg. Rate	Std. Dev.	Total by Avg.	r ²	Total by Eq'n	Method Chosen	Parking
710	General Office Building	200	1000 Sq. Ft.	Office	148	2.39	0.69	478	0.9	465	average	478
820	Shopping Center	10	1000 Sq. Ft.	Retail	46	1.95	0.75	20	1	115	average	20
850	Supermarket	0	1000 Sq. Ft.	Retail	19	2.93	0.73	0	0.9	0	average	0
932	High-Turnover (Sit Down) Restaurant	15	1000 Sq. Ft.	Restaurant	51	9.44	5.38	142	N/A	N/A	average	142
222	Multifamily Housing (Mid Rise)	650	Dwellings	Residential	73	1.31	0.22	852	1	862	average	852
310	Hotel	125	Rooms	Hotel	22	0.74	0.22	93	0.7	100	average	93
	Roux Institute			Other								1288
760	Research and Development	50	1000 Sq. Ft.	Lab	13	2.58	0.56	129	0.9	123	average	129

AM Peak Hour								
Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	
48%	8AM	229	90%	206	10%	21	186	
24%	8AM	5	80%	4	50%	2	2	
30%	8AM	0	80%	0	20%	0	0	
68%	8AM	96	80%	77	50%	39	39	
56%	8AM	477	80%	381	50%	191	191	
90%	8AM	83	100%	83	20%	17	67	
	8AM	341	80%	273		0	273	
91%	8AM	117	80%	94	20%	19	75	
		Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking	
		1349		1119		287	831	
AM Peak Hour Total Parking Demand								

Midday Peak Hour								
Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	
100%	11AM	478	90%	430	10%	43	387	
76%	11AM	15	80%	12	80%	9	2	
67%	11AM	0	80%	0	80%	0	0	
83%	11AM	118	80%	94	80%	75	19	
37%	11AM	315	80%	252	50%	126	126	
89%	11AM	82	100%	82	20%	16	66	
	11AM	1023	80%	818		0	818	
93%	11AM	120	80%	96	20%	19	77	
		Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking	
		2151		1785		289	1495	
Midday Peak Hour Total Parking Demand								

PM Peak Hour								
Peak Hour %	Peak Hour	Peak Hour Parking	Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	
85%	4PM	406	90%	366	10%	37	329	
81%	4PM	16	80%	13	50%	6	6	
97%	4PM	0	80%	0	20%	0	0	
42%	4PM	59	80%	48	50%	24	24	
45%	4PM	383	80%	307	50%	153	153	
74%	4PM	68	100%	68	20%	14	55	
	4PM	1252	80%	1002		0	1002	
75%	4PM	97	80%	77	20%	15	62	
		Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking	
		2282		1880		249	1631	
PM Peak Hour Total Parking Demand								

Roux Institute (School and Partners Only) Parking Generation Detail

Time-of-Day Pattern by Group

	Graduate Learners (Daytime)		Graduate Learners (Night)		Corporate Learners		Daytime Special Events		Lunch Special Events		Evening Special Events	
	in	out	in	out	in	out	in	out	in	out	in	out
6am												
7am					10%		20%					
8am	10%				20%		60%					
9am	20%				40%		20%					
10am	60%				20%							
11am	10%				10%				80%			
noon									20%			
1pm										20%		
2pm			10%							80%		
3pm			60%			10%						
4pm		10%	20%			20%		20%			10%	
5pm		20%	10%			40%		60%			50%	
6pm		60%				20%		20%			40%	20%
7pm		10%				10%						50%
8pm				10%								30%
9pm				20%								
10pm				60%								
11pm				10%								

Roux Institute (School and Partners Only) Parking Generation, Short-Term
Before mode share and internal capture adjustments

	Graduate Learners (Daytime) 40% of 359		Graduate Learners (Night) 60% of 359		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups	Faculty/ Staff	Visiting Faculty	Researchers	Cumulative Parking Demand
	144		215		100		25		25		100		59	55	5	47	
	in	out	in	out	in	out	in	out	in	out	in	out	demand	demand	demand	demand	
6am	0	0	0	0	0	0	0	0	0	0	0	0	6	5	1	23	35
7am	0	0	0	0	10	0	5	0	0	0	0	0	8	7	1	40	71
8am	14	0	0	0	20	0	15	0	0	0	0	0	28	26	3	43	165
9am	29	0	0	0	40	0	5	0	0	0	0	0	52	48	5	47	289
10am	86	0	0	0	20	0	0	0	0	0	0	0	59	55	5	47	411
11am	14	0	0	0	10	0	0	0	20	0	0	0	59	55	5	44	452
noon	0	0	0	0	0	0	0	0	5	0	0	0	50	46	5	40	434
1pm	0	0	0	0	0	0	0	0	0	5	0	0	49	46	5	43	431
2pm	0	0	22	0	0	0	0	0	0	20	0	0	55	51	5	46	447
3pm	0	0	129	0	0	10	0	0	0	0	0	0	55	51	5	44	565
4pm	0	14	43	0	0	20	0	5	0	0	10	0	50	46	5	36	560
5pm	0	29	22	0	0	40	0	15	0	0	50	0	33	31	3	15	492
6pm	0	86	0	0	0	20	0	5	0	0	40	20	12	11	1	5	348
7pm	0	14	0	0	0	10	0	0	0	0	0	50	6	6	1	0	258
8pm	0	0	0	22	0	0	0	0	0	0	0	30	6	5	1	0	206
9pm	0	0	0	43	0	0	0	0	0	0	0	0	6	5	1	0	163
10pm	0	0	0	129	0	0	0	0	0	0	0	0					22
11pm	0	0	0	22	0	0	0	0	0	0	0	0					0

= Daily Peak

Roux Institute (School and Partners Only) Parking Generation, Medium-Term
Before mode share and internal capture adjustments

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups	Faculty /Staff	Visiting Faculty	Researchers	Cumulative Parking Demand
	319		479		250		25		25		100		84	101	10	62	
	in	out	in	out	in	out	in	out	in	out	in	out	demand	demand	demand	demand	
6am	0	0	0	0	0	0	0	0	0	0	0	0	8	10	1	30	49
7am	0	0	0	0	25	0	5	0	0	0	0	0	11	13	1	53	108
8am	32	0	0	0	50	0	15	0	0	0	0	0	40	48	5	56	277
9am	64	0	0	0	100	0	5	0	0	0	0	0	74	89	9	61	528
10am	192	0	0	0	50	0	0	0	0	0	0	0	84	101	10	62	794
11am	32	0	0	0	25	0	0	0	20	0	0	0	84	101	10	58	867
noon	0	0	0	0	0	0	0	0	5	0	0	0	71	86	9	52	837
1pm	0	0	0	0	0	0	0	0	0	5	0	0	71	85	8	56	834
2pm	0	0	48	0	0	0	0	0	0	20	0	0	78	94	9	60	884
3pm	0	0	287	0	0	25	0	0	0	0	0	0	79	95	9	57	1145
4pm	0	32	96	0	0	50	0	5	0	0	10	0	71	86	9	47	1136
5pm	0	64	48	0	0	100	0	15	0	0	50	0	47	57	6	19	971
6pm	0	192	0	0	0	50	0	5	0	0	40	20	17	20	2	6	661
7pm	0	32	0	0	0	25	0	0	0	0	0	50	9	11	1	0	530
8pm	0	0	0	48	0	0	0	0	0	0	0	30	8	10	1	0	450
9pm	0	0	0	96	0	0	0	0	0	0	0	0	8	10	1	0	355
10pm	0	0	0	287	0	0	0	0	0	0	0	0					48
11pm	0	0	0	48	0	0	0	0	0	0	0	0					0

= Daily Peak

Roux Institute (School and Partners Only) Parking Generation, Long-Term
Before mode share and internal capture adjustments

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups	Faculty /Staff	Visiting Faculty	Researchers	Cumulative Parking Demand
	319		479		350		25		25		100		84	139	14	77	
	in	out	in	out	in	out	in	out	in	out	in	out	demand	demand	demand	demand	
6am	0	0	0	0	0	0	0	0	0	0	0	0	8	14	1	37	61
7am	0	0	0	0	35	0	5	0	0	0	0	0	11	18	2	65	136
8am	32	0	0	0	70	0	15	0	0	0	0	0	40	67	7	70	341
9am	64	0	0	0	140	0	5	0	0	0	0	0	74	122	12	75	650
10am	192	0	0	0	70	0	0	0	0	0	0	0	84	139	14	77	941
11am	32	0	0	0	35	0	0	0	20	0	0	0	84	139	14	72	1023
noon	0	0	0	0	0	0	0	0	5	0	0	0	71	118	12	65	985
1pm	0	0	0	0	0	0	0	0	0	5	0	0	71	117	12	69	983
2pm	0	0	48	0	0	0	0	0	0	20	0	0	78	129	13	75	1037
3pm	0	0	287	0	0	35	0	0	0	0	0	0	79	131	13	71	1288
4pm	0	32	96	0	0	70	0	5	0	0	10	0	71	118	12	58	1252
5pm	0	64	48	0	0	140	0	15	0	0	50	0	47	78	8	24	1029
6pm	0	192	0	0	0	70	0	5	0	0	40	20	17	28	3	8	681
7pm	0	32	0	0	0	35	0	0	0	0	0	50	9	15	2	0	535
8pm	0	0	0	48	0	0	0	0	0	0	0	30	8	14	1	0	455
9pm	0	0	0	96	0	0	0	0	0	0	0	0	8	14	1	0	359
10pm	0	0	0	287	0	0	0	0	0	0	0	0					48
11pm	0	0	0	48	0	0	0	0	0	0	0	0					0

= Daily Peak

2021 HCL List
Roux Development

Location	HCL	% Injury	CRF	Total Crashes
US1 at Veranda and I-295 Ramps	2021-60334	64.3%	6.05	14
Washington at Randall	2021-17037	62.5%	1.04	8
Washington I-295 NB Exit 8	2021-3123995	16.7%	2.04	12
Washington from Galvin to Bates	2021-3123985	36.4%	1.59	11

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 60334 HIGH NODE: 0000

REGION: 1

U/R: URBAN

DESCRIPTION: Int of Rt1 NB from Veranda St and Rt1 SB from Veranda

RTE # / RD #: 0001S

DATE DRAWN: 5/10/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

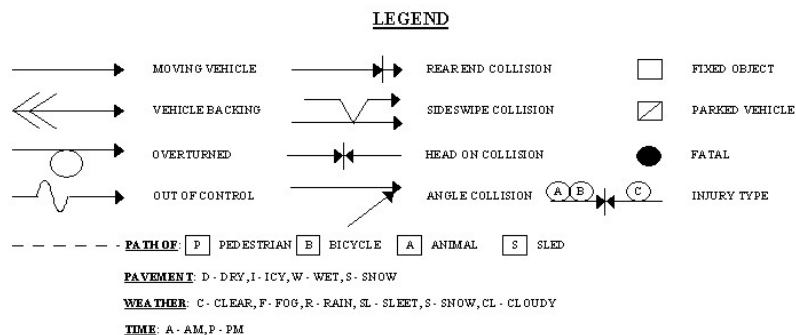
STUDY TO: 12/31/2021

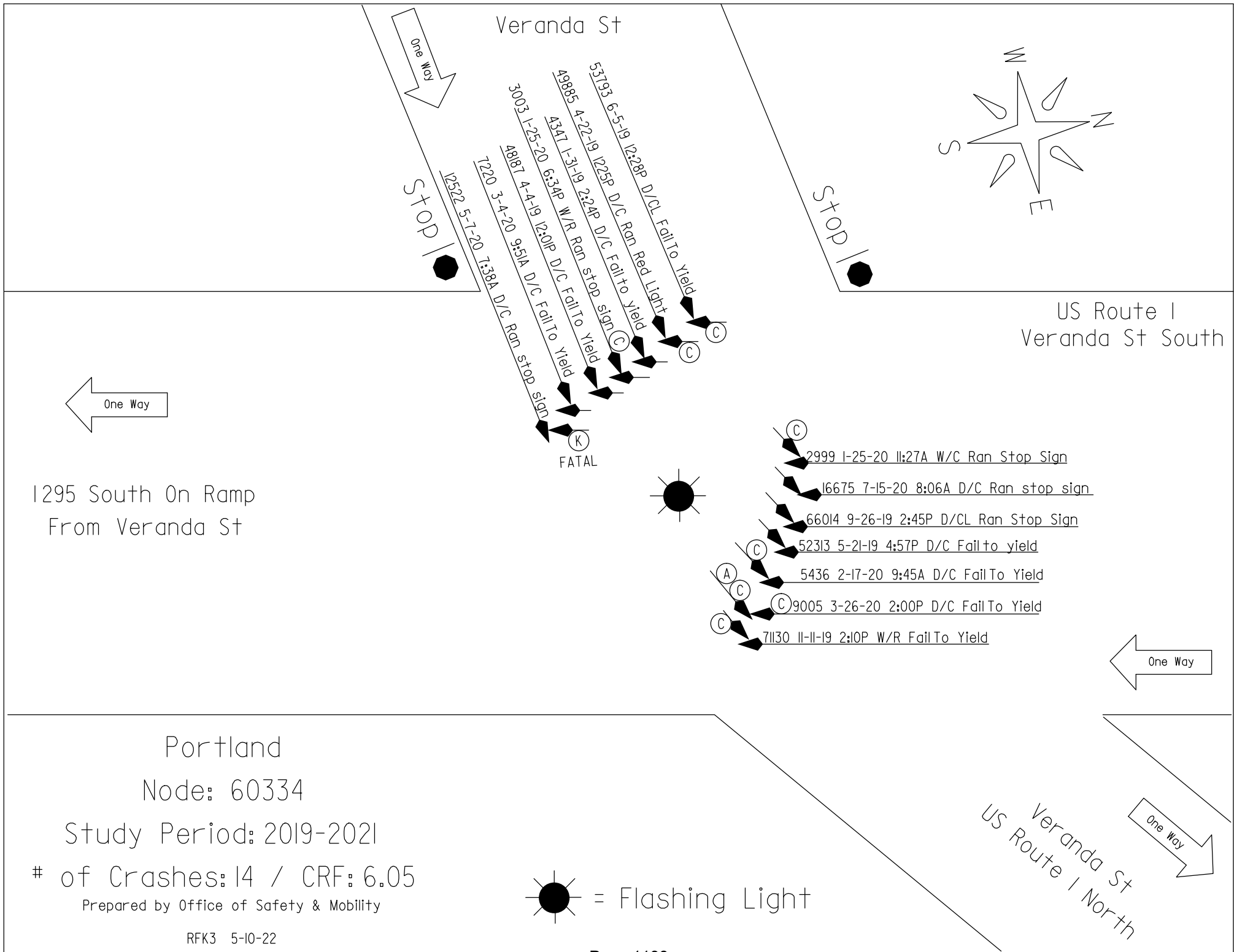
CRASH RATE: 2.05

CRF: 6.05

% INJURY: 64.3

TOTAL CRASHES: 14







Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ **Crash Summary I - Single Node** ☐ **Section Detail** ☒ **Crash Summary II** ☐ **1320 Public** ☐ **1320 Private** ☐ **1320 Summary**

REPORT DESCRIPTION

Portland
Jct of Rt1 SB from Veranda & Rt1 NB from Veranda

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: **0001S** Start Node: **60334** Start Offset: **0** ☐ **Exclude First Node**
End Node: **60334** End Offset: **0** ☐ **Exclude Last Node**

Crash Summary I

Nodes																			
Node	Route - MP	Node Description				U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF		
60334	0001S - 16.49	Int of I 295 RD	RAMP ON FROM VERANDA ST	RD INV 3200	2	14	1	1	0	7	5	64.3	2.275		2.05	0.34	6.06		
														Statewide Crash Rate:		0.10			
Study Years:	3.00	NODE TOTALS:				14	1	1	0	7	5	64.3	2.275		2.05	0.34	6.05		

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM												PM												Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11		
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONDAY	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
WEDNESDAY	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
THURSDAY	0	0	0	0	0	0	0	1	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	5
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2
Totals	0	0	0	0	0	0	0	1	1	2	0	1	3	0	4	0	1	0	1	0	0	0	0	0	0	14

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	20	23-Bicyclist	0
2-(Sport) Utility Vehicle	5	24-Witness	4
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	1	26-Construction	0
5-Pickup	2	27-Farm Vehicle	0
6-Motor Home	0	Total	32
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	12	0	0	0	0	13
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	7	1	0	0	0	0	8
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	6	0	0	0	0	0	6
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	1	0	0	0	0	1
Drove Too Fast For Conditions	0	0	0	0	0	0	0
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	0	0	0	0	0	0	0
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	14	14	0	0	0	0	28

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	14	13	0	0	0	0	27
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	1	0	0	0	0	1
Total	14	14	0	0	0	0	28

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	3	0	0	0	0	3
25-29	1	0	0	0	0	1
30-39	2	0	0	0	0	2
40-49	2	0	0	0	0	2
50-59	4	0	0	0	0	4
60-69	7	0	0	0	0	7
70-79	3	0	0	0	0	3
80-Over	5	0	0	0	0	5
Unknown	0	0	0	0	0	0
Total	28	0	0	0	0	28

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	4
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	28
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	24		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	0	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	14	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	0	
14-Other	0	
Total	14	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	1	1
A	1	1
B	0	0
C	7	10
PD	5	0
Total	14	12

Road Character	
Road Grade	Total
1-Level	14
2-On Grade	0
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	14

Light	
Light Condition	Total
1-Daylight	13
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	1
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	14

Crash Summary II - Characteristics**Crashes by Year and Month**

Month	2019	2020	2021	Total
JANUARY	1	2	0	3
FEBRUARY	0	1	0	1
MARCH	0	2	0	2
APRIL	2	0	0	2
MAY	1	1	0	2
JUNE	1	0	0	1
JULY	0	1	0	1
AUGUST	0	0	0	0
SEPTEMBER	1	0	0	1
OCTOBER	0	0	0	0
NOVEMBER	1	0	0	1
DECEMBER	0	0	0	0
Total	7	7	0	14

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14

Maine Department Of Transportation - Office of Safety, Crash Records Section

Crash Summary II - Characteristics**Crashes by Weather, Light Condition and Road Surface**

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	9	0	0	0	0	0	0	0	0	0	1	10
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	0	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics**Crashes by Weather, Light Condition and Road Surface**

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics**Crashes by Weather, Light Condition and Road Surface**

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	11	0	0	0	0	0	0	0	0	0	3	14

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 17037 HIGH NODE: 0000

REGION: 1

U/R: URBAN

DESCRIPTION: Int of Randall St and Washington Ave

RTE # / RD #: 0026X

DATE DRAWN: 4/28/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

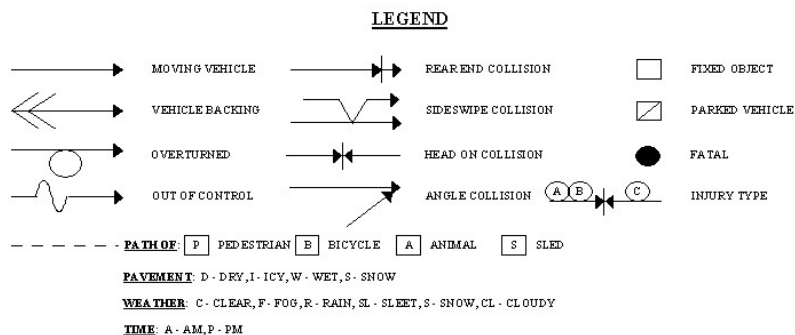
STUDY TO: 12/31/2021

CRASH RATE: 0.3

CRF: 1.04

% INJURY: 62.5

TOTAL CRASHES: 8



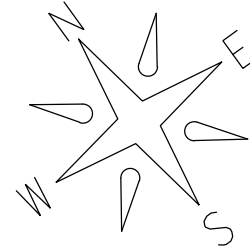
Portland
Node: 17037

Study Period: 2019-2021

of Crashes: 8 / CRF: 1.04

Prepared by Office of Safety & Mobility

RFK3 4-28-22



Washington Ave

14291 6-17-20 5:00P D/C Follow Too Close
61004 8-8-19 11:35A D/C Follow Too Close
15639 7-2-20 8:43A D/C Follow Too Close
2744 2-2-21 6:12P S/S Unsafe speed

21028 8-12-21 8:49A D/C Fail To Yield
13221 5-28-21 10:55A D/CL Fail To Yield
19454 8-17-20 12:45P D/C Fail To Yield

23258 9-30-20 11:21P W/R Fail To Yield

Stop

Randall St



Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I - Single Node ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Jct of Washington Ave & Randall St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X

Start Node: 17037

Start Offset: 0

☐ Exclude First Node

End Node: 17037

End Offset: 0

☐ Exclude Last Node

Crash Summary I

Nodes														
Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
17037	0026X - 1.32	Int of RANDALL ST WASHINGTON AV	2	8	0	0	0	5	3	62.5	8.776	0.30	0.29	1.04
				Statewide Crash Rate: 0.13										
Study Years: 3.00				NODE TOTALS:										
				8	0	0	0	5	3	62.5	8.776	0.30	0.29	1.04

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM											Hour of Day											PM											Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11											
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1								
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1								
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2								
THURSDAY	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3								
FRIDAY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1								
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
Totals	0	0	0	0	0	0	0	0	2	0	1	1	1	0	0	0	0	1	1	0	0	0	0	1	0	8									

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	12	23-Bicyclist	0
2-(Sport) Utility Vehicle	5	24-Witness	2
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	0	27-Farm Vehicle	0
6-Motor Home	0	Total	19
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	7	1	0	0	0	9
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	3	1	0	0	0	0	4
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	1	0	0	0	0	0	1
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	3	0	0	0	0	0	3
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	8	8	1	0	0	0	17

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	7	8	1	0	0	0	16
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	1	0	0	0	0	0	1
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	8	8	1	0	0	0	17

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	3	0	0	0	0	3
20-24	1	0	0	0	0	1
25-29	3	0	0	0	0	3
30-39	5	0	0	0	0	5
40-49	4	0	0	0	0	4
50-59	0	0	0	0	0	0
60-69	1	0	0	0	0	1
70-79	0	0	0	0	0	0
80-Over	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	17	0	0	0	0	17

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	17
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	17		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	0	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	1	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	7	
14-Other	0	
Total	8	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	0	0
C	5	9
PD	3	0
Total	8	9

Road Character	
Road Grade	Total
1-Level	8
2-On Grade	0
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	8

Light	
Light Condition	Total
1-Daylight	6
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	2
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	8

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	0	1	1
MARCH	0	0	0	0
APRIL	0	0	0	0
MAY	0	0	1	1
JUNE	0	1	0	1
JULY	0	1	0	1
AUGUST	1	1	1	3
SEPTEMBER	0	1	0	1
OCTOBER	0	0	0	0
NOVEMBER	0	0	0	0
DECEMBER	0	0	0	0
Total	1	4	3	8

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Head-on - Sideswipe	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Intersection Movement	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	8	0	0	0	0	0	0	0	0	0	0	0	8

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	5	0	0	0	0	0	0	0	0	0	0	5
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	1	0	0	0	0	0	0	0	0	0	0	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	1	0	0	0	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6	0	0	0	0	0	0	1	0	0	1	8

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 18719 HIGH NODE: 18737

REGION: 1

U/R: URBAN

DESCRIPTION: Washington Ave from I-295NB Exit 8 off to Bates St

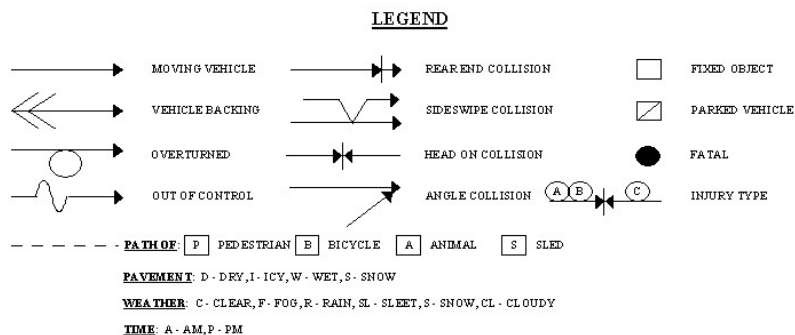
RTE # / RD #: 0026X

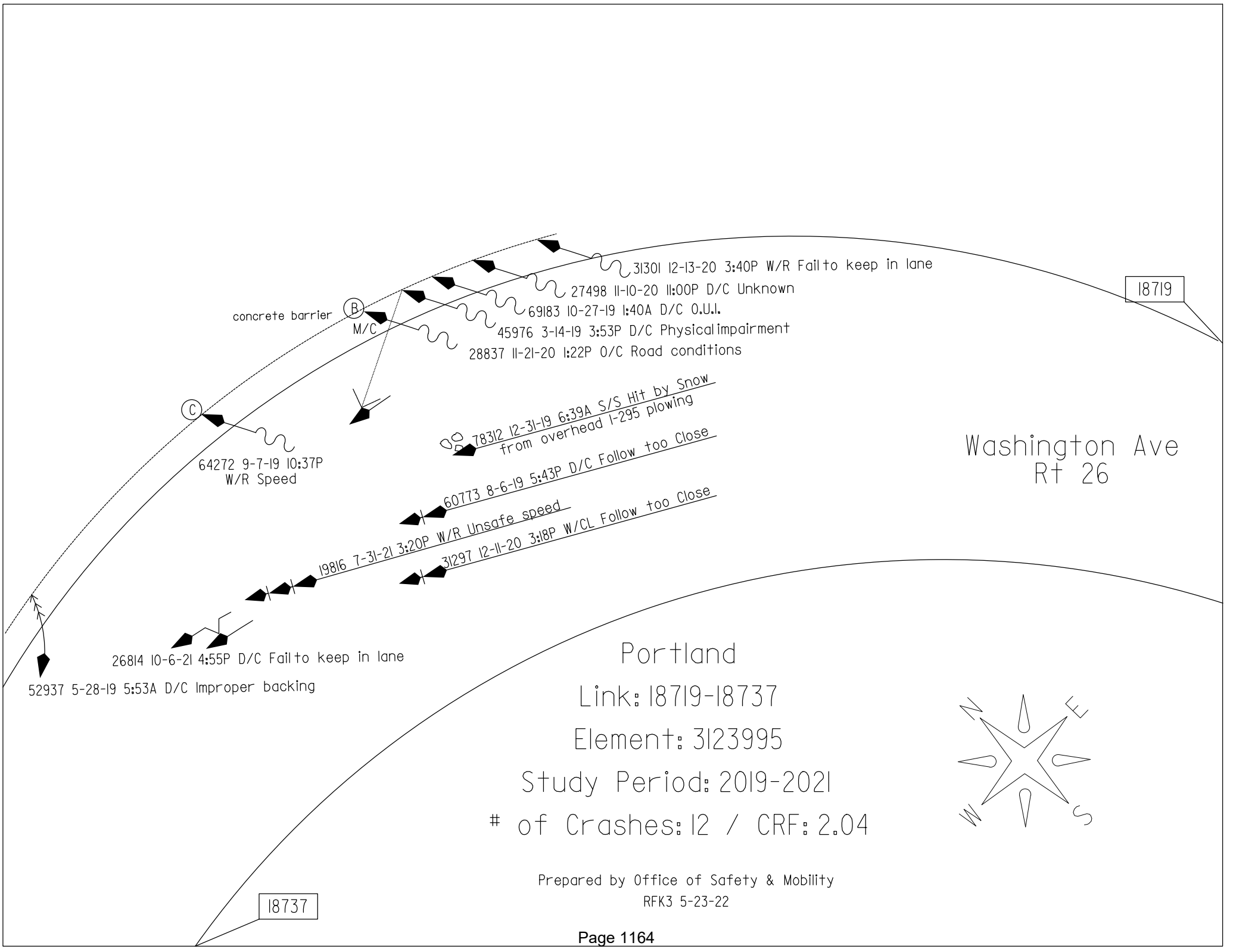
DATE DRAWN: 5/23/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

STUDY TO: 12/31/2021

CRASH RATE: 392.29 CRF: 2.04 % INJURY: 16.7 TOTAL CRASHES: 12







Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I -
Single Element ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Washington Ave from I-295SB Exit 8 Off to Bates/Veranda St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X

Start Node: 18719

Start Offset: 0

☒ Exclude First Node

End Node: 18737

End Offset: 0

☒ Exclude Last Node

Crash Summary I

Sections																	
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section U/R Length	Total Crashes	K	Injury Crashes				Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF	
								A	B	C	PD						
18719	18737	3123995	0 - 0.24	0026X - 0.97	0.24	2	12	0	0	1	1	10	16.7	0.01020	392.29	192.74	2.04
Int of I 295 NB		WASHINGTON AV		ST RTE 26		Statewide Crash Rate: 78.55											
Study Years:		3.00		Section Totals:		0.24	12	0	0	1	1	10	16.7	0.01020	392.29	192.74	2.04

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	Injury Crashes				Crash Report	Crash Date	Crash Mile Point	Injury Degree
							A	B	C	PD				
18719	18737	3123995	0 - 0.24	0026X - 0.97	12	0	0	1	1	10	2020-27498	11/10/2020	1.09	PD
											2019-45976	03/14/2019	1.10	PD
											2020-31301	12/13/2020	1.10	PD
											2020-28837	11/21/2020	1.11	B
											2020-31297	12/11/2020	1.11	PD
											2019-78312	12/31/2019	1.12	PD
											2019-64272	09/07/2019	1.13	C
											2019-60773	08/06/2019	1.13	PD
											2019-69183	10/27/2019	1.13	PD
											2021-19816	07/31/2021	1.16	PD
											2021-26814	10/06/2021	1.18	PD
											2019-52937	05/28/2019	1.20	PD
Totals:					12	0	0	1	1	10				

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM											Hour of Day											PM											Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11											
SUNDAY	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2								
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
TUESDAY	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	4									
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1									
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1									
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1									
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	3									
Totals	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	4	1	1	0	0	0	0	1	1	0	12									

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	9	23-Bicyclist	0
2-(Sport) Utility Vehicle	6	24-Witness	2
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	2	27-Farm Vehicle	0
6-Motor Home	0	Total	20
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	1		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	2	5	1	0	0	0	8
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	0	0	0	0	0	0	0
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	2	0	0	0	0	0	2
Improper Turn	0	0	0	0	0	0	0
Improper Backing	1	0	0	0	0	0	1
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	2	0	0	0	0	0	2
Failed to Keep in Proper Lane	3	0	0	0	0	0	3
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	1	0	0	0	0	0	1
Total	12	5	1	0	0	0	18

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	8	5	1	0	0	0	14
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	1	0	0	0	0	0	1
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	3	0	0	0	0	0	3
Other	0	0	0	0	0	0	0
Total	12	5	1	0	0	0	18

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	3	0	0	0	0	3
25-29	2	0	0	0	0	2
30-39	3	0	0	0	0	3
40-49	5	0	0	0	0	5
50-59	3	0	0	0	0	3
60-69	1	0	0	0	0	1
70-79	0	0	0	0	0	0
80-Over	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	18	0	0	0	0	18

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	1
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	18
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	1		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	12		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	1		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	3		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	2	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	0	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	10	
14-Other	0	
Total	12	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	1	1
C	1	1
PD	10	0
Total	12	2

Road Character	
Road Grade	Total
1-Level	3
2-On Grade	9
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	12

Light	
Light Condition	Total
1-Daylight	7
2-Dawn	1
3-Dusk	1
4-Dark - Lighted	2
5-Dark - Not Lighted	1
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	12

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	0	0	0
MARCH	1	0	0	1
APRIL	0	0	0	0
MAY	1	0	0	1
JUNE	0	0	0	0
JULY	0	0	1	1
AUGUST	1	0	0	1
SEPTEMBER	1	0	0	1
OCTOBER	1	0	1	2
NOVEMBER	0	2	0	2
DECEMBER	1	2	0	3
Total	6	4	2	12

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	2	0	0	0	0	0	0	2	0	0	0	0	0	0	4
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	0	0	0	0	9	0	0	0	0	0	0	12

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Not Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	4	0	0	0	1	0	0	0	0	0	0	5
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	1	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	1	0	0	0	1
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6	0	0	0	1	0	0	1	0	0	4	12

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 17036 HIGH NODE: 18737

REGION: 1

U/R: URBAN

DESCRIPTION: Washington Ave from Galvin St to Bates St

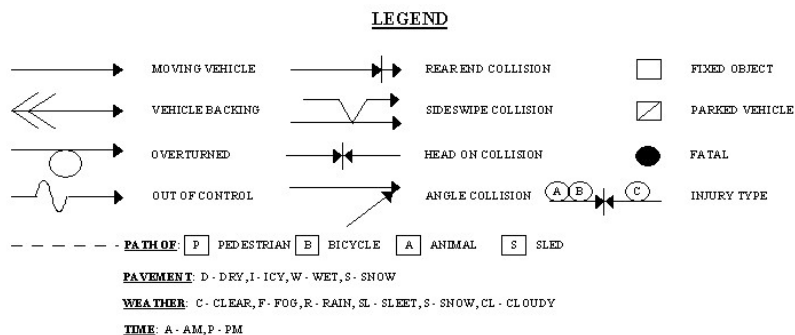
RTE # / RD #: 0026X

DATE DRAWN: 5/23/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

STUDY TO: 12/31/2021

CRASH RATE: 692.71 CRF: 1.59 % INJURY: 36.4 TOTAL CRASHES: 11



Portland
Link: I7036-I8737

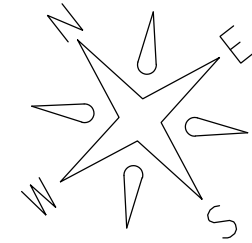
Element: 3123985

Study Period: 2019-2021

of Crashes: 11 / CRF: 1.59

Prepared by Office of Safety & Mobility

RFK3 5-23-22



I7036

Driveway
#521

I8737

pole (B) 7801 3-28-21 9:00A D/CL Sick

69175 10-25-19 5:40P D/C Follow too close

50601 5-2-19 7:40A W/R Follow too close

(B) 24542 9-15-21 12:21P D/CL Follow too close
laid down moped

19629 8-18-20 4:25P D/C Fail to Yield

30654 11-8-21 5:18P D/C Fail to Yield

49657 4-17-19 4:15P D/C Fail to yield

(C) 52817 5-21-19 4:51P D/C Follow too close

60278 7-28-19 9:17P D/C Fail to keep in lane

16740 6-20-20 10:30P D/C Hit and run

53067 5-29-19 9:37P D/C Fail To Keep In Lane

Washington Ave. (Rte. 26)

Driveway

Driveway



Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I -
Single Element ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Washington Ave from Galvin St to Bates St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X

Start Node: 18737

Start Offset: 0

☒ Exclude First Node

End Node: 17036

End Offset: 0

☒ Exclude Last Node

Crash Summary I

Sections																	
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
17036	18737	3123985	0 - 0.06	0026X - 1.21	0.06	2	11	0	0	2	2	7	36.4	0.00529	692.71	435.32	1.59
Int of GALVIN ST		WASHINGTON AV		ST RTE 26		Statewide Crash Rate: 187.15											
Study Years:		3.00		Section Totals:		0.06	11	0	0	2	2	7	36.4	0.00529	692.71	435.32	1.59

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	Injury Crashes				Crash Report	Crash Date	Crash Mile Point	Injury Degree										
							A	B	C	PD														
17036	18737	3123985	0 - 0.06	0026X - 1.21	11	0	0	2	2	7	2019-53067	05/29/2019	1.22	C										
											2020-19629	08/18/2020	1.23	PD										
											2021-30654	11/08/2021	1.23	PD										
											2019-49657	04/17/2019	1.24	PD										
											2020-16740	06/20/2020	1.24	PD										
											2019-60278	07/28/2019	1.24	PD										
											2021-7801	03/28/2021	1.25	B										
											2019-69175	10/25/2019	1.25	PD										
											2019-50601	05/02/2019	1.25	PD										
											2021-24542	09/15/2021	1.26	B										
											2019-52817	05/21/2019	1.26	C										
											Totals:					11	0	0	2	2	7			

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM												PM												Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11		
SUNDAY	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	3
THURSDAY	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Totals	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	3	2	0	0	0	2	1	0	0	11

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	14	23-Bicyclist	0
2-(Sport) Utility Vehicle	2	24-Witness	0
3-Passenger Van	0	25-Other	1
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	3	27-Farm Vehicle	0
6-Motor Home	0	Total	21
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	1		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	9	0	0	0	0	10
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	3	0	0	0	0	0	3
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	0	0	0	0	0	0	0
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	3	0	1	0	0	0	4
Failed to Keep in Proper Lane	2	0	0	0	0	0	2
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	10	9	1	0	0	0	20

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	9	9	1	0	0	0	19
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	1	0	0	0	0	0	1
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	10	9	1	0	0	0	20

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	2	0	0	0	0	2
25-29	4	0	0	0	0	4
30-39	5	0	0	0	0	5
40-49	0	0	0	0	0	0
50-59	4	0	0	0	0	4
60-69	3	0	0	0	0	3
70-79	1	0	0	0	0	1
80-Over	0	0	0	0	0	0
Unknown	1	0	0	0	0	1
Total	21	0	0	0	0	21

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	21
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	20		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	1		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	3	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	0	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	8	
14-Other	0	
Total	11	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	2	2
C	2	2
PD	7	0
Total	11	4

Road Character	
Road Grade	Total
1-Level	8
2-On Grade	2
3-Top of Hill	1
4-Bottom of Hill	0
5-Other	0
Total	11

Light	
Light Condition	Total
1-Daylight	6
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	5
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	11

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	0	0	0
MARCH	0	0	1	1
APRIL	1	0	0	1
MAY	3	0	0	3
JUNE	0	1	0	1
JULY	1	0	0	1
AUGUST	0	1	0	1
SEPTEMBER	0	0	1	1
OCTOBER	1	0	0	1
NOVEMBER	0	0	1	1
DECEMBER	0	0	0	0
Total	6	2	3	11

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Head-on - Sideswipe	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Intersection Movement	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	0	0	0	0	2	0	0	0	0	0	0	0	0	11

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	5	0	0	0	0	0	0	0	0	0	0	5
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	3	0	0	0	0	0	0	0	0	0	0	3
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	0	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	10	0	0	0	0	0	0	0	0	0	1	11

Warrant Requirements:

- ☒ Volume entering major approaches at least 300 veh/hr for 8 hours in an average day
- ☒ Volume entering minor approaches at least 200 veh/hr for same 8 hours
- ☒ Minor approach delay at least 30 seconds per vehicle during highest hour of the day

2-Way Volumes on Baxter Blvd (DOT Count)				Short-Term Build Projected Volume at Bates/Baxter Intersection	
Hour	Volume	Multiple of Peak Hour	8 Highest Hours	Major Approaches (peak hour 700)	Minor Approach (peak hour 328)
12:00 AM	27	0.03			
1:00 AM	21	0.02			
2:00 AM	15	0.02			
3:00 AM	7	0.01			
4:00 AM	14	0.02			
5:00 AM	71	0.08			
6:00 AM	181	0.22			
7:00 AM	518	0.62			
8:00 AM	573	0.68	x	477	223
9:00 AM	526	0.63			
10:00 AM	538	0.64			
11:00 AM	573	0.68	x	477	223
12:00 PM	585	0.70	x	487	228
1:00 PM	645	0.77	x	537	252
2:00 PM	703	0.84	x	585	274
3:00 PM	734	0.87	x	611	286
4:00 PM	773	0.92	x	643	301
5:00 PM	841	1.00	x	700	328
6:00 PM	572	0.68			
7:00 PM	412	0.49			
8:00 PM	253	0.30			
9:00 PM	142	0.17			
10:00 PM	102	0.12			
11:00 PM	54	0.06			

Peak Hour Delay, Short-Term Build (two-way stop condition)		
Approach	Type	Delay (s)
EB	Major	8.5
WB	Major	0
SB	Minor	31.8



—EXISTING RETAINING WALL



TUKEY'S BRIDGE BIKE & PEDESTRIAN TRAIL

C

B

THIS DOCUMENT IS THE PROPERTY OF WOODWARD & CURRAN INC. AND ITS CLIENT.



**Woodward
& Curran**

FIG. 1



Memorandum

To: Zachary Powell
Bruce Hyman
Tom Errico

Date: September 9, 2022
Rev Sept 27, 2022
Project #: 58570.00

From: Jennifer Conley, PE, PTOE

Re: Ideals Roux Institute Transportation Materials
Planning Board Workshop

Introduction

The City of Portland Planning staff has requested a number of technical transportation materials in reference to the modification of zoning for the former B&M property to accommodate a mixed use campus for the Roux Institute. Under current zoning, the site would allow for a building program that could include 1.1 million sf of office development accounting for setbacks, height restrictions, parking needs and approximate 50% lot coverage. The proposed long-term development program, consistent with the proposed Institutional Overlay Zone and Institutional Development Plan (IDP), includes the following land uses:

- › Academic Building – 400,000 SF
- › Multi-family Housing – 650 Units
- › Office – 200,000 SF
- › Research and Development – 50,000 SF
- › Hotel – 125 Rooms
- › Retail – 10,000 SF
- › Restaurant – 15,000 SF

IDEALS has met with City and Maine DOT staff for several months to discuss transportation assumptions and that input is reflected in the information provided below and accompanying electronic files.

Trip Generation of IDP Full Development Build Out

Trip estimates for the potential build out of the site were generated using industry standard rates and Maine DOT Traffic Movement Permit guidance. Trip generation rates were obtained from the Institute of Transportation Engineers Trip Generation Manual, 11th Edition, where available. Input was received from the City of Portland regarding appropriate land use codes, specifically for the restaurant component. In addition, because the land use code for university/college does not reflect the type of institution proposed here, VHB developed a trip generation methodology based on the anticipated populations at the site.

Relevant ITE land uses for the Roux Campus include general office building (LUC 710), multi-family housing mid-rise (LUC 221), high-turnover, sit-down restaurant (LUC 932), strip retail plaza (LUC 822), and hotel (LUC 310). The trip generation assumptions for the full development program and ITE trip estimates (including all modes) are in Table 1. Information on Roux projected population and programming and the resulting trip profile are provided in Table 2 below.

Table 1 Trip Assumptions for IDP full build development program

<i>Site Land Uses and Descriptions</i>				<i>AM PEAK HOUR</i>			<i>PM PEAK HOUR</i>		
<i>LUC</i>	<i>Land Use</i>	<i>Size</i>	<i>Unit</i>	<i>Total</i>	<i>Entering</i>	<i>Exiting</i>	<i>Total</i>	<i>Entering</i>	<i>Exiting</i>
N/A	Academic Building	400	1,000	314	288	26	562	138	425
221	Multifamily Housing (Mid-Rise)	650	Units	274	63	211	254	155	99
710	General Office Building	200	1,000 SF	304	268	36	288	49	239
760	Research and Development Center	50	1,000 SF	52	42	9	49	8	41
310	Hotel	125	Rooms	58	32	25	74	38	36
822	Strip Retail Plaza (<40k)	10	1,000 SF	24	14	9	66	33	33
932	High-Turnover Sit-Down Rest.	15	1,000 SF	144	79	65	136	83	53
Total Trips				1169	786	382	1428	503	926

The trip generation developed using Roux Institute programming is 113 fewer PM peak hour trips than calculated using the ITE trip estimates for LUC 550 – University/College. The comparison of trip estimates is further detailed in Table 2 below.

Table 2 Academic Building Trip Generation Components on a Typical Day

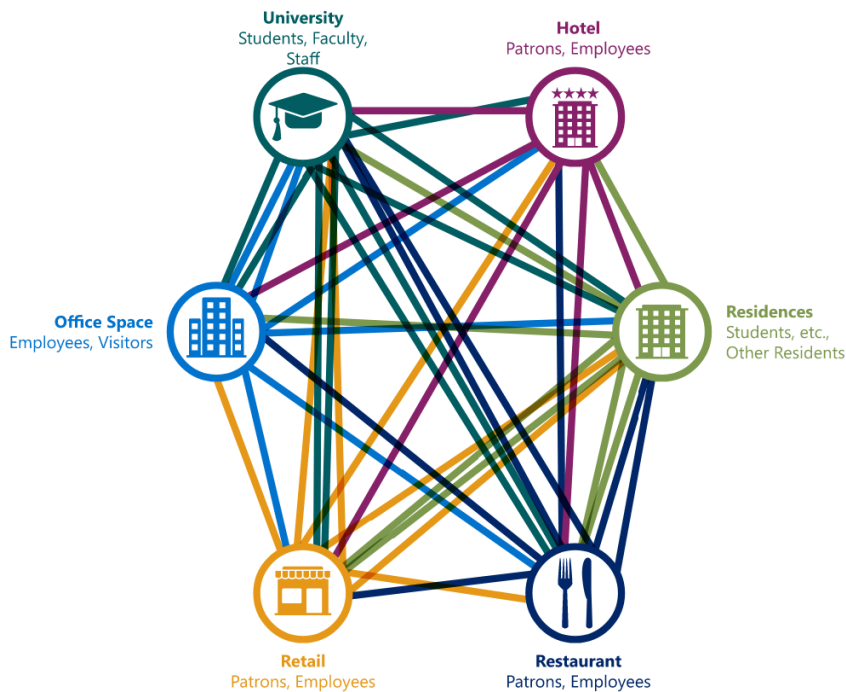
		AM peak hour	PM peak hour
1,680 Enrolled Graduate Learners (hybrid)	in	32	48
	out	<u>0</u>	<u>64</u>
	total	32	112
3,500+ Corporate Learners (online and hybrid)	in	70	0
	out	<u>0</u>	<u>140</u>
	total	70	140
150 People at Special Events	in	15	50
	out	<u>0</u>	<u>15</u>
	total	15	65
50+ Embedded Startups (ITE LUC Office 100 emp)	in	43	13
	out	<u>6</u>	<u>61</u>
	total	49	74
165 Faculty & Staff (ITE LUC Office 165 emp)	in	71	18
	out	<u>10</u>	<u>88</u>
	total	81	106
10% more Visiting Faculty & Staff (ITE LUC Office 16 emp)	in	7	2
	out	<u>1</u>	<u>9</u>
	total	8	11
105 Researchers (ITE LUC R&D 105 emp)	in	50	7
	out	<u>9</u>	<u>48</u>
	total	59	55
Total Academic Building Population	in	288	138
	out	<u>26</u>	<u>425</u>
	total	314	562
ITE Estimate	in	527	216
	out	<u>149</u>	<u>459</u>
	total	676	675
Percentage of ITE Trips		46%	83%

Internally Captured Trips

As a mixed-use development, many trips will occur between destinations on the campus. Students, faculty, and staff will often eat in on-site restaurants and shop at retail stores. Some students and employees will live in the residential units or work in the office space. Office workers may travel between offices, university buildings, restaurants, and stores. Visiting faculty, corporate partner employees, researchers and prospective students will stay in the hotel. Inclusion of integrated uses on the campus such as housing, hotel, office space, and restaurants will reduce the number of trips that impact City roadways. For traffic generation purposes, internal trips are separated from total trips estimated using engineering standards. The overall internal trip capture across the land uses for this development

were estimated to be approximately 28% in the AM peak hour and 22% in the PM peak hour for the IDP full build program.

Figure 1 Internal Trip Combinations



Mode Share

Target mode shares have been developed for the project based on a number of projects that are planned or contemplated in the East Deering neighborhood. The East Deering Neighborhood is served by multiple bus routes and features a pedestrian and bicycle network. With improvements to these resources, the project site will be well-suited for trips by modes other than single-occupant vehicles.

For instance, IDEALS is committed to working with Portland METRO to support increased transit opportunity to and from the campus area. A dedicated transit station adjacent to the site has been discussed with, and supported by METRO and will include an appropriate bus turn around. METRO has included the Roux campus transit trip generation in their forecasts that they will use to evaluate future transit investments. Specifically, with ARPA funding, METRO plans to double the frequency of the Route 7 to run every 30 minutes, extend its hours of operation, and extend the Route 7 to Thompson's Point, which will provide Roux students and faculty a one-seat ride between Veranda Street and downtown Portland, Maine Medical Center, and Portland Transportation Center, as well as Falmouth Village. The Route 9, METRO's highest ridership route, is accessible at Washington Avenue at Veranda Street, approximately 1/4 mile from the Roux campus.

In order to best serve the site, METRO has shared other potential ideas, such as either reducing headways on Route 7 further or extending another route, such as Route 5, to provide additional service to downtown Portland as well as connections to the Portland Transportation Center. All of these strategies would help the site meet its transit goals.

Northeastern University currently subsidizes transit passes at campuses throughout their network and is currently working with METRO to offer the same at the Roux Institute. For the remainder of the site, IDEALS is committed to reaching a high transit mode share and anticipates including subsidized transit passes as part of the Transportation Demand Management planning for the site.

Connections between the campus and local and regional pedestrian and bicycle networks are also imperative to achieving the goal mode split. As such, IDEALS has committed to design a shared use path connection from the site under the north end of Tukey's bridge to the Back Cove Trail and the connection onto Tukey's bridge that is consistent with a recommended project in the Martin's Point Shared Use Path Design Feasibility Study. This connection provides an opportunity for bicyclist and pedestrian commuters to and from the site to avoid traffic and travel via this path to the Back Cove Trail and to points throughout Portland without having to interact with Washington Avenue.

In addition, for commuters to other destinations, IDEALS is committed to improving Sherwood Street to accommodate bicycles and pedestrians. Based on the limited cross section under the I-295 bridge, the facility may be shared in that area, but west of the bridge, separate sidewalks and bicycle lanes are proposed. Separate from this project, the city is also contemplating improvements to Veranda Street and Bates Street to better accommodate cyclists in a separate facility.

Outside of these commitments, there has been significant study into providing better bicycle and pedestrian connections to and through this area. For potential bicyclist commuters from Falmouth and even beyond to Cumberland and Yarmouth, there are two projects that would improve connectivity. The Casco Bay Trail Alliance is proposing a 72 mile off road trail loop that would connect from the site to the West Side Trail in Yarmouth and from there onto a loop that travels through Freeport, Brunswick, Lewiston and Auburn. If this trail were developed as Casco Bay Trail Alliance proposes, this trail could provide commuters to the site from Yarmouth, Cumberland and Falmouth with an off road bicycle route. This alignment continues to be evaluated for potential train service in addition to potential trail use.

The Martin's Point Shared Use Path study recommended a number of projects to improve the connection from the Back Cove Trail to Martin's Point. As indicated above, the project is designing the recommended connection under Tukey's Bridge. In addition, the project will be providing a shared use path connection along the waterfront of the site for future connections that may be developed to reach Martin's Point and beyond. Unfortunately, beyond the site there is not currently right of way available to make the complete connection.

Finally, improving the accommodation for cyclists and pedestrians connecting to and crossing over Tukey's Bridge with additional capacity would reduce the congestion and provide the most direct human powered connection for commutes between the site and the Peninsula.

For pedestrians, the City has suggested that a direct pedestrian route from the site to the intersection of Washington Avenue at Veranda Street be developed connecting along a part of what was previously the Washington Avenue sidewalk (in front of Howie's building). The significant grade changes and required highway crossing or tunneling make construction of this route extremely challenging and the resulting path likely below grade at points, however, it would provide a direct connection to Washington Avenue and the Route 9 busses, reducing the walk distance by 850 feet which would increase the potential walk-shed of the site.

It is anticipated that these investments as well as other Transportation Demand Management strategies will reduce auto mode share. Target mode shares for each proposed Roux Campus land use were developed and discussed with City of Portland and Maine Department of Transportation officials at several meetings. These shares, as outlined in Table 3 below, were applied to external trips to determine the likely number of trips by each mode.

Table 3 Mode Share by Proposed Land Use

Land Use	% Transit	% Ped/Bike	% Vehicle	% Carpool
University	10%	20%	65%	5%
Residential	10%	20%	65%	5%
Office	10%	10%	75%	5%
Hotel	10%	10%	75%	5%
Retail	10%	50%	40%	0%
Restaurant	10%	50%	40%	0%
Overall Site Mode Shares	10%	18/19%	67/66%	5%

Applying each of these mode shares to the trip generation for the appropriate land use results in the trip generation by mode as shown in Table 4 below.

Table 4 External Trips by Land Use and Mode for Long-Term Build Out

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
University	145	22	45	11	320	49	98	25
Residential	131	20	40	10	123	19	38	9
Office	229	31	31	15	218	29	29	15
Hotel	33	4	4	2	45	6	6	3
Retail	2	0	2	0	7	2	8	0
Restaurant	24	6	31	0	25	6	31	0
Total Trips	568	85	154	39	739	111	212	52

As shown in Table 5, the single occupant automobile mode share is expected to be 66 to 67 percent of site trips. Other non-single occupant automobile mode share is anticipated to be 33 to 34 percent. Those overall mode shares are provided in Table 5 below along with the Portland Plan City wide mode shares. For an additional datapoint, data from a Portland based campus is also provided. Although this data point does not include a hotel or residential component, it does include some office space as well as minor retail and restaurant space to serve the campus.

Table 5 Overall Mode Shares compared to Other Local Mode Shares

Mode	AM	PM	Portland Plan City Wide	Portland Based Campus
Drove Alone	67%	66%	68%	71%
Transit	10%	10%	3%	18%
Non-Motorized	18%	19%	14%	5%
Carpool	5%	5%	8%	6%
Telework/Other	0%	0%	7%	%

Trip Generation of As of Right or Zone Change Developments

The zoning analysis is not evaluating a specific proposed development as is conducted in a site plan review, but rather evaluating whether the proposed Institutional Development Plan causes more intensive transportation impacts than what could be built on the site under current zoning. As indicated above, based on the limitations of the current zone including 75 feet max height, 75' front yard and 25' side yard setbacks, three levels of parking being required (one above and two underground), results in a total square footage of 2.25 million square feet of development on the site. Assuming only 50 percent lot coverage would result in approximately 1.1 million square feet of development. The most intense use allowed on the site under current zoning would be office space.

Once accounting for the mode share consistent with that used for the IDP office component, trip generation calculations for 1.1 million square feet of office development result in 1254 AM peak hour vehicle trips and 1188 PM peak hour vehicle trips. As shown in Table 6 below, the IDP full build program is 55 percent fewer trips than the trips generated by the buildout of the site under the existing zoning during the AM peak hour and 37 percent fewer trips than trips generated by the existing zoning build out during the PM peak hour.

Table 6 Comparison of Existing Zoning Trip Generation with Proposed Program Trip Generation

Peak Period	Existing Zoning Full Build with only 50% building coverage¹	Proposed IDP Full Build Program²	Net Total from Existing Zoning to Proposed IDP Buildout	Percentage Change from Existing Zoning to Proposed IDP Buildout
AM Peak Hour				
Enter	1104	424	-680	
Exit	150	141	-9	
Total	1254	565	-689	-55%
PM Peak Hour				
Enter	202	217	15	
Exit	986	520	-466	
Total	1188	737	-451	-37%
% Auto Usage	75%	varies by use overall 67%		

1. Assumes 50% of lot coverage under existing zoning resulting in 1.1 million sf ITE LUC 710 Office

2. Based on Proposed IDP Full Buildout Program.

Trip Assignment

To distribute the trips anticipated for the proposed site uses to the transportation network, multiple data sources were compared and contemplated. Population density and journey to work data were considered in the development of the initial distribution as illustrated in the table below. The distribution was validated with the small sample size of the existing Roux specific data, as shown in Table 7 below, and the assignment further refined in collaboration with the city to reflect the likely assignments on Washington Avenue from local points north and west and a portion of the access to and from I-295 south via the Veranda ramps at Exit 9.

Table 7 Distribution Trip Assignments

Route	Proposed Distribution ¹	Current Roux Distribution ²	Difference
I-295 points north	15%	19%	-4%
I-95 points north	4%	5%	-1%
26/100 points north/west	7%	7%	0%
302 points north/west	8%	9%	-1%
25 points west	0%	0%	0%
I-295 points south	50%	46%	4%
Baxter Blvd	5%	7%	-2%
Route 1 north	7%	4%	3%
Presumpscot / Route 9	4%	4%	0%

1. Trip distribution based on population density and journey to work information.

2. Based on the limited zip code information for current Roux students, faculty, and staff.

Figure 2 Trip Distribution



After discussions with City of Portland staff and transportation consultant, distribution of the 50 percent to and from the south was further considered. As congestion increases at the intersection of Washington Avenue and Veranda Street, site related traffic may find traveling to the south via exit 9 to provide a shorter travel time. Under the full development scenario, based on likely travel ease, trips exiting the site were split between the Exit 8 ramps and the Exit 9 ramps. Entering trips were assigned 40 percent to exit 8 and 10 percent to exit 9.

As the site is developed, the modal split of the trips will be monitored to understand if the site is meeting the alternative mode goals.

The resulting vehicular trip generation of the IDP Full Build development program is illustrated in Figure 3. In addition to the trip generation developed for the full IDP build out, trip generation estimates were developed for what may be included in interim phases on the site. Figure 4 and Figure 5 illustrate the vehicular trips that could be associated with an interim year development depending on the building program.

Figure 3 Full IDP Build Out Trip Generation AM(PM)

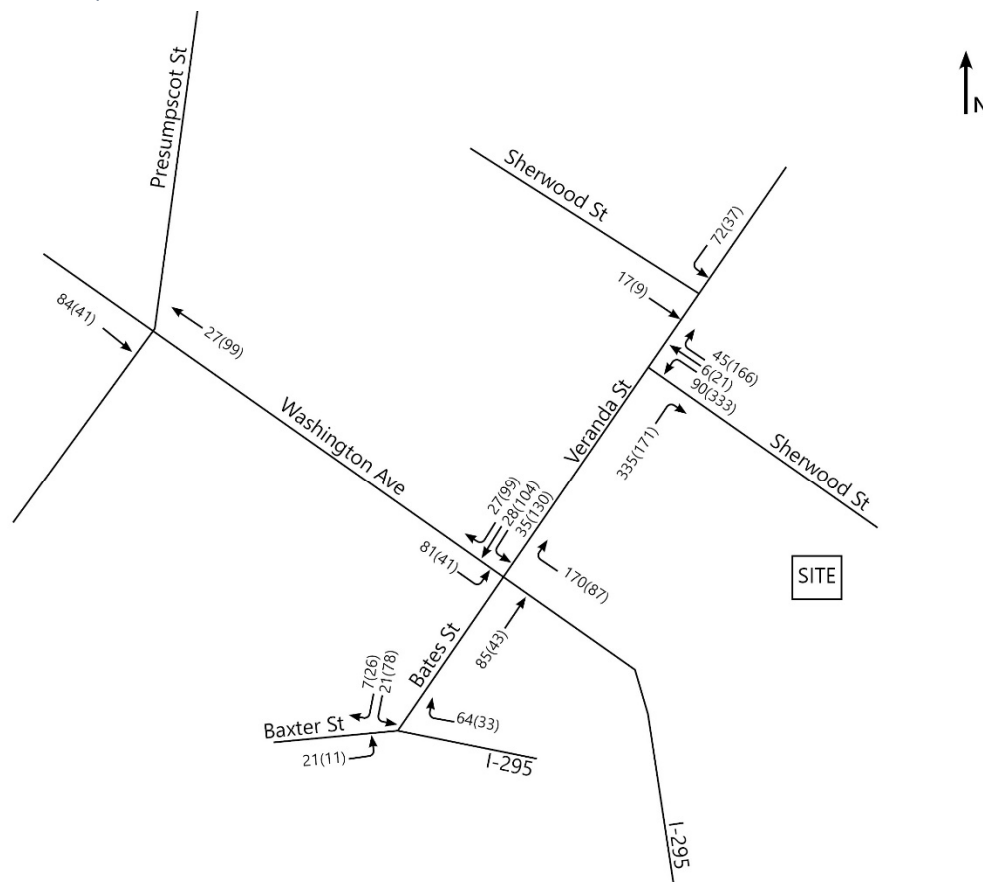


Figure 4 Interim Short Term Trip Generation AM(PM)

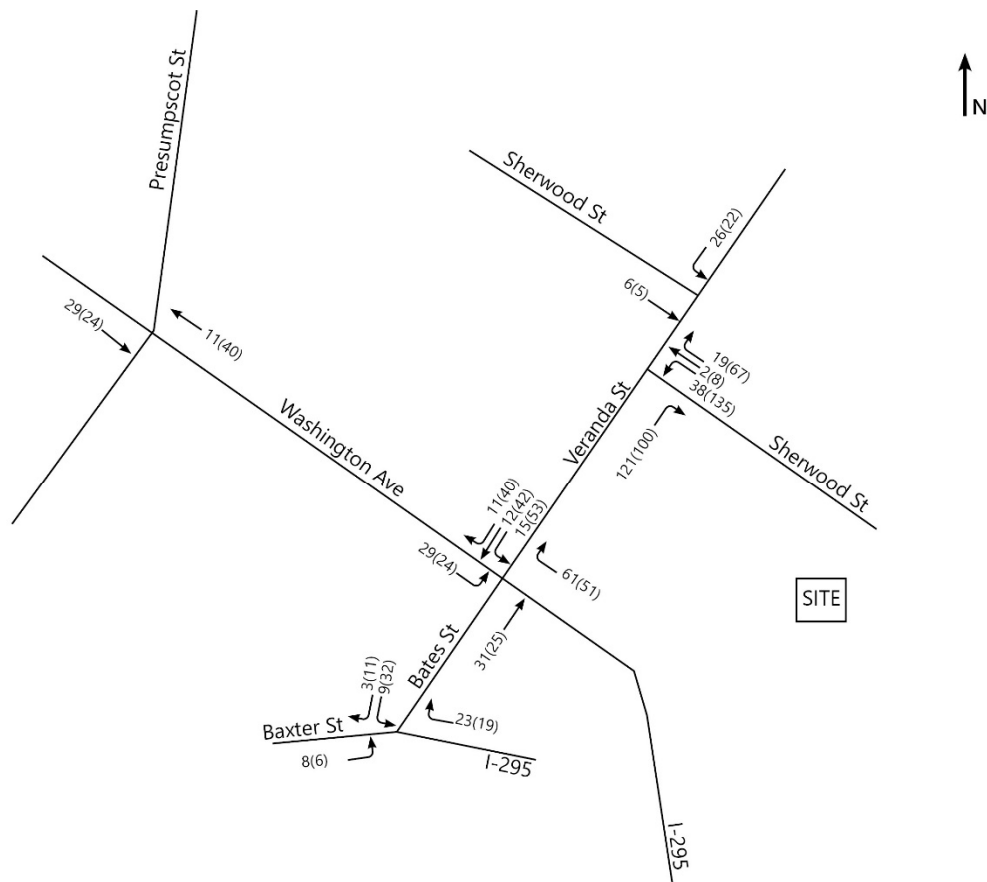
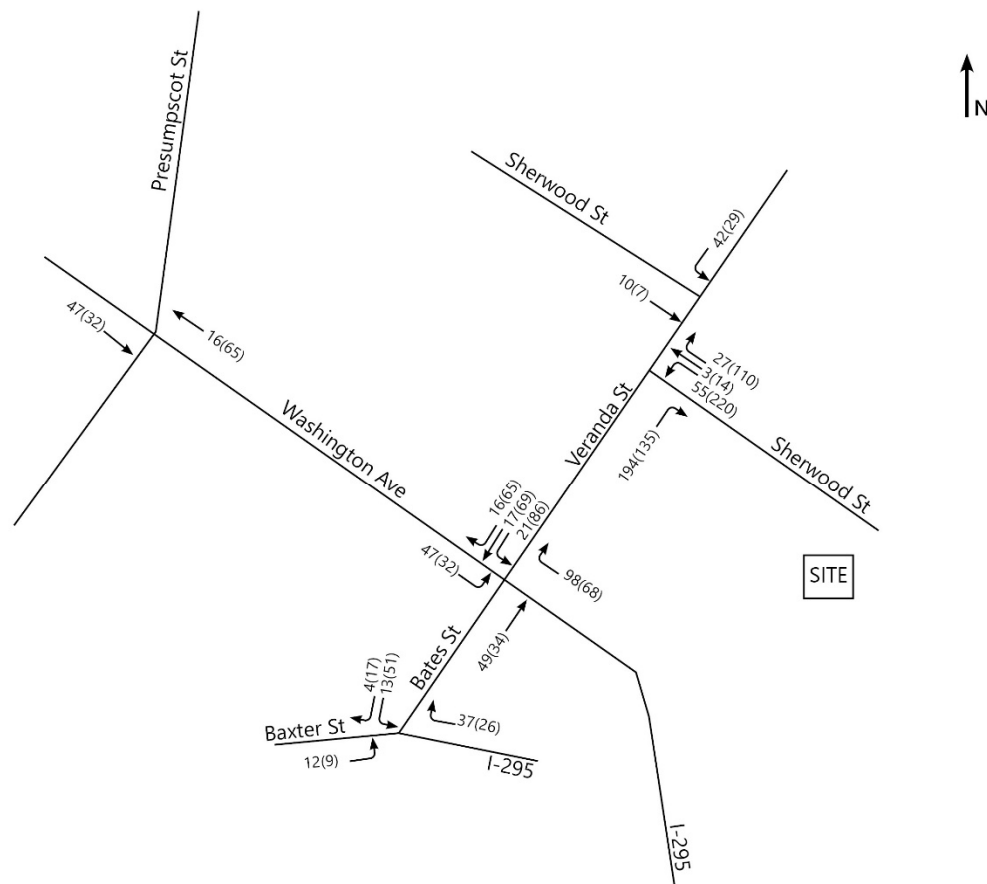


Figure 5 Interim Medium Term Trip Generation AM(PM)

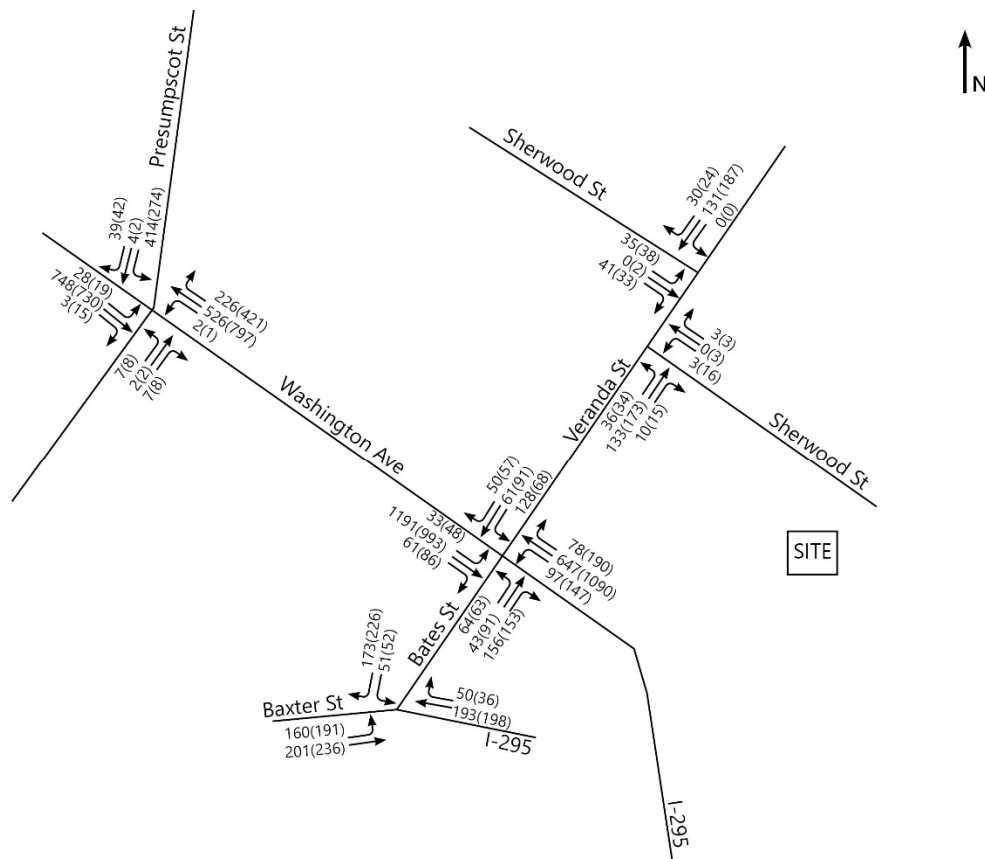


Existing Traffic Volume Summary

Traffic volume data were gathered in order to establish the existing and future conditions without the project. Historic traffic count data was gathered from Maine DOT and the City of Portland for 2017 AM and PM peak hour traffic counts along the Washington Avenue corridor. In addition, VHB collected 2021 AM and PM peak period traffic count data along Washington Avenue as well as at the intersections of Veranda Street at Sherwood Street and at Bates Street at Baxter Boulevard. This zoning traffic analysis concentrates on the intersections of Washington Avenue at Veranda Street, Veranda at Sherwood Street and Baxter Boulevard at Bates Street. The City's transportation consultant requested that the intersection of Washington Avenue at Presumpscot Street be included in the analysis in order for the impacts of the lane drop along Washington Avenue to be captured in the operations of Washington Avenue at Veranda Street.

Traffic volume adjustments were applied based on weekly group mean factors according to MaineDOT guidance. The 2017 AM and PM peak hour traffic volume data was higher than the more recently collected data and was used for this analysis where available. The data were balanced when appropriate and the resulting traffic volume networks are representative of Existing conditions traffic volumes (see Figure 6).

Figure 6 Existing Conditions AM(PM)



In order to create the future baseline condition traffic volume networks to evaluate the impact of site related increases, a 0.5 percent per year growth rate was applied to the existing traffic for five, ten, and twenty years, resulting in the 2026, 2031, and 2041 no build traffic volume networks. In addition, City staff requested that the traffic associated with two projects be included in the projections. The traffic associated with Front Street Housing located west of Washington Avenue and the residential project located off of Dalton Street east of Sherwood Street and just north of Veranda were each included as site specific projects in future year projections. See Figure 7, Figure 8, and Figure 9 for 2026, 2031, and 2041 no build traffic volume networks.

Figure 7 2026 No Build

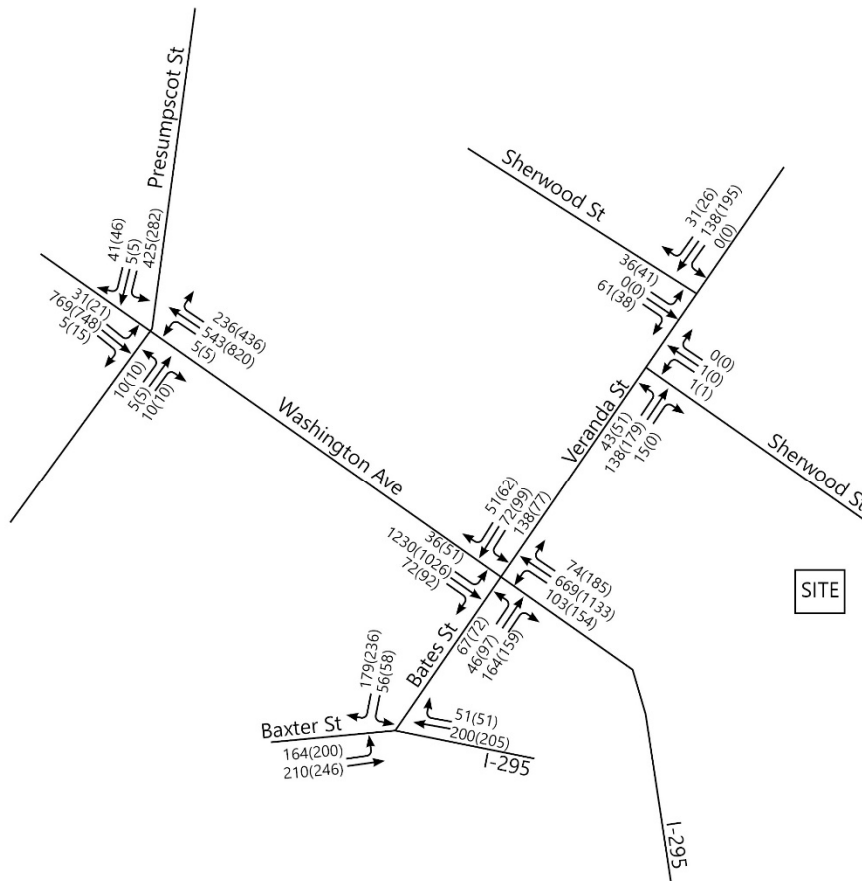


Figure 8 2031 No Build AM(PM)

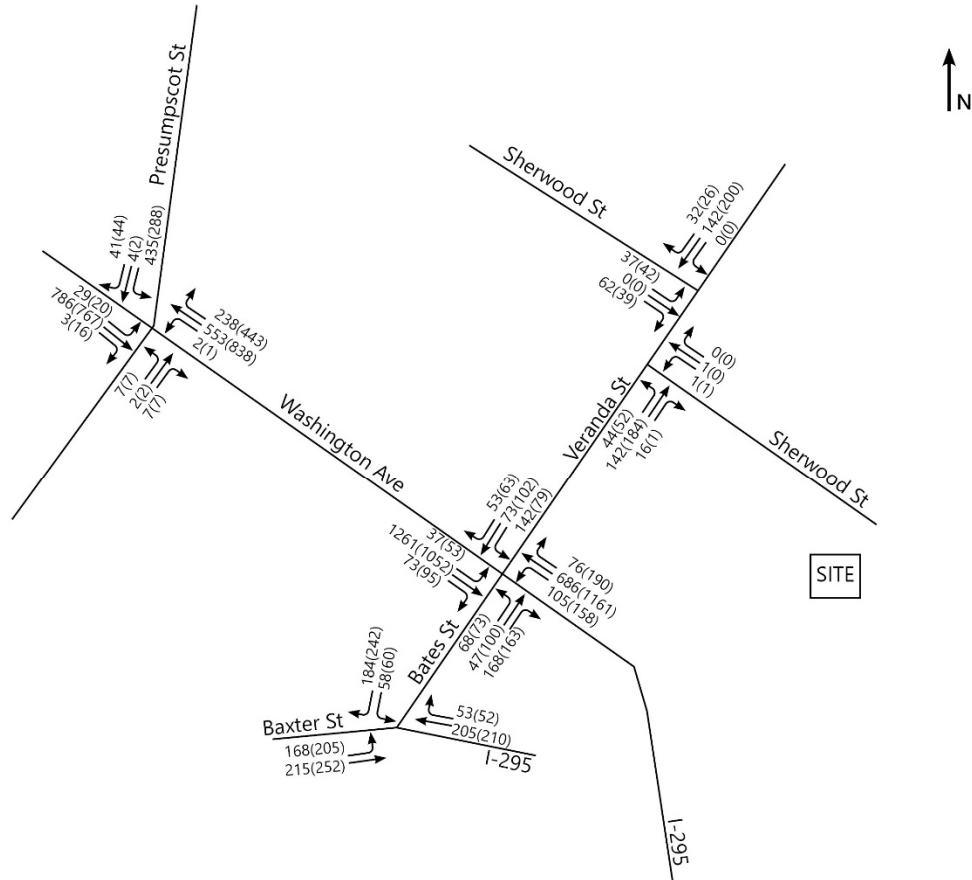
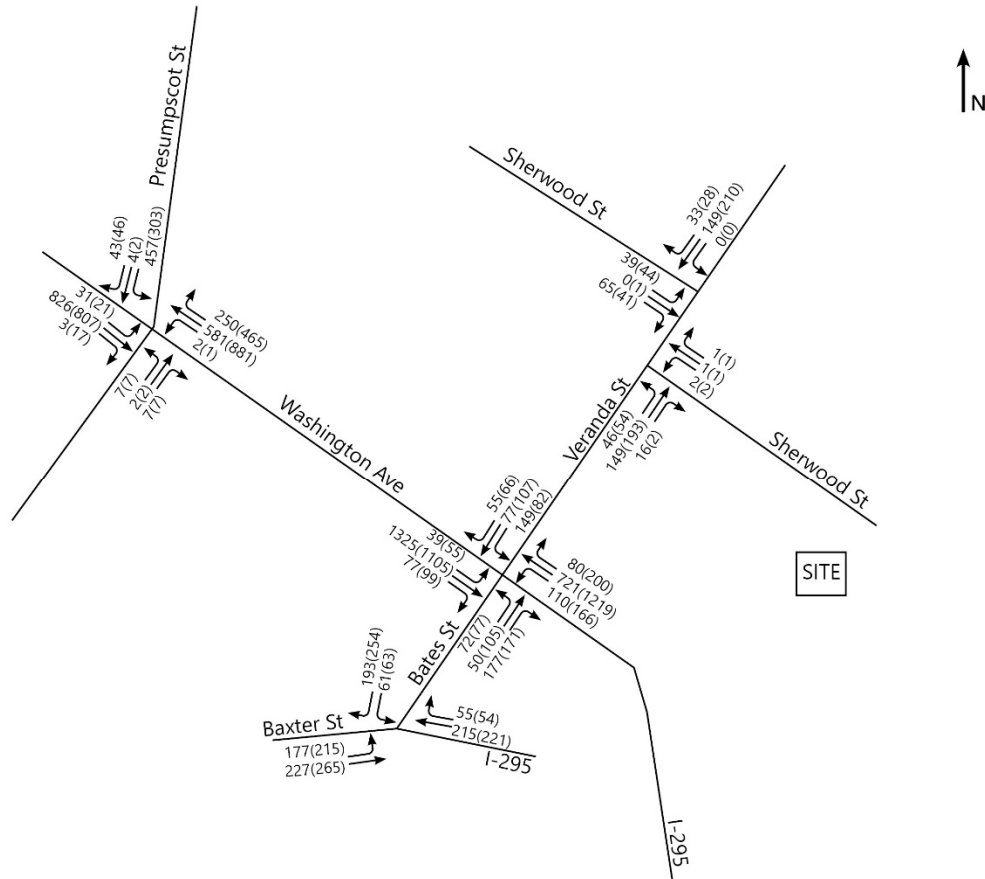


Figure 9 2041 No Build AM(PM)



LOS and Delay Output Summary

The trips associated with each of the potential build scenarios were added to the appropriate forecast year. Figure 10, Figure 11, Figure 12, and Figure 13 illustrate the Build scenarios for a short term interim phase, a medium term interim phase, the Full Buildout per the IDP, and the Full Buildout per Existing zoning, respectively. Capacity analyses were conducted for the study area intersections under No Build conditions as well as each of the potential build scenarios. The summary of the results are provided in Table 8 through Table 13 below. The LOS summary tables and Synchro output sheets are provided with this document and synchro files will be shared separately.

Figure 10 Interim Short Term Build AM(PM)

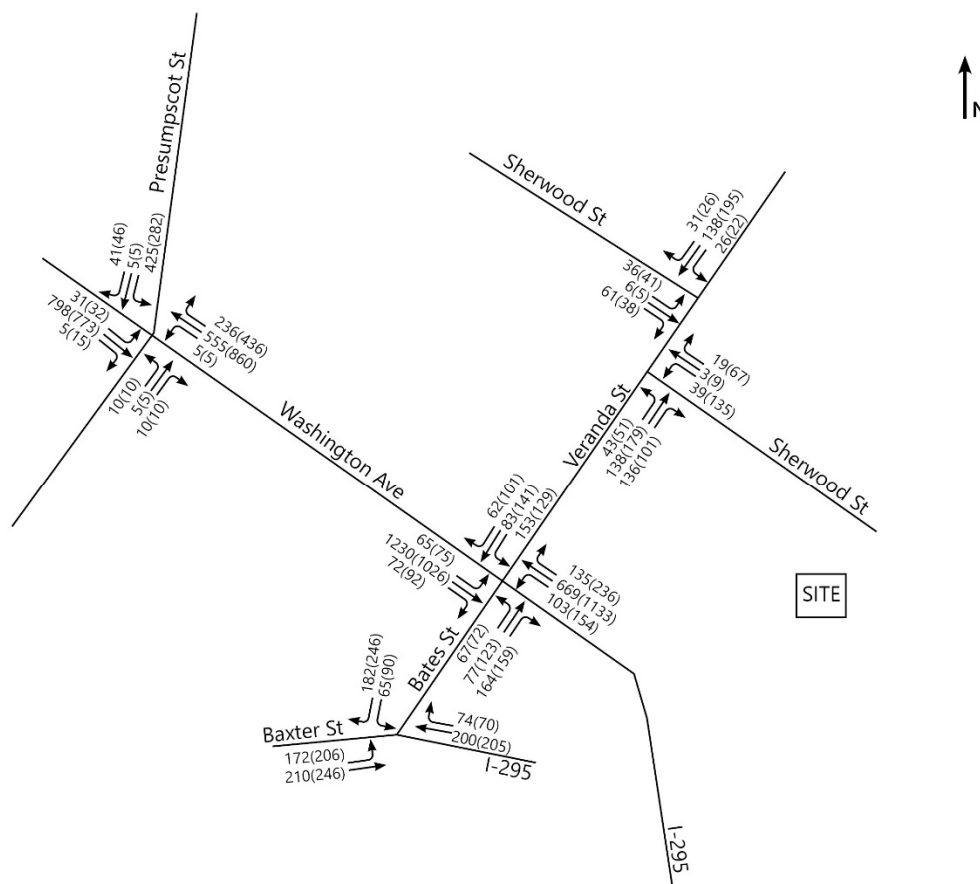


Figure 12 Full IDP Build AM(PM)

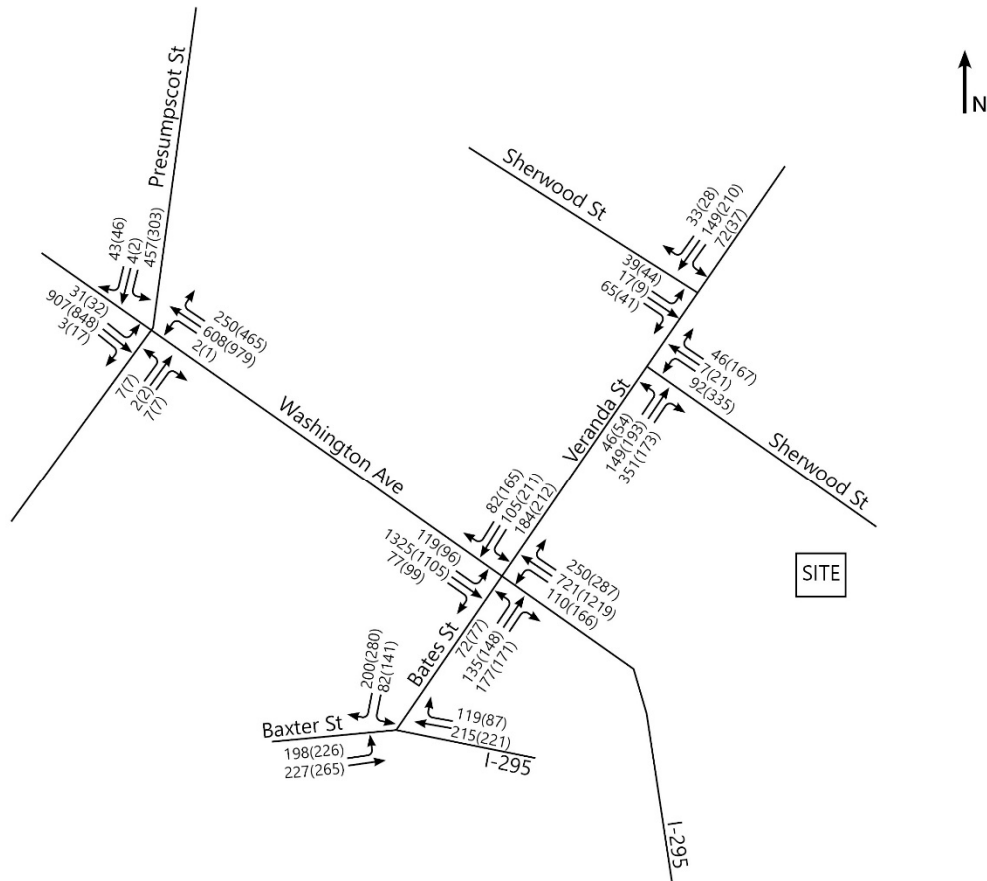


Figure 13 Full Build per Existing Zoning AM(PM)

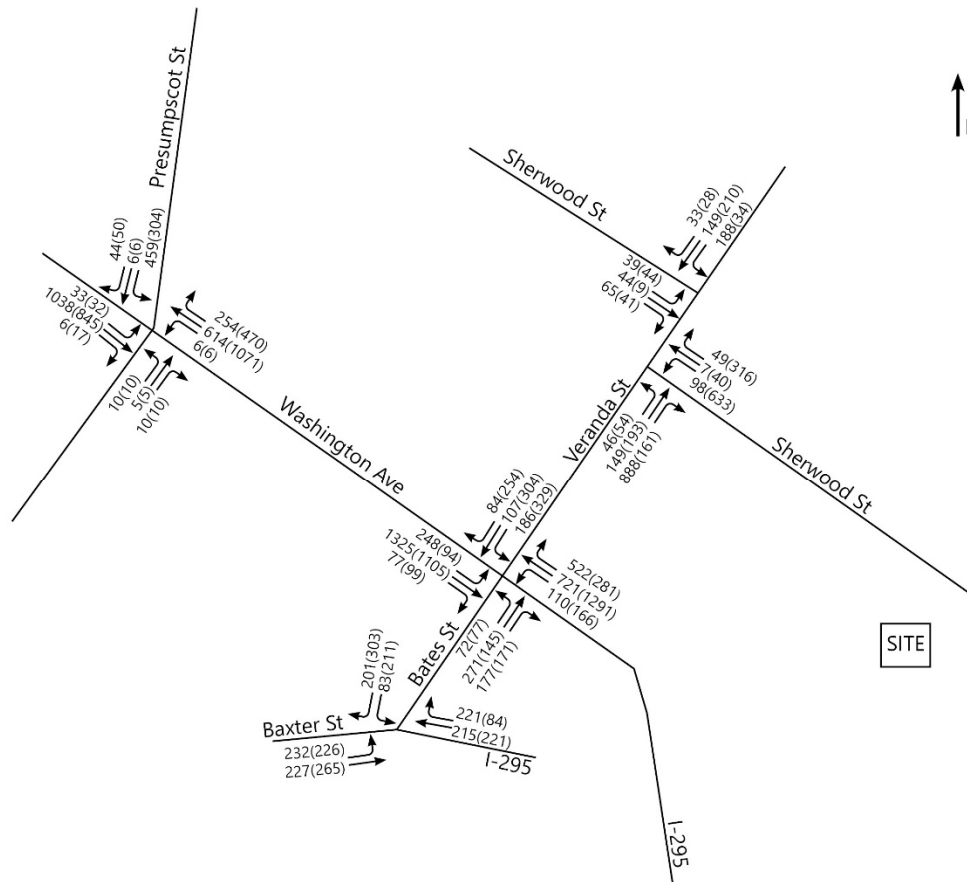


Table 8 Delay Summary, AM Peak Hour (seconds)

	Short Term		Medium Term			Long Term				
	No Build	Build IDP	No Build	Build IDP	Build IDP w/Mitigation	No Build	Build IDP	Build IDP w/Mitigation	Existing Zoning Build-Out	Existing Zoning Build-Out w/ Additional Mitigation
Veranda and Washington Ave										
Overall	24.4	33.5	31.2	31.5	33.5	86.6	127.6	22.5	157.2	110.4
EBL	53.2	48.0	38.5	46.7	48.9	85.2	104.6	41.1	142.0	162.7
EBT	53.4	59.8	52.4	64.7	44.4	52.3	106.0	66.5	262.6	402.1
EBR					17.1			20.8		47.2
WBL	48.7	53.0	38.9	49.7	41.6	67.7	66.9	54.5	54.1	59.8
WBTR	47.1	48.7	42.5	47.4	48.9	77.6	64.0	52.1	57.9	42.2
NBL	56.5	49.3	48.4	57.8	54.9	205.8	200.3	51.1	214.8	59.2
NBT	15.3	20.9	18.6	18.1	33.2	165.0	179.3	18.7	195.7	29.4
NBR	9.8	12.6	13.4	14.1	10.0	128.4	143.2	6.2	195.7	58.5
SBL	59.4	65.8	56.3	84.0	73.6	59.4	198.2	30.4	364.3	441.6
SBT	19.4	33.6	34.5	27.7	31.3	47.9	113.6	23.9	55.9	113.1
SBR	17.5	35.4	32.0	25.6	28.6	49.3	105.3	22.5	51.1	101.1
Driveway at Veranda and Sherwood St										
Overall	2.2	8.5	2.1	8.6	4.1	10.1	16.3	32.3	86.4	79.9
EBLTR	4.0	4.2	3.7	4.4	4.9	4.0	5.6	36.0	65.0	53.2
WBLTR	0.5	4.8	0.5	5.3	5.9	13.0	8.7	44.9	252.2	190.3
NBL	5.2	8.1	6.7	9.0	11.0	11.8	19.0	38.1	41.7	57.8
NBT					6.8			30.3		56.0
SBLTR	7.3	9.7	7.7	7.5	15.9	11.4	17.7	52.6	56.1	52.4
Bates and Baxter Blvd										
Overall	1.8	1.9	1.8	2.0	6.2	1.9	4.3	6.4	200.8	209.4
EBL	2.9	3.4	2.8	3.1	5.1	3.4	9.5	5.4	919.8	152.1
EBT	0.1	0.1	0.4	0.4	5.9	0.4	0.5	6.0	1.4	9.1
WBTR	0.6	0.9	0.7	0.9	8.2	0.8	2.9	8.6	193.0	509.4
SBL	8.6	9.3	9.3	9.3	4.7	8.3	10.8	4.6	27.2	4.9
Washington and Presumpscot St										
Overall	27.6	76.0	31.3	34.7	71.8	95.4	106.5	36.0	88.1	100.0
EBLTR	61.7	64.6	60.6	82.1	67.9	71.5	63.2	63.9	55.1	65.5
WBL	76.2	28.0	139.9	111.4	37.3	32.9	32.9	124.6	31.6	134.6
WBTR	45.3	16.7	72.5	85.3	16.8	25.3	23.7	63.5	18.6	21.1
NBT	31.9	127.7	19.6	44.9	159.8	244.1	332.1	12.7	360.4	32.4
NBR	3.9	8.6	3.4	3.4	13.2	35.8	31.2	3.2	16.4	47.0
SBL	24.7	151.0	22.9	20.7	118.3	118.9	126.6	22.2	52.7	38.6
SBTR	18.2	134.5	16.3	17.9	106.9	94.6	119.4	15.1	129.2	157.1

Table 9 Delay Summary, PM Peak Hour (seconds)

	Short Term		Medium Term			Long Term				Existing Zoning Build- Out w/ Additional
	No Build	Build IDP	No Build	Build IDP	Build IDP w/Mitigation	No Build	Build IDP	Build IDP w/Mitigation	Existing Zoning Build-Out	Mitigation
Veranda and Washington Ave										
Overall	30.8	37.5	30.8	54.9	35.1	37.3	102.8	45.8	104.8	103.8
EBL	45.3	47.2	42.7	51.3	41.1	42.4	51.6	41.6	58.8	110.0
EBT	56.6	60.3	50.3	72.4	48.1	56.4	87.9	78.7	96.8	52.8
EBR					13.4			16.2		16.1
WBL	47.1	51.6	48.5	56.6	64.7	50.4	63.1	67.8	83.1	168.4
WBTR	44.7	48.0	44.4	50.3	71.4	47.9	56.4	62.1	68.8	238.3
NBL	60.2	78.5	61.7	110.5	74.7	77.6	231.8	87.8	234.0	183.9
NBT	22.9	33.8	23.7	53.3	30.3	32.4	150.0	49.2	163.5	169.9
NBR	19.9	27.9	19.6	47.8	9.2	27.3	143.3	28.6	160.6	109.2
SBL	54.3	70.2	57.9	118.8	57.0	60.0	136.4	57.4	155.2	62.1
SBT	29.6	29.4	30.0	47.1	26.9	33.4	59.9	33.3	37.7	35.8
SBR	26.6	25.3	26.9	38.7	25.6	31.8	57.8	30.6	37.7	33.5
Driveway at Veranda and Sherwood St										
Overall	0.0	9.9	0.0	11.6	13.1	9.3	13.6	52.1	105.7	230.8
EBLTR	4.6	4.4	4.8	4.8	5.6	4.2	5.2	58.5	77.4	61.8
WBLTR	8.6	3.6	0.5	5.0	7.4	0.5	5.4	65.9	81.2	415.7
NBL	9.3	13.4	7.7	22.2	43.2	10.9	184.4	74.4	178.5	586.4
NBT					27.6			49.5		464.1
SBLTR	2.0	15.6	4.5	26.6	19.1	8.5	181.9	63.9	64.4	180.9
Bates and Baxter Blvd										
Overall	1.9	2.6	1.8	3.1	6.4	2.1	3.5	10.7	6.5	7.7
EBL	3.1	3.5	2.8	3.9	5.5	2.9	4.0	10.1	10.5	7.7
EBT	0.1	0.2	0.5	0.5	6.4	0.4	0.6	6.7	0.6	6.5
WBTR	0.7	0.8	0.7	1.0	8.6	0.8	1.2	19.6	3.7	10.7
SBL	10.7	13.1	9.4	12.2	5.2	12.0	14.0	5.4	16.3	5.3
Washington and Presumpscot St										
Overall	17.3	21.8	16.5	17.5	24.3	27.9	23.8	30.7	27.4	88.6
EBLTR	62.7	67.4	89.6	74.1	64.8	61.1	63.6	61.0	66.5	60.4
WBL	49.0	56.5	54.2	55.3	58.4	64.5	59.3	72.5	52.9	61.1
WBTR	25.6	31.6	34.4	33.4	32.2	41.9	38.5	56.8	64.0	21.7
NBT	12.4	38.6	10.5	32.6	30.2	43.7	37.8	44.1	67.3	68.2
NBR	5.6	6.1	5.1	5.3	7.3	7.9	6.7	8.6	6.7	377.3
SBL	32.9	36.0	38.9	43.7	52.5	44.0	39.6	39.6	34.0	42.0
SBTR	16.0	15.1	13.5	14.6	16.9	16.9	17.9	11.4	17.7	12.2

Table 10 LOS Summary, AM Peak Hour

	Short Term		Medium Term			Long Term				Existing Zoning Build-Out w/ Additional Mitigation
	No Build	Build IDP	No Build	Build IDP	Build IDP w/Mitigation	No Build	Build IDP	Build IDP w/Mitigation	Existing Zoning Build-Out	
Veranda and Washington Ave										
Overall	C	C	C	C	C	F	F	C	F	F
EBL	D	D	D	D	D	F	F	D	F	F
EBT	D	E	D	E	D	D	F	E	F	F
EBR					B			C		D
WBL	D	D	D	D	D	E	E	D	E	E
WBTR	D	D	D	D	D	E	E	D	E	D
NBL	E	D	D	E	D	F	F	D	F	E
NBT	B	C	B	B	C	F	F	B	F	C
NBR	A	B	B	B	A	F	F	A	F	E
SBL	E	E	E	F	E	E	F	C	F	F
SBT	B	C	C	C	C	D	F	C	E	F
SBR	B	D	C	C	C	D	F	C	E	F
Driveway at Veranda and Sherwood St										
Overall	A	A	A	A	A	B	C	C	F	E
EBLTR	A	A	A	A	A	A	A	D	E	D
WBLTR	A	A	A	A	A	B	A	D	F	F
NBL	A	A	A	A	B	B	C	D	D	E
NBT					A			C		E
SBLTR	A	A	A	A	C	B	C	D	E	D
Bates and Baxter Blvd										
Overall	A	A	A	A	A	A	A	A	F	E
EBL	A	A	A	A	A	A	A	A	F	E
EBT	A	A	A	A	A	A	A	A	A	A
WBTR	A	A	A	A	A	A	A	A	F	E
SBL	A	A	A	A	A	A	B	A	D	A
Washington and Presumpscot St										
Overall	C	E	C	C	E	F	F	D	F	F
EBLTR	E	E	E	F	E	E	E	E	E	E
WBL	E	C	F	F	D	C	C	F	C	F
WBTR	D	B	E	F	B	C	C	E	B	C
NBT	C	F	B	D	F	F	F	B	F	C
NBR	A	A	A	A	B	D	C	A	B	D
SBL	C	F	C	C	F	F	F	C	D	D
SBTR	B	F	B	B	F	F	F	B	F	F

Table 11 LOS Summary, PM Peak Hour

	Short Term		Medium Term			Long Term				Existing Zoning Build- Out w/ Additional Mitigation
	No Build	Build IDP	No Build	Build IDP	Build IDP w/Mitigation	No Build	Build IDP	Build IDP w/Mitigation	Existing Zoning Build-Out	
Veranda and Washington Ave										
Overall	C	D	C	D	D	D	F	D	F	F
EBL	D	D	D	D	D	D	D	D	E	F
EBT	E	E	D	E	D	E	F	E	F	D
EBR					B			B		B
WBL	D	D	D	E	E	D	E	E	F	F
WBTR	D	D	D	D	E	D	E	E	E	F
NBL	E	E	E	F	E	E	F	F	F	F
NBT	C	C	C	D	C	C	F	D	F	F
NBR	B	C	B	D	A	C	F	C	F	F
SBL	D	E	E	F	E	E	F	E	F	E
SBT	C	C	C	D	C	C	E	C	D	D
SBR	C	C	C	D	C	C	E	C	D	C
Driveway at Veranda and Sherwood St										
Overall	A	A	A	B	B	A	B	D	F	F
EBLTR	A	A	A	A	A	A	A	E	E	E
WBLTR	A	A	A	A	A	A	A	E	F	F
NBL	A	B	A	C	E	B	E	E	F	F
NBT					D			D		F
SBLTR	A	C	A	D	C	A	E	E	E	F
Bates and Baxter Blvd										
Overall	A	A	A	A	A	A	A	B	A	A
EBL	A	A	A	A	A	A	A	B	B	A
EBT	A	A	A	A	A	A	A	A	A	A
WBTR	A	A	A	A	A	A	A	C	A	B
SBL	B	B	A	B	A	B	B	A	C	A
Washington and Presumpscot St										
Overall	B	C	B	B	C	C	C	C	C	F
EBLTR	E	E	F	E	E	E	E	E	E	E
WBL	D	E	D	E	E	E	E	E	D	E
WBTR	C	C	C	C	C	D	D	E	E	C
NBT	B	D	B	C	C	D	D	D	E	E
NBR	A	A	A	A	A	A	A	A	A	F
SBL	C	D	D	D	D	D	D	D	C	D
SBTR	B	B	B	B	B	B	B	B	B	B

Table 12 95th Percentile Queue Summary, AM Peak Hour (feet)

	Short Term		Medium Term			Long Term				Existing Zoning Build-Out w/ Additional Mitigation
	No Build	Build IDP	No Build	Build IDP	Build IDP w/Mitigation	No Build	Build IDP	Build IDP w/Mitigation	Existing Zoning Build-Out	
Veranda and Washington Ave										
Overall										
EBL	122	133	98	135	112	149	309	113	321	369
EBT	214	267	213	290	120	237	436	203	381	388
EBR					121			144		423
WBL	144	147	136	149	148	153	152	148	151	152
WBTR	193	248	178	250	233	360	396	339	413	355
NBL	163	168	167	168	201	225	243	175	226	177
NBT	243	303	261	272	486	1357	1411	249	1256	773
NBR	214	296	251	252	181	1345	1412	222	1223	376
SBL	103	131	104	146	208	95	151	243	238	230
SBT	347	420	443	445	414	616	1081	382	1019	1186
SBR	367	452	477	470	438	653	1097	407	994	1195
Driveway at Veranda and Sherwood St										
Overall										
EBLTR	48	47	37	47	58	45	67	406	500	426
WBLTR	-	-	-	-	69	-	-	273	394	817
NBL	2	42	16	45	57	117	101	130	177	141
NBT					49			59		84
SBLTR	15	52	64	59	74	24	108	159	199	166
Bates and Baxter Blvd										
Overall										
EBL	57	62	62	63	74	72	108	85	184	206
EBT	-	-	-	-	85	-	-	84		116
WBTR	4	7	7	11	87	9	4	96	781	708
SBL	66	66	60	68	58	58	69	61	84	61
Washington and Presumpscot St										
Overall										
EBLTR	55	55	38	41	42	65	61	66	55	58
WBL	284	311	595	604	370	428	414	582	384	623
WBTR	95	93	89	97	75	102	89	693	89	692
NBT	274	783	158	248	1026	1339	1277	219	1063	237
NBR	63	483	33	48	847	1386	1369	37	824	261
SBL	97	103	92	113	113	148	103	90	852	1051
SBTR	463	1456	406	467	774	957	809	261	774	989

Table 13 95th Percentile Queue Summary, PM Peak Hour (feet)

	Short Term		Medium Term			Long Term				Existing Zoning Build- Out w/ Additional Mitigation
	No Build	Build IDP	No Build	Build IDP	Build IDP w/Mitigation	No Build	Build IDP	Build IDP w/Mitigation	Existing Zoning Build-Out	
Veranda and Washington Ave										
Overall										
EBL	115	133	107	219	92	132	298	128	274	176
EBT	257	298	253	353	161	282	427	269	427	213
EBR					104			146		119
WBL	126	151	129	150	156	136	147	154	156	178
WBTR	177	319	205	396	487	228	479	519	484	452
NBL	214	222	221	221	311	229	232	324	226	339
NBT	482	617	483	936	584	668	1246	896	1206	1426
NBR	444	581	440	909	239	636	1259	365	1209	440
SBL	115	135	125	153	211	118	152	220	271	239
SBT	371	365	379	657	351	447	790	460	561	486
SBR	392	392	394	675	360	468	804	474	580	497
Driveway at Veranda and Sherwood St										
Overall										
EBLTR	50	47	56	60	82	51	67	472	457	441
WBLTR	-	-	-	-	82	-	-	424	401	816
NBL	2	30	10	49	374	2	77	647	734	729
NBT					159			276		308
SBLTR	11	105	59	214	67	23	885	125	142	368
Bates and Baxter Blvd										
Overall										
EBL	63	71	74	81	82	67	90	111	120	105
EBT	-	-	-	-	88	-	-	97		92
WBTR	5	8	7	6	90	10	27	231	109	137
SBL	67	78	62	22	72	69	95	72	114	70
Washington and Presumpscot St										
Overall										
EBLTR	61	57	45	45	50	56	56	56	61	57
WBL	300	304	350	364	307	426	402	459	387	396
WBTR	102	110	107	96	107	112	105	138	117	72
NBT	250	601	234	287	851	756	599	1096	822	1192
NBR	86	298	97	74	556	459	369	882	590	1096
SBL	85	98	55	67	73	89	73	64	33	42
SBTR	430	411	360	412	448	476	501	228	443	248

Improvements Required under Each Full Build Scenario

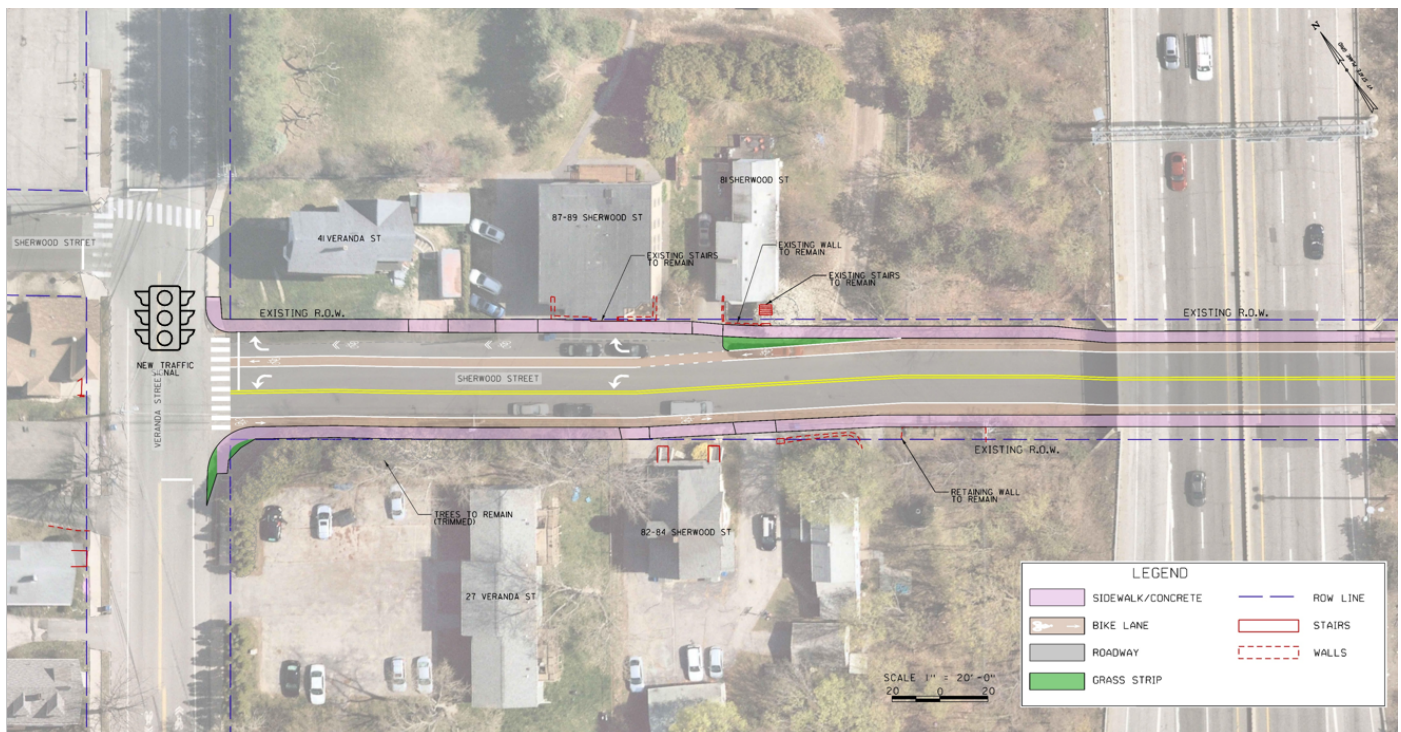
The improvements required to address any impacts of adding development traffic to the roadway network were determined. Because the operations are tied to trip generation, the full build based on existing zoning has additional impacts, and requires additional improvements, beyond the impacts of the IDP full build program.

IDP Development Program Impacts

Based on the evaluation of the IDP full build program and the anticipated impact on the transportation network, there are a series of potential projects that could mitigate these impacts. Each project is listed with the anticipated phase of the program development at which the mitigation may be necessary based on operations.

- › Sherwood Street (short term)
 - Improve Sherwood Street to accommodate bicycles and pedestrians in separate facilities (i.e. bike lanes and sidewalk) where possible with potential shared accommodations through the limited cross section under the I-295 bridge. Figure 14 below illustrates a concept for accommodating alternative modes on Sherwood Street. Figure 4 also illustrates providing a separate left and right turn lanes on Sherwood which is not anticipated to be required until the mid term and a traffic signal that is required in the long term.

Figure 14 Sherwood Street Concept



- › Back Cove Trail Connection (short term)
 - A shared use path connection from the site under the north end of Tukey's bridge to connect with the Back Cove Trail and the connection onto Tukey's bridge. The alignment of this shared use path is illustrated in Figure 15 below.

Figure 15 Back Cove Trail Connection



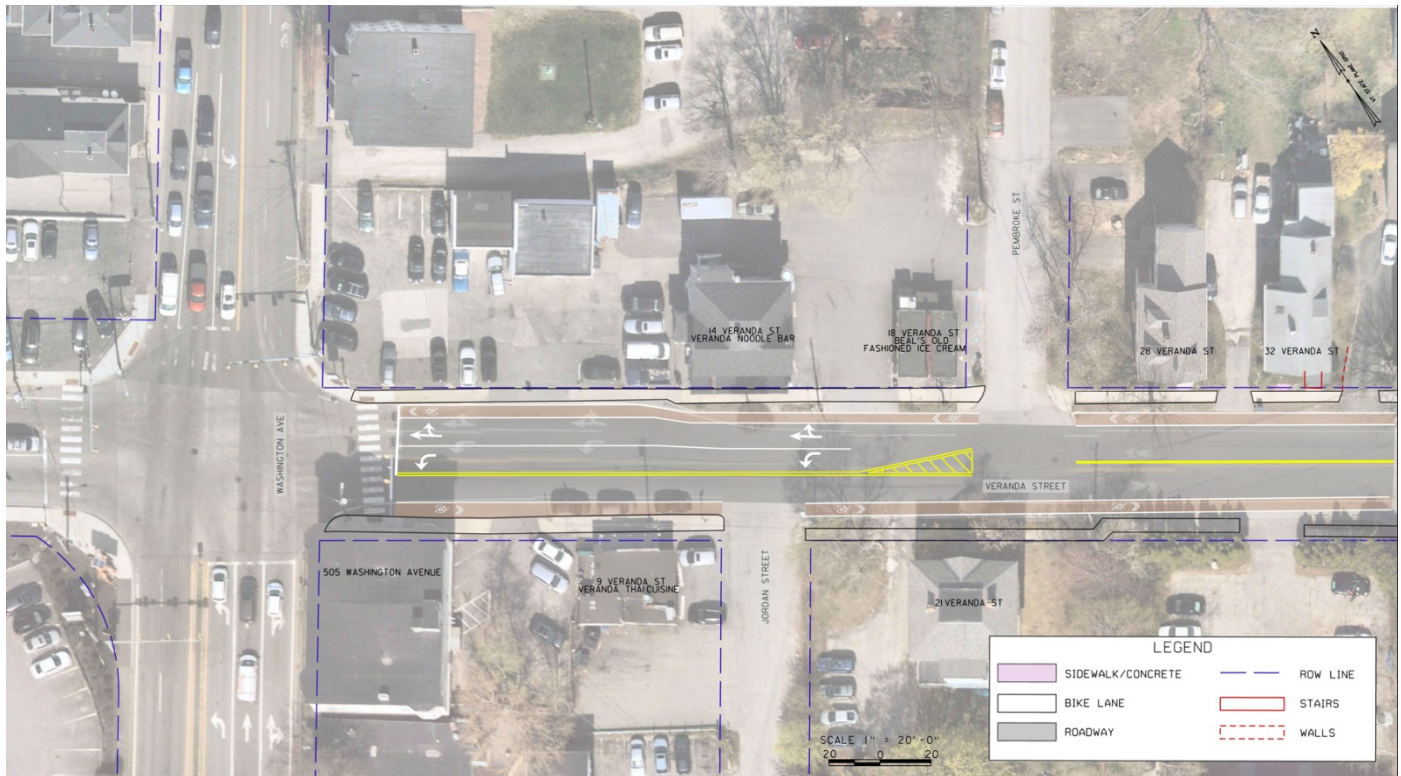
- › Washington Avenue at Veranda Street (mid to long term)
 - Addition of an eastbound right turn lane (Bates approach) and northbound right-turn lane (I-295 Ramp). With these lanes, and timing changes, the overall LOS will improve to a C during the AM peak hour and LOS D during the PM peak hour (was LOS F without improvement). Alternatively, the ramp from the Washington Avenue off-ramp to Sherwood Street could be considered. Figure 16 illustrates the land being set aside for the potential ramp alignment.

Figure 16 Site Overview with Potential Ramp Alignment



- › Veranda Street (medium term)
 - Improve Veranda Street to accommodate bicycles. Figure 17 illustrates the updated configuration.

Figure 17 Veranda Street Concept



- › Veranda Street at Sherwood Street (full IDP build program)
 - Provide signalized control including a separate northbound left-turn lane. These changes would result in an overall LOS C/D during the AM/PM peak hours.
- › Bates Street at Baxter Boulevard (full IDP build program)
 - Provide an all-way stop control. Under all-way stop control, the intersection would experience a slight increase in delay resulting in less than 19 seconds of delay for the westbound and eastbound approaches. However, it would improve the southbound left turn from LOS B during the AM and PM peak hours to a LOS A.
- › Washington Avenue at Presumpscot Street (full IDP build program)
 - Per discussion with the City's Consultant, VHB also looked at the intersection of Washington Avenue at Presumpscot Street based on its likely effect on the operations of Washington Avenue at Veranda Street. For the full IDP build program, a northbound left turn prohibition would need to be considered, a second southbound thru lane added and the southbound left advance phase removed to address the poor operations during the AM peak hour. In addition, the pedestrian crossing the south leg of the intersection would need to be removed in order to improve overall operations.

Additional Improvements required under Existing Zoning Buildout

Under this existing zoning buildout, improvements would be required consistent with those outlined above for the proposed development. The following infrastructure would be required **in addition** to the above to accommodate the build out of the site under existing zoning.

- In addition to the lanes proposed under the proposed overlay buildout, a second westbound left turn lane on Veranda Street to access the I-295 SB on ramp even with accounting for 50% of the traffic using the interchange to the north on Veranda Street.
- The peak hour impacts are more intensive and more directional under existing zoning, requiring left turn lanes on Veranda Street at Sherwood Street to accommodate the traffic at the signal that would be proposed under either program.

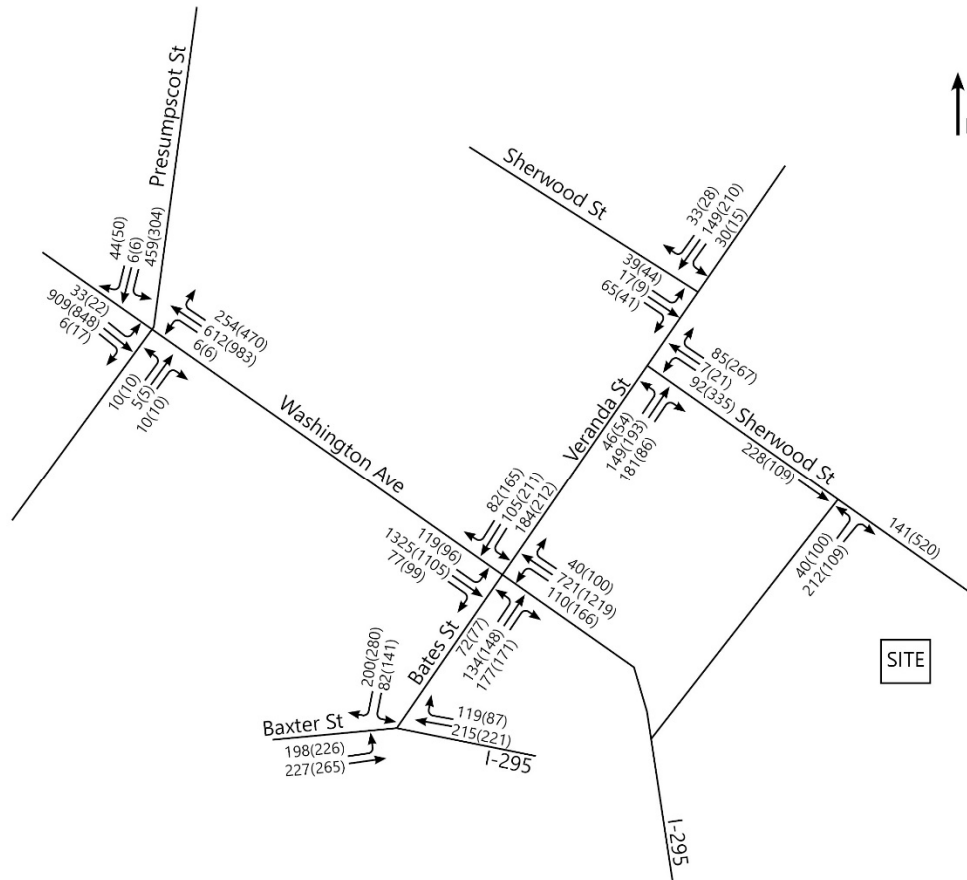
I-295 Off-Ramp

In recognizing that a majority of trips to and from the site will route through the intersection of Washington/Veranda/I-295 Ramp and understanding that the potential to expand that intersection is limited, the Roux Institute is designing the campus so as to accommodate a future potential ramp from the existing I-295 northbound off-ramp to City-owned Sherwood Street just east of the interstate overpass. The ramp connection at Sherwood Street would be a three-leg intersection with an all-way stop condition. This condition was contemplated without the addition of lanes at the intersection of Washington and Presumpscot and without the addition of a dedicated northbound right turn lane (I-295 off-ramp) at Washington and Veranda. Provided the trips entering the site from the south on I-295 would utilize this route and ramp option and some of the trips destined for points north and east would utilize the new ramp, it is anticipated the new intersection would operate at a LOS A on all approaches in the AM peak hour and LOS A/B/E on each approach in the PM peak hour, with the LOS E serving those exiting the site. Queues are anticipated to be less than 100 feet in the AM peak hour and less than 600 feet in the PM peak hour. The ramp diverge would operate at LOS A/A in the AM/PM condition. The Build condition traffic volumes for this condition are shown in Figure 18 and the LOS results are provided in Table 14.

Table 14 Delay and LOS Results, Full Build with Ramp

	Long Term with Ramp (AM)			Long Term with Ramp (PM)		
	Delay	LOS	Queue Length	Delay	LOS	Queue Length
Veranda and Washington Ave						
Overall	24.6	C		50.4	D	
EBL	39.9	D	95	39.9	D	105
EBT	50.7	D	171	53.1	D	200
EBR	18.7	B	133	15.2	B	116
WBL	52.6	D	144	84.7	F	146
WBTR	51.4	D	317	81.1	F	505
NBL	46.6	D	133	95.1	F	330
NBT	16.3	B	236	46.9	D	669
NBR	12.0	B	222	42.6	D	655
SBL	23.8	C	130	67.5	E	251
SBT	18.9	B	274	37.8	D	475
SBR	16.6	B	280	36.2	D	488
Driveway at Veranda and Sherwood St						
Overall	34.4	C		59.6	E	
EBLTR	48.1	D	337	70.4	E	424
WBLTR	43.3	D	233	62.0	E	343
NBL	30.2	C	104	76.3	E	622
NBT	32.0	C	75	43.1	D	295
SBLTR	51.0	D	134	87.3	F	181
Bates and Baxter Blvd						
Overall	6.3	A		6.8	A	
EBL	5.3	A	84	5.9	A	88
EBT	6.1	A	88	6.8	A	99
WBTR	8.7	A	98	9.1	A	96
SBL	4.7	A	60	5.5	A	78
Washington and Presumpscot St						
Overall	64.0	E		35.3	D	
EBLTR	59.4	E	64	73.7	E	60
WBL	28.6	C	371	46.5	D	342
WBTR	33.5	C	77	49.8	D	116
NBT	55.5	E	779	54.6	D	1108
NBR	5.3	A	304	10.1	B	765
SBL	132.5	F	107	55.5	E	86
SBTR	120.3	F	776	23.0	C	568
Sherwood St & New I-295 Ramp						
Overall	6.8	A		32.6	D	
EBLR	6.1	A	98	14.8	B	135
NBT	6.6	A	61	45.8	E	592
SBT	9.0	A	98	7.1	A	63

Figure 18 Full IDP Build with Redistribution for I-295 Off-Ramp



Parking Analysis

Parking will be built over time as part of the development program. All vehicular trips are intended to park on-site. As demand increases during the phased development, parking will be introduced incrementally to avoid excess supply and inadvertent encouragement of driving to the site. Base parking demand was estimated for each hour of the day using ITE Parking Generation Manual, 5th Edition rates and the same land use codes as for trip generation with the exception of the Roux Institute which used the evaluation of population travel profiles as outlined above. The estimates indicate that total parking demand across all uses on the site will peak at 4 PM as driven by Roux Institute parking needs. Demand at full build-out could be as high as almost 1630 vehicles, inclusive of day users and residents.

All site parking is intended to be communal; availability in the closest parking to a destination will not be guaranteed. Additionally, uses with opposing peak parking demands will be able to share parking resources. All parking will be

paid parking, and a parking office will be created to handle permitting and enforcement for the campus. Parking costs and regulations may vary between classes of users (students, staff, residents, office tenants, visitors, etc.). IDEALS is considering on-site car share, enabling travel to and from the site using other modes, with the comfort that vehicles are available if necessary.

To ensure that Campus users do not impinge on the limited parking available in adjacent neighborhoods, IDEALS is committed to working with the City to create and support a residential permit parking program that would not prevent Campus users from parking off-site.

High Crash Locations Summary

Maine DOT identified high crash locations as segments or intersections with eight or more traffic crashes and a critical rate factor exceeding 1.00 over the most recent three-year period. Within the vicinity of the project site for calendar years 2019 through 2021, two intersections and two segments meet these criteria and are illustrated on the graphic in Figure 19.

US1 at Veranda and I-295 Ramps

All 14 crashes at this intersection were due to northeast-bound vehicles failing to yield to vehicles at the intersection. Drivers heading northeast at this location on Veranda Street approach on a slight curve. Vegetation/hedges at the inside of the curve may be contributing to the crashes, by obstructing view of the upcoming Stop signs. At this intersection, the road flares out significantly to accommodate Wordsworth Street. Streetview images show that the stop bar was worn significantly.

Reconstruction of the intersection as a part of the Veranda Street bridge replacement appears to have addressed each of these issues by removing the roadway curve and signalizing the intersection.

Washington at Randall

Almost all crashes were related to northwest-bound left turning vehicles from Washington Avenue turning onto Randall Street. There were four intersection movements, including a head-on collision, where drivers failed to yield to oncoming traffic. There were an additional three crashes of vehicles being struck from behind that appear to be stemming from vehicles attempting to make left turns into Randall. One crash was for a right turning vehicle out of Randall Street.

The sight distance is much more than the minimum at the location. The volumes are very high on this section of road, leaving few gaps for vehicles. The volumes are too high for a 'road diet' and no available width for consideration of a two-way-center-left-turn-lane (TWCLTL) and keeping two lanes in each direction. The elimination of left turns into or out of Randall Street at this location may solve this crash pattern.

Washington I-295 NB Exit 8

Of the 12 crashes, 7 crashes were related to speed of exiting vehicles from northbound I-295. Exiting vehicles appear to not be slowing down and the grade down the ramp may be inhibiting deceleration. In combination, the curve at the bottom of the ramp may be unexpected for some drivers as 6 of the crashes involve vehicles striking the outside guardrail. There is an existing sign indicating a traffic signal is ahead, which cannot be seen in advance. Consideration

should be made for additional signage to reduce speed down the ramp, signs to indicate a curve ahead, and chevron signs on the curve.

The remaining crashes could be considered typical of stop and go traffic at a signalized intersection. Optimized signal timing could possibly reduce delay, but due to known existing congestion improvements may be minimal.

Washington from Galvin to Bates

There did not appear to be any consistent crash patterns for this section of road. Some crashes were due to eastbound left turning vehicles entering the driveway between the car dealer and the apartment, which is nearly at the signalized intersection and where the exclusive left turn lane begins. Crashes may be related small gaps in traffic from high congestion. An additional 3 crashes involved vehicles not staying in lane, but with a long straight road with plenty of sight distance, crashes may be due to drivers attempting to change lanes in response to congestion and queueing.

Figure 19 High Crash Locations in Vicinity of Project Site

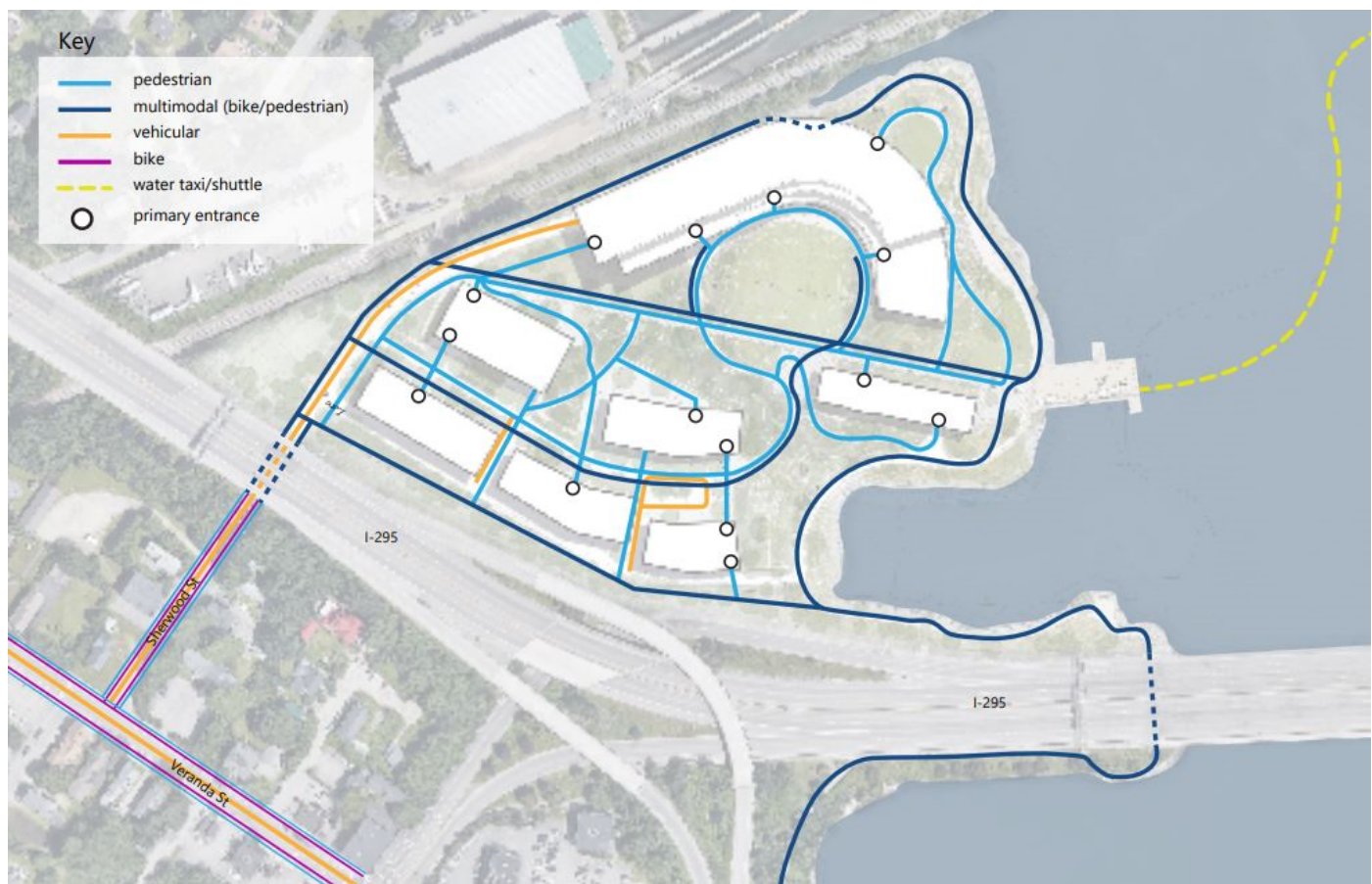


Pedestrian and Bicycle Infrastructure Conceptual Plan

Within the site, pedestrian and bicyclist circulation will be prioritized on a series of internal paths, depicted below. Bicycle parking will be made available at locations convenient to building entrances. For residential and Roux institute uses, secure and covered bike parking will also be made available for longer term bike parking and storage. It is anticipated that those navigating to and from the site via vehicular modes will park once and utilize these pathways to move between the various uses on the site, limiting the on-site vehicle circulation. The pathways will serve all other entering and exiting modes through interconnectivity with transit stops and the broader local and regional pedestrian and bicycle networks.

Critical connections to local and more regional bike and pedestrian networks are proposed to integrate the site into the larger network, making access and egress of the site by these non-motorized modes seamless. This includes improvements to Sherwood Street between the site and Veranda Street, improvements to Veranda Street between Sherwood Street and Washington Avenue, as well as the direct Back Cove Trail connection under Tukey's Bridge. As indicated above, additional bicycle and pedestrian infrastructure may be needed to reach the alternative mode share percentages outlined above under either the full build IDP Development program or the Existing Zoning full build condition.

Figure 20 Site Transportation Circulation and Connections



Conclusions

As illustrated above, the full build development program as proposed by the Institution Development Plan is anticipated to be less intensive, both in square footage and in the resulting trip generation, than an office development that could be constructed on site under existing zoning. Accordingly, the development under existing zoning would result in more delay at area intersections as well as additional improvements being required in order to mitigate impacts.

External Trips by Land Use and Mode, Short Term

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
Office	39	5	5	3	38	5	5	3
Retail	0	0	0	0	0	0	0	0
Restaurant	23	6	28	0	24	6	30	0
University	76	12	23	6	182	28	56	14
Residential	36	6	11	3	44	7	13	3
Hotel	38	5	5	3	50	7	7	3
Total	212	33	73	14	338	52	111	23

External Trips by Land Use and Mode, Medium Term

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
Office	74	10	10	5	72	10	10	5
Retail	1	0	2	0	3	1	4	0
Restaurant	17	4	21	0	18	5	23	0
University	127	20	39	10	291	45	89	22
Residential	75	12	23	6	80	12	25	6
Hotel	37	5	5	2	49	7	7	3
Total	331	50	99	23	514	79	157	37

External Trips by Land Use and Mode, Long Term

Land Use	AM Peak Hour				PM Peak Hour			
	Drive	Transit	Non-Motorized	Carpool Passenger	Drive	Transit	Non-Motorized	Carpool Passenger
Office	229	31	31	15	218	29	29	15
Retail	2	0	2	0	7	2	8	0
Restaurant	24	6	31	0	25	6	31	0
University	145	22	45	11	320	49	98	25
Residential	131	20	40	10	123	19	38	9
Hotel	33	4	4	2	45	6	6	3
Total	565	84	153	39	737	111	211	52

Trip Generation - Project Specific - 5 year program
Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

Site Land Uses and Descriptions				
Code	Land Use	Size	Unit	TYPE
822	Strip Retail Plaza (<40k)	0	1,000 SF	Commercial
932	High-Turnover Sit-Down Rest.	10	1,000 SF	Commercial
710	General Office Building	10	1,000 SF	Office/Lab
	University/College	1750	Students	Roux
760	Research and Development Center	50	1,000 SF	Incubator
310	Hotel	125	Rooms	Commercial
221	Multifamily Housing (Mid-Rise)	235	Units	Housing

AM PK HR OF ADJACENT STREET TRAFFIC											
directional dist.		average				regression		# trips			
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting
60%	40%	5	2.36	0.94	0	0.57	0	average	0	0	0
55%	45%	37	9.57	11.61	96	-	-	average	96	53	43
88%	12%	221	1.52	0.58	15	0.78	23	average	15	13	2
		(non-ITE method, see calculations)						158		143	14
82%	18%	39	1.03	0.65	52	0.7	69	average	52	42	9
56%	44%	28	0.46	0.14	58	0.84	55	average	58	32	25
23%	77%	30	0.37	0.09	87	0.91	92	regression	92	21	71

PM PK HR OF ADJACENT STREET TRAFFIC											
directional dist.		average				regression		# trips			
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting
50%	50%	25	6.59	2.94	0	0.56	0	average	0	0	0
61%	39%	104	9.05	6.18	91	-	-	average	91	55	35
17%	83%	232	1.44	0.60	14	0.77	25	average	14	2	12
								307		95	211
16%	84%	39	0.98	0.64	49	0.7	67	average	49	8	41
51%	49%	31	0.59	0.22	74	0.78	65	average	74	38	36
61%	39%	31	0.39	0.08	92	0.91	92	average	92	56	36

Trip Generation developed using the ITE Trip Generation Manual, 11th Edition. 2021
for RD space, data at that size is mostly under curve, used average rate

	total	entering	exiting
AM Peak Hour Total Site Trips:	470	305	164

	total	entering	exiting
PM Peak Hour Total Site Trips:	626	254	371

Trip Generation - Project Specific - 10 year program
Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

Site Land Uses and Descriptions				
Code	Land Use	Size	Unit	TYPE
822	Strip Retail Plaza (<40k)	5	1,000 SF	Commercial
932	High-Turnover Sit-Down Rest.	10	1,000 SF	Commercial
710	General Office Building	50	1,000 SF	Office/Lab
	University/College	2500	Students	Roux
760	Research and Development Center	50	1,000 SF	Incubator
310	Hotel	125	Rooms	Commercial
221	Multifamily Housing (Mid-Rise)	415	Units	Housing

AM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
60%	40%	5	2.36	0.94	12	0.57	18	average	12	7	5		
55%	45%	37	9.57	11.61	96	-	-	average	96	53	43		
88%	12%	221	1.52	0.58	76	0.78	92	average	76	67	9		
(non-ITE method, see calculations)							260		239		21		
82%	18%	39	1.03	0.65	52	0.7	69	average	52	42	9		
56%	44%	28	0.46	0.14	58	0.84	55	average	58	32	25		
23%	77%	30	0.37	0.09	154	0.91	171	regression	171	39	132		

PM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
50%	50%	25	6.59	2.94	33	0.56	48	average	33	16	16		
61%	39%	104	9.05	6.18	91	-	-	average	91	55	35		
17%	83%	232	1.44	0.60	72	0.77	93	average	72	12	60		
							489		132		357		
16%	84%	39	0.98	0.64	49	0.7	67	average	49	8	41		
51%	49%	31	0.59	0.22	74	0.78	65	average	74	38	36		
61%	39%	31	0.39	0.08	162	0.91	162	average	162	99	63		

Trip Generation developed using the ITE Trip Generation Manual, 11th Edition. 2021

for RD space, data at that size is mostly under curve, used average rate

	total	entering	exiting
AM Peak Hour Total Site Trips:	723	479	244

	total	entering	exiting
PM Peak Hour Total Site Trips:	969	360	609

Trip Generation - Project Specific - 20 year program
Total Site generated trips (not accounting for internal, pass-by, or diverted trips)

Site Land Uses and Descriptions				
Code	Land Use	Size	Unit	TYPE
822	Strip Retail Plaza (<40k)	10	1,000 SF	Commercial
932	High-Turnover Sit-Down Rest.	15	1,000 SF	Commercial
710	General Office Building	200	1,000 SF	Office/Lab
	University/College	4500	Students	Roux
760	Research and Development Center	50	1,000 SF	Incubator
310	Hotel	125	Rooms	Commercial
221	Multifamily Housing (Mid-Rise)	650	Units	Housing

AM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
60%	40%	5	2.36	0.94	24	0.57	29	average	24	14	9		
55%	45%	37	9.57	11.61	144	-	-	average	144	79	65		
88%	12%	221	1.52	0.58	304	0.78	304	average	304	268	36		
					(non-ITE method, see calculations)				314	288	26		
82%	18%	39	1.03	0.65	52	0.7	69	average	52	42	9		
56%	44%	28	0.46	0.14	58	0.84	55	average	58	32	25		
23%	77%	30	0.37	0.09	241	0.91	274	regression	274	63	211		

PM PK HR OF ADJACENT STREET TRAFFIC													
directional dist.		average			regression		# trips						
% enter	% exit	# studies	Avg Rate	Std Dev.	Total by Avg	r ²	total by Eq'n	Method Chosen	Total Trips	Entering	Exiting		
50%	50%	25	6.59	2.94	66	0.56	78	average	66	33	33		
61%	39%	104	9.05	6.18	136	-	-	average	136	83	53		
17%	83%	232	1.44	0.60	288	0.77	295	average	288	49	239		
									562	138	425		
16%	84%	39	0.98	0.64	49	0.7	67	average	49	8	41		
51%	49%	31	0.59	0.22	74	0.78	65	average	74	38	36		
61%	39%	31	0.39	0.08	254	0.91	254	average	254	155	99		

Trip Generation developed using the ITE Trip Generation Manual, 11th Edition. 2021
Assume phase 2 has HTO Sit-Down Restaurant LUC 932
for RD space, data at that size is mostly under curve, used average rate

	total	entering	exiting
AM Peak Hour Total Site Trips:	1169	786	382

	total	entering	exiting
PM Peak Hour Total Site Trips:	1428	503	926

5 Year Program - Internal Capture Calculations

Unadjusted Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	11	56	53	10
Retail 1	0	0	0	0
Retail 2	0	0	0	0
Total Retail	0	0	0	0
Restaurant	43	53	35	55
University	14	143	211	95
Residential	71	21	36	56
Hotel	25	32	36	38
Total	164	305	371	254

Table 2 - Phase 1

Vehicular Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	11	56	53	10
Retail	0	0	0	0
Restaurant	43	53	35	55
University	14	143	211	95
Residential	71	21	36	56
Hotel	25	32	36	38
Total	164	305	371	254

Table 3 - Phase 1

Internal Person - Trip Origin Destination Matrix Percentages calculated at origin															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		20%	30%	10%	1%	0%		Office		20%	4%	10%	2%	0%	
Retail	29%		13%	29%	14%	0%		Retail	2%		29%	5%	26%	5%	
Restaurant	31%	14%		31%	4%	3%		Restaurant	3%	41%		5%	18%	7%	
University	5%	28%	20%		12%	2%		University	5%	20%	4%		4%	1%	
Residential	2%	1%	20%	75%		0%		Residential	4%	42%	21%	4%		3%	
Hotel	75%	14%	8%	10%	0%			Hotel	0%	16%	68%	0%	2%		
All Other Land Uses								All Other Land Uses							
Internal Person - Trip Origin Destination Matrix Percentages calculated at destination															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		32%	10%	10%	0%	0%		Office		8%	2%	10%	4%	0%	
Retail	4%		50%	4%	2%	0%		Retail	31%		29%	31%	46%	17%	
Restaurant	14%	8%		7%	5%	4%		Restaurant	30%	50%		30%	16%	71%	
University	0%	32%	20%		50%	2%		University	30%	12%	15%		10%	1%	
Residential	3%	17%	20%	15%		0%		Residential	57%	10%	14%	57%		12%	
Hotel	2%	4%	5%	3%	0%			Hotel	0%	2%	5%	0%	0%		
All Other Land Uses								All Other Land Uses							

Table 4 - Phase 1

Internal Person - Trip Origin Destination Matrix (Computed at Origin)															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	3	1	0	0	0	Office		11	2	5	1	0	0
Retail	0		0	0	0	0	0	Retail	0		0	0	0	0	0
Restaurant	13	6		13	2	1	0	Restaurant	1	14		2	6	2	0
University	1	4	3		2	0	0	University	11	42	8		8	2	0
Residential	1	1	14	53		0	0	Residential	1	15	8	1		1	0
Hotel	19	4	2	3	0		0	Hotel	0	6	25	0	1		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	
Trip Origin Destination Matrix (Computed at Destination)															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		0	5	14	0	0	0	Office		0	1	10	2	0	0
Retail	2		26	6	0	0	0	Retail	3		16	29	26	6	0
Restaurant	8	0		10	1	1	0	Restaurant	3	0		29	9	27	0
University	0	0	11		11	1	0	University	3	0	8		6	0	0
Residential	2	0	11	21		0	0	Residential	6	0	8	54		5	0
Hotel	1	0	3	4	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 5 - Phase 1

Balanced Internal Capture															
	AM Peak								PM Peak						
	Destination (To) Entering								Destination (To)						
Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		0	3	1	0	0	0	Office		0	1	5	1	0	0
Retail	0		0	0	0	0	0	Retail	0		0	0	0	0	0
Restaurant	8	0		10	1	1	0	Restaurant	1	0		2	6	2	0
University	0	0	3		2	0	0	University	3	0	8		6	0	0
Residential	1	0	11	21		0	0	Residential	1	0	8	1		1	0
Hotel	1	0	2	3	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 6 - Phase 1

Mode Split						
Land Use	Origin (Exiting)			Destination (Entering)		
	% Transit	% Ped/Bike	% Vehicle	% Transit	% Ped/Bike	% Vehicle
Office	10%	10%	75%	10%	10%	75%
Retail	10%	50%	40%	10%	50%	40%
Restaurant	10%	50%	40%	10%	50%	40%
University	10%	20%	65%	10%	20%	65%
Residential	10%	20%	65%	10%	20%	65%
Hotel	10%	10%	75%	10%	10%	75%
All Other Land Uses	10%	20%	65%	10%	20%	65%

Table 7 - Phase 1

AM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips @ driveway)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips @ driveway)		Total	% of internal trips	Vehicles
Office	10	45	56	19%	34	5	5	Office	4	7	11	40%	5	1	1
Retail	0	0	0	-	0	0	0	Retail	0	0	0	-	0	0	0
Restaurant	19	34	53	35%	14	3	17	Restaurant	20	23	43	47%	9	2	11
University	35	108	143	25%	70	11	22	University	5	9	14	34%	6	1	2
Residential	3	18	21	13%	12	2	4	Residential	33	37	71	47%	24	4	7
Hotel	2	31	32	5%	23	3	3	Hotel	6	20	25	22%	15	2	2
All Other Land Uses								All Other Land Uses							
Totals	68	236	305	22%	153	24	50		68	96	164	42%	59	10	23
PM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips off site)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips off site)		Total	% of internal trips	Vehicles
Office	6	5	10	54%	4	0	0	Office	7	46	53	14%	34	5	5
Retail	0	0	0	-	0	0	0	Retail	0	0	0	-	0	0	0
Restaurant	20	36	55	36%	14	4	18	Restaurant	12	24	35	33%	9	2	12
University	9	86	95	9%	56	9	17	University	17	194	211	8%	126	19	39
Residential	13	43	56	23%	28	4	9	Residential	11	24	36	32%	16	2	5
Hotel	4	34	38	10%	25	3	3	Hotel	3	33	36	8%	25	3	3
All Other Land Uses								All Other Land Uses							
Totals	51	203	254	20%	127	20	47		51	321	371	14%	210	32	63

10 Year Program - Internal Capture Calculations

Unadjusted Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	18	109	101	20
Retail 1	5	7	16	16
Retail 2	0	0	0	0
Total Retail	5	7	16	16
Restaurant	43	53	35	55
University	21	239	357	132
Residential	132	39	63	99
Hotel	25	32	36	38
Total	244	479	609	360

Table 2 - Phase 2

Vehicular Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	18	109	101	20
Retail	5	7	16	16
Restaurant	43	53	35	55
University	21	239	357	132
Residential	132	39	63	99
Hotel	25	32	36	38
Total	244	479	609	360

Table 3 - Phase 2

Internal Person - Trip Origin Destination Matrix Percentages calculated at origin															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		10%	30%	10%	1%	0%		Office		20%	4%	10%	2%	0%	
Retail	29%		5%	29%	14%	0%		Retail	2%		29%	5%	26%	5%	
Restaurant	31%	14%		20%	4%	3%		Restaurant	3%	41%		5%	18%	7%	
University	5%	28%	63%		12%	2%		University	5%	20%	4%		4%	1%	
Residential	2%	1%	20%	75%		0%		Residential	4%	42%	21%	4%		3%	
Hotel	75%	14%	8%	10%	0%			Hotel	0%	16%	68%	0%	2%		
All Other Land Uses								All Other Land Uses							
Internal Person - Trip Origin Destination Matrix Percentages calculated at destination															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		32%	10%	10%	0%	0%		Office		8%	2%	10%	4%	0%	
Retail	4%		50%	4%	2%	0%		Retail	31%		29%	31%	46%	17%	
Restaurant	14%	8%		7%	5%	4%		Restaurant	30%	50%		30%	16%	71%	
University	0%	15%	20%		50%	2%		University	30%	12%	15%		10%	1%	
Residential	3%	17%	20%	15%		0%		Residential	57%	10%	14%	57%		12%	
Hotel	2%	4%	5%	3%	0%			Hotel	0%	2%	5%	0%	0%		
All Other Land Uses								All Other Land Uses							

Table 4 - Phase 2

Internal Person - Trip Origin Destination Matrix (Computed at Origin)															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	6	2	0	0	0	Office		20	4	10	2	0	0
Retail	1		0	1	1	0	0	Retail	0		5	1	4	1	0
Restaurant	13	6		9	2	1	0	Restaurant	1	14		2	6	2	0
University	1	6	13		3	0	0	University	18	71	14		14	4	0
Residential	3	1	26	99		0	0	Residential	3	27	13	3		2	0
Hotel	19	4	2	3	0		0	Hotel	0	6	25	0	1		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	
Trip Origin Destination Matrix (Computed at Destination)															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	5	24	0	0	0	Office		1	1	13	4	0	0
Retail	4		26	10	1	0	0	Retail	6		16	41	45	6	0
Restaurant	15	1		17	2	1	0	Restaurant	6	8		40	16	27	0
University	0	1	11		20	1	0	University	6	2	8		10	0	0
Residential	3	1	11	36		0	0	Residential	11	2	8	75		5	0
Hotel	2	0	3	7	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 5 - Phase 2

Balanced Internal Capture															
	AM Peak								PM Peak						
	Destination (To) Entering								Destination (To)						
Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		2	5	2	0	0	0	Office		1	1	10	2	0	0
Retail	1		0	1	1	0	0	Retail	0		5	1	4	1	0
Restaurant	13	1		9	2	1	0	Restaurant	1	8		2	6	2	0
University	0	1	11		3	0	0	University	6	2	8		10	0	0
Residential	3	1	11	36		0	0	Residential	3	2	8	3		2	0
Hotel	2	0	2	3	0		0	Hotel	0	0	3	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 6 - Phase 2

Mode Split						
Land Use	Origin (Exiting)			Destination (Entering)		
	% Transit	% Ped/Bike	% Vehicle	% Transit	% Ped/Bike	% Vehicle
Office	10%	10%	75%	10%	10%	75%
Retail	10%	50%	40%	10%	50%	40%
Restaurant	10%	50%	40%	10%	50%	40%
University	10%	20%	65%	10%	20%	65%
Residential	10%	20%	65%	10%	20%	65%
Hotel	10%	10%	75%	10%	10%	75%
All Other Land Uses	10%	20%	65%	10%	20%	65%

Table 7 - Phase 2

AM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates			% of internal trips	External Trips by Mode				Person-Trip Estimates			% of internal trips	External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips @ driveway)	Total			Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips @ driveway)		Total		Vehicles
Office	20	90	109	18%	67	9	9	Office	9	9	18	49%	7	1	1
Retail	5	2	7	70%	1	0	1	Retail	4	1	5	77%	0	0	1
Restaurant	29	24	53	54%	10	2	12	Restaurant	26	18	43	59%	7	2	9
University	50	189	239	21%	123	19	38	University	15	6	21	69%	4	1	1
Residential	5	34	39	12%	22	3	7	Residential	50	81	132	38%	53	8	16
Hotel	2	30	32	5%	23	3	3	Hotel	7	18	25	28%	14	2	2
All Other Land Uses								All Other Land Uses							
Totals	110	369	479	23%	246	37	70		110	134	244	45%	85	13	30
PM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates			% of internal trips	External Trips by Mode				Person-Trip Estimates			% of internal trips	External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips off site)	Total			Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (vehicles trips off site)		Total		Vehicles
Office	10	10	20	49%	8	1	1	Office	15	86	101	14%	65	9	9
Retail	14	3	16	82%	1	0	1	Retail	11	5	16	67%	2	1	3
Restaurant	25	31	55	45%	12	3	15	Restaurant	20	15	35	56%	6	2	8
University	15	117	132	12%	76	12	23	University	27	330	357	7%	215	33	66
Residential	23	76	99	23%	50	8	15	Residential	16	47	63	26%	30	5	9
Hotel	6	32	38	15%	24	3	3	Hotel	3	33	36	9%	25	3	3
All Other Land Uses								All Other Land Uses							
Totals	91	269	360	25%	170	27	60		91	518	609	15%	343	52	98

20 Year Program - Internal Capture Calculations

Unadjusted Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	46	310	280	57
Retail 1	9	14	33	33
Retail 2	0	0	0	0
Total Retail	9	14	33	33
Restaurant	65	79	53	83
University	26	288	425	138
Residential	211	63	99	155
Hotel	25	32	36	38
Total	382	786	926	503

Table 2 - Phase 3

Vehicular Trip Generation				
Land Use	AM Peak		PM Peak	
	Origin (Exiting)	Destination (Entering)	Origin (Exiting)	Destination (Entering)
Office	46	310	280	57
Retail	9	14	33	33
Restaurant	65	79	53	83
University	26	288	425	138
Residential	211	63	99	155
Hotel	25	32	36	38
Total	382	786	926	503

Table 3 - Phase 3

Internal Person - Trip Origin Destination Matrix Percentages calculated at origin															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		20%	30%	10%	1%	0%		Office		20%	4%	10%	2%	0%	
Retail	29%		13%	29%	14%	0%		Retail	2%		29%	5%	26%	5%	
Restaurant	31%	14%		31%	4%	3%		Restaurant	3%	41%		5%	18%	7%	
University	5%	28%	40%		12%	2%		University	5%	20%	4%		4%	1%	
Residential	2%	1%	20%	75%		0%		Residential	4%	42%	21%	4%		3%	
Hotel	75%	14%	8%	10%	0%			Hotel	0%	16%	68%	0%	2%		
All Other Land Uses								All Other Land Uses							
Internal Person - Trip Origin Destination Matrix Percentages calculated at destination															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		32%	10%	10%	0%	0%		Office		8%	2%	10%	4%	0%	
Retail	4%		50%	4%	2%	0%		Retail	31%		29%	31%	46%	17%	
Restaurant	14%	8%		7%	5%	4%		Restaurant	30%	50%		30%	16%	71%	
University	0%	25%	20%		50%	2%		University	30%	12%	15%		10%	1%	
Residential	3%	17%	20%	15%		0%		Residential	57%	10%	14%	57%		12%	
Hotel	2%	4%	5%	3%	0%			Hotel	0%	2%	5%	0%	0%		
All Other Land Uses								All Other Land Uses							

Table 4 - Phase 3

Internal Person - Trip Origin Destination Matrix (Computed at Origin)															
	AM Peak								PM Peak						
	Destination (To)								Destination (To)						
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		9	14	5	0	0	0	Office		56	11	28	6	0	0
Retail	3		1	3	1	0	0	Retail	1		10	2	9	2	0
Restaurant	20	9		20	3	2	0	Restaurant	2	22		3	10	4	0
University	1	7	10		3	1	0	University	21	85	17		17	4	0
Residential	4	2	42	158		0	0	Residential	4	42	21	4		3	0
Hotel	19	4	2	3	0		0	Hotel	0	6	25	0	1		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	
Trip Origin Destination Matrix (Computed at Destination)															
Destination (To)								Destination (To)							
Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From)	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		5	8	29	0	0	0	Office		3	2	14	6	0	0
Retail	12		39	12	1	0	0	Retail	18		24	43	71	6	0
Restaurant	43	1		20	3	1	0	Restaurant	17	16		41	25	27	0
University	0	4	16		32	1	0	University	17	4	12		15	0	0
Residential	9	2	16	43		0	0	Residential	32	3	12	79		5	0
Hotel	6	1	4	9	0		0	Hotel	0	1	4	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 5 - Phase 3

Balanced Internal Capture															
	AM Peak								PM Peak						
	Destination (To) Entering								Destination (To)						
Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses	Origin (From) EXITING	Office	Retail	Restaurant	University	Residential	Hotel	All Other Land Uses
Office		5	8	5	0	0	0	Office		3	2	14	6	0	0
Retail	3		1	3	1	0	0	Retail	1		10	2	9	2	0
Restaurant	20	1		20	3	1	0	Restaurant	2	16		3	10	4	0
University	0	4	10		3	1	0	University	17	4	12		15	0	0
Residential	4	2	16	43		0	0	Residential	4	3	12	4		3	0
Hotel	6	1	2	3	0		0	Hotel	0	1	4	0	0		0
All Other Land Uses	0	0	0	0	0	0		All Other Land Uses	0	0	0	0	0	0	

Table 6 - Phase 3

Mode Split						
Land Use	Origin (Exiting)			Destination (Entering)		
	% Transit	% Ped/Bike	% Vehicle	% Transit	% Ped/Bike	% Vehicle
Office	10%	10%	75%	10%	10%	75%
Retail	10%	50%	40%	10%	50%	40%
Restaurant	10%	50%	40%	10%	50%	40%
University	10%	20%	65%	10%	20%	65%
Residential	10%	20%	65%	10%	20%	65%
Hotel	10%	10%	75%	10%	10%	75%
All Other Land Uses	10%	20%	65%	10%	20%	65%

Table 7 - Phase 3

AM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips @ driveway)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (trips off site)		Total	% of internal trips	Vehicles
Office	33	277	310	11%	207	28	28	Office	17	29	46	37%	22	3	3
Retail	12	2	14	84%	1	0	1	Retail	8	1	9	84%	1	0	1
Restaurant	37	42	79	47%	17	4	21	Restaurant	45	20	65	70%	8	2	10
University	73	215	288	25%	140	21	43	University	18	8	26	68%	5	1	2
Residential	7	56	63	11%	36	6	11	Residential	65	146	211	31%	95	15	29
Hotel	2	30	32	6%	23	3	3	Hotel	11	14	25	45%	10	1	1
All Other Land Uses								All Other Land Uses							
Totals	164	622	786	21%	424	62	107		164	218	382	43%	141	22	46
PM Internal and External Trips Summary															
	Entering Trips								Exiting Trips						
	Person-Trip Estimates				External Trips by Mode				Person-Trip Estimates				External Trips by Mode		
Destination Land Use	Internal	External (vehicles trips off site)	Total		% of internal trips	Vehicles	Transit	Non-Motorized	Origin (From) EXITING	Internal	External (trips off site)		Total	% of internal trips	Vehicles
Office	23	34	57	41%	25	3	3	Office	24	257	280	8%	192	26	26
Retail	27	6	33	82%	2	1	3	Retail	22	11	33	67%	4	1	5
Restaurant	39	43	83	48%	17	4	22	Restaurant	34	19	53	64%	8	2	9
University	22	116	138	16%	75	12	23	University	49	376	425	12%	244	38	75
Residential	39	115	155	25%	75	12	23	Residential	26	73	99	26%	48	7	15
Hotel	9	29	38	23%	22	3	3	Hotel	5	31	36	13%	24	3	3
All Other Land Uses								All Other Land Uses							
Totals	160	343	503	32%	217	34	77		160	767	926	17%	520	77	133

Roux Institute (School and Partners Only) Trip Generation Detail
Time-of-Day Pattern by Group

	Graduate Learners (Daytime)		Graduate Learners (Night)		Corporate Learners		Daytime Special Events		Lunch Special Events		Evening Special Events	
	in	out	in	out	in	out	in	out	in	out	in	out
6am												
7am					10%		20%					
8am	10%				20%		60%					
9am	20%				40%		20%					
10am	60%				20%							
11am	10%				10%				80%			
noon									20%			
1pm										20%		
2pm			10%							80%		
3pm			60%			10%						
4pm		10%	20%			20%		20%			10%	
5pm		20%	10%			40%		60%			50%	
6pm		60%				20%		20%			40%	20%
7pm		10%				10%						50%
8pm				10%								30%
9pm				20%								
10pm				60%								
11pm				10%								

Roux Institute (School and Partners Only) Trip Generation, Short-Term

	Graduate Learners (Daytime) 40% of 359		Graduate Learners (Night) 60% of 359		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups		Faculty/Staff		Visiting Faculty		Researchers		Total Trips		
	144		215		100		25		25		100										in	out	total
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out			
6am	0	0	0	0	0	0	0	0	0	0	0	0									0	0	0
7am	0	0	0	0	10	0	5	0	0	0	0	0									15	0	15
8am	14	0	0	0	20	0	15	0	0	0	0	0	30	4	28	4	3	0	33	6	143	14	157
9am	29	0	0	0	40	0	5	0	0	0	0	0									74	0	74
10am	86	0	0	0	20	0	0	0	0	0	0	0									106	0	106
11am	14	0	0	0	10	0	0	0	20	0	0	0									44	0	44
noon	0	0	0	0	0	0	0	0	5	0	0	0									5	0	5
1pm	0	0	0	0	0	0	0	0	0	5	0	0									0	5	5
2pm	0	0	22	0	0	0	0	0	0	20	0	0									22	20	42
3pm	0	0	129	0	0	10	0	0	0	0	0	0									129	10	139
4pm	0	14	43	0	0	20	0	5	0	0	10	0									53	39	92
5pm	0	29	22	0	0	40	0	15	0	0	50	0	10	47	9	44	1	4	4	32	96	211	306
6pm	0	86	0	0	0	20	0	5	0	0	40	20									40	131	171
7pm	0	14	0	0	0	10	0	0	0	0	0	50									0	74	74
8pm	0	0	0	22	0	0	0	0	0	0	0	30									0	52	52
9pm	0	0	0	43	0	0	0	0	0	0	0	0									0	43	43
10pm	0	0	0	129	0	0	0	0	0	0	0	0									0	129	129
11pm	0	0	0	22	0	0	0	0	0	0	0	0									0	22	22

= Peak Hour

AM Peak Hour	
In	Out
143	14
PM Peak Hour	
In	Out
96	211

Roux Institute (School and Partners Only) Trip Generation, Medium-Term

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups		Faculty/Staff		Visiting Faculty		Researchers		Total Trips		
	319		479		250		25		25		100										in	out	total
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out			
6am	0	0	0	0	0	0	0	0	0	0	0	0									0	0	0
7am	0	0	0	0	25	0	5	0	0	0	0	0									30	0	30
8am	32	0	0	0	50	0	15	0	0	0	0	0	43	6	52	7	5	1	42	7	239	21	260
9am	64	0	0	0	100	0	5	0	0	0	0	0									169	0	169
10am	192	0	0	0	50	0	0	0	0	0	0	0									242	0	242
11am	32	0	0	0	25	0	0	0	20	0	0	0									77	0	77
noon	0	0	0	0	0	0	0	0	5	0	0	0									5	0	5
1pm	0	0	0	0	0	0	0	0	0	5	0	0									0	5	5
2pm	0	0	48	0	0	0	0	0	0	20	0	0									48	20	68
3pm	0	0	287	0	0	25	0	0	0	0	0	0									287	25	312
4pm	0	32	96	0	0	50	0	5	0	0	10	0									106	87	193
5pm	0	64	48	0	0	100	0	15	0	0	50	0	13	61	14	70	1	7	6	40	132	357	489
6pm	0	192	0	0	0	50	0	5	0	0	40	20									40	267	307
7pm	0	32	0	0	0	25	0	0	0	0	0	50									0	107	107
8pm	0	0	0	48	0	0	0	0	0	0	0	30									0	78	78
9pm	0	0	0	96	0	0	0	0	0	0	0	0									0	96	96
10pm	0	0	0	287	0	0	0	0	0	0	0	0									0	287	287
11pm	0	0	0	48	0	0	0	0	0	0	0	0									0	48	48

AM Peak Hour	
In	Out
239	21
PM Peak Hour	
In	Out
132	357

= Peak Hour

Roux Institute (School and Partners Only) Trip Generation, Long-Term

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups		Faculty/Staff		Visiting Faculty		Researchers		Total Trips		
	319		479		350		25		25		100										in	out	total
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out			
6am	0	0	0	0	0	0	0	0	0	0	0	0									0	0	0
7am	0	0	0	0	35	0	5	0	0	0	0	0									40	0	40
8am	32	0	0	0	70	0	15	0	0	0	0	0	43	6	71	10	7	1	50	9	288	26	314
9am	64	0	0	0	140	0	5	0	0	0	0	0									209	0	209
10am	192	0	0	0	70	0	0	0	0	0	0	0									262	0	262
11am	32	0	0	0	35	0	0	0	20	0	0	0									87	0	87
noon	0	0	0	0	0	0	0	0	5	0	0	0									5	0	5
1pm	0	0	0	0	0	0	0	0	0	5	0	0									0	5	5
2pm	0	0	48	0	0	0	0	0	0	20	0	0									48	20	68
3pm	0	0	287	0	0	35	0	0	0	0	0	0									287	35	322
4pm	0	32	96	0	0	70	0	5	0	0	10	0									106	107	213
5pm	0	64	48	0	0	140	0	15	0	0	50	0	13	61	18	88	2	9	7	48	138	425	563
6pm	0	192	0	0	0	70	0	5	0	0	40	20									40	287	327
7pm	0	32	0	0	0	35	0	0	0	0	0	50									0	117	117
8pm	0	0	0	48	0	0	0	0	0	0	0	30									0	78	78
9pm	0	0	0	96	0	0	0	0	0	0	0	0									0	96	96
10pm	0	0	0	287	0	0	0	0	0	0	0	0									0	287	287
11pm	0	0	0	48	0	0	0	0	0	0	0	0									0	48	48

= Peak Hour

AM Peak Hour	
In	Out
288	26
PM Peak Hour	
In	Out
138	425

Short Term

			People on a typical day	math for day	math for peaks		
755	755	Enrolled Graduate Learners	359	$(.7*755*0.25)+(.3*75$	see trip profile tab	70% only visit for a class a week (*25%), 30% use it regularly this pop is on site 11 to 6 and 60% pm site 4pm to 10pm	40% of
1000	1,000+	Corporate Learners	100	$(.10*1000)$	see trip profile tab	only 25% on site once or twice during 6 to 8 week course - less than 1/8 at any time -we went with a 10% on campus each day to be conservative, 25% arrive in peak hour	
170	170	Alumni	na		see trip profile tab	part of Roux family, not commuting to campus	
		Special Event Attendee	150			25 ppl for full day, 25 ppl for lunch event, 100 ppl for after work event	
30	30+	Embedded Startups	ITE		ITE	run trip gen for office with 70 employees	
65	65	Faculty & Staff	ITE		ITE	run trip gen for office with 65 employees	
65	65	Researchers	ITE		ITE	run trip gen for R&D with 65 employees	
130	130	Total FTE Staff				this is just the total of two #s above	
		TOTAL				Total trips	

Mid Term

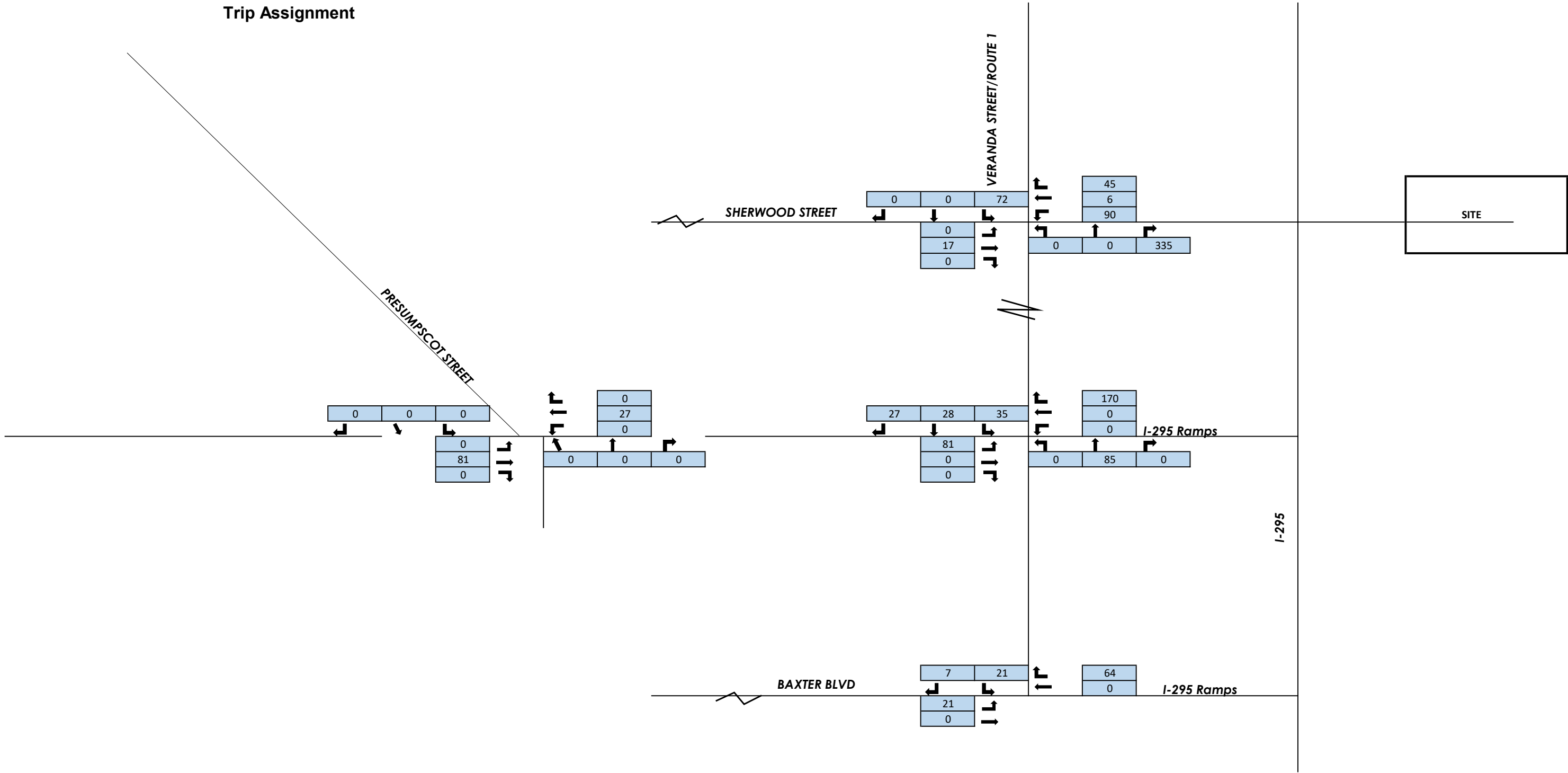
1680	1,680	Enrolled Graduate Learners	798	$(.7*1680*0.25)+(.3*1$	see trip profile tab	70% only visit for a class a week (*25%), 30% use it regularly this pop is on site 11 to 6 and 60% pm site 4pm to 10pm	40% of
2500	2,500+	Corporate Learners	250	$(.10*2500)$	see trip profile tab	only 25% on site once or twice during 6 to 8 week course - less than 1/8 at any time -we went with a 10% on campus each day to be conservative, 25% arrive in peak hour	
1400	1,400	Alumni	na		see trip profile tab	part of Roux family, not commuting to campus	
		Special Event Attendee	150			25 ppl for full day, 25 ppl for lunch event, 100 ppl for after work event	
50	50+	Embedded Startups	ITE		ITE	run trip gen for office with 100 employees	
120	120	Faculty & Staff	ITE		ITE	run trip gen for office with 120 employees	
85	85	Researchers	ITE		ITE	run trip gen for R&D with 85 employees	
205	205	Total FTE Staff				this is just the total of two #s above	
		TOTAL				Total trips	

Long Term

1680	1,680	Enrolled Graduate Learners (hybrid)	798	$(.7*1680*0.25)+(.3*1$	see trip profile tab	70% only visit for a class a week (*25%), 30% use it regularly this pop is on site 11 to 6 and 60% pm site 4pm to 10pm	40% of
		3,500+ Corporate Learners (online and hybrid)					
3500	3,500+	Corporate Learners	350	$(.10*3500)$	see trip profile tab	only 25% on site once or twice during 6 to 8 week course - less than 1/8 at any time -we went with a 10% on campus each day to be conservative, 25% arrive in peak hour	
3900	3,900	Alumni	na		see trip profile tab	part of Roux family, not commuting to campus	
		Special Event Attendee	150			25 ppl for full day, 25 ppl for lunch event, 100 ppl for after work event	
50	50+	Embedded Startups	ITE		ITE	run trip gen for office with 100 employees	
165	165	Faculty & Staff	ITE		ITE	run trip gen for office with 165 employees	
105	105	Researchers	ITE		ITE	run trip gen for R&D with 105 employees	
270	270	Total FTE Staff				this is just the total of two #s above	
		TOTAL				Total trips	

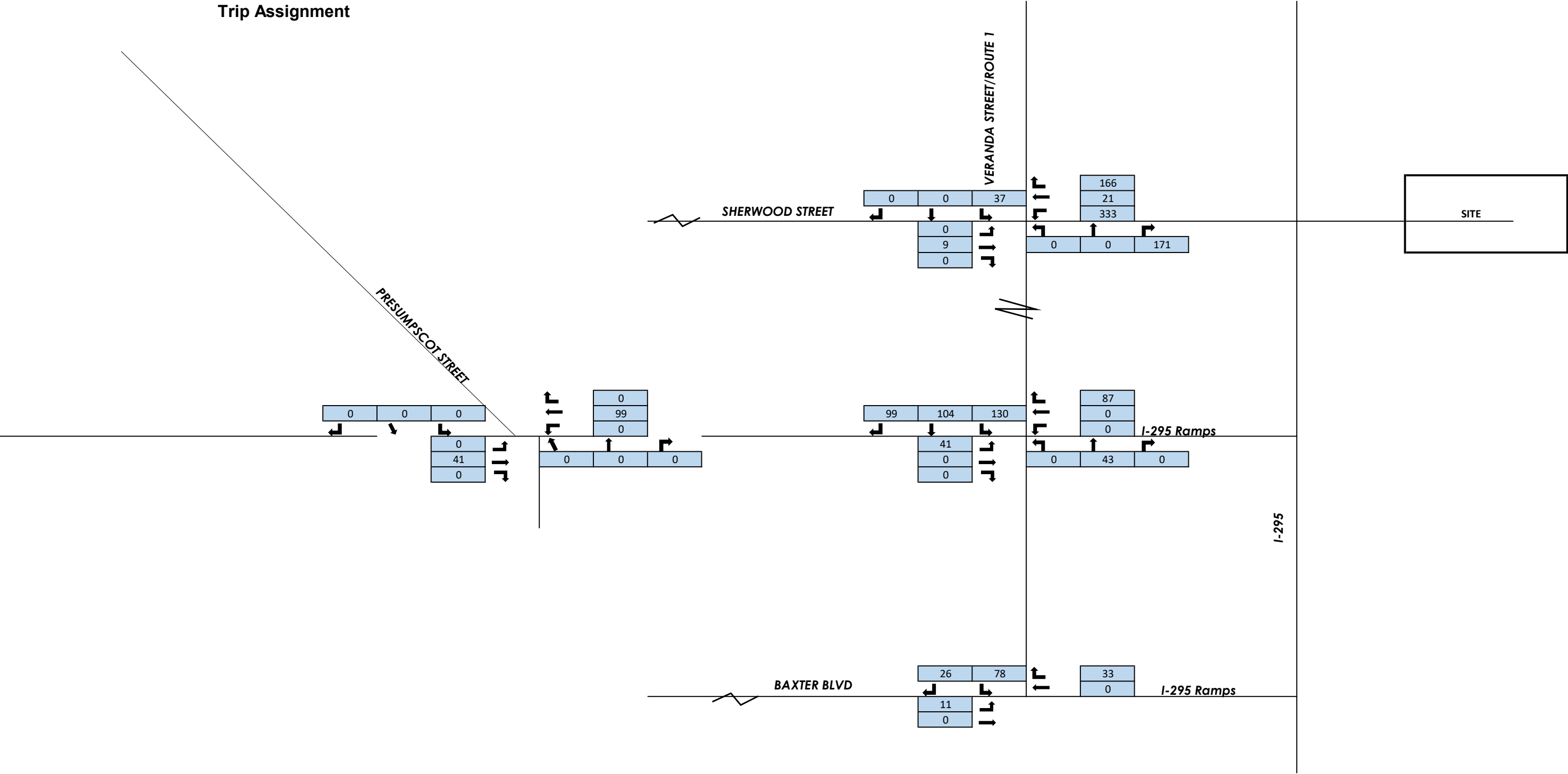
Long-Term Build, AM

Trip Assignment



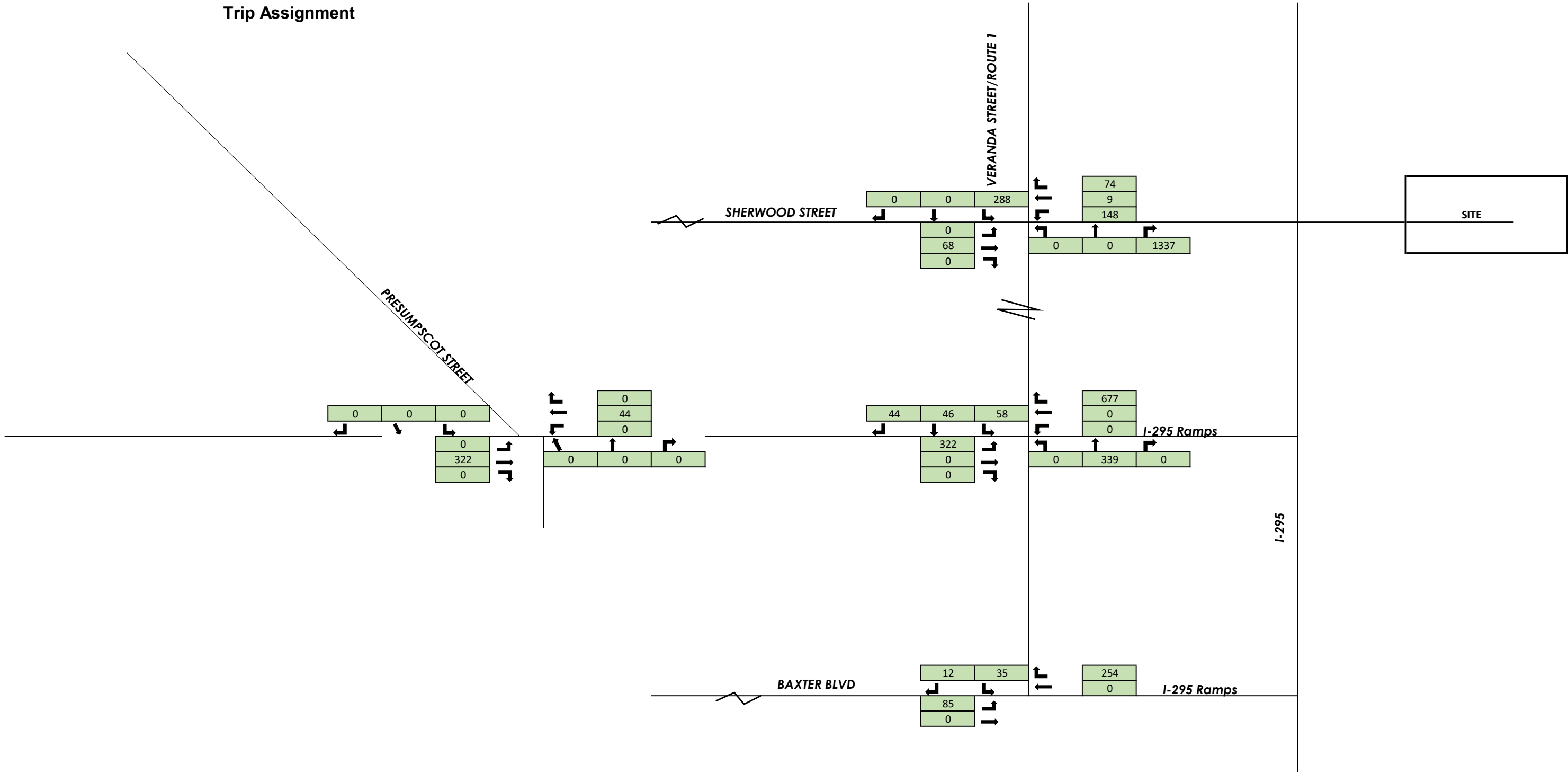
Long-Term Build, PM

Trip Assignment



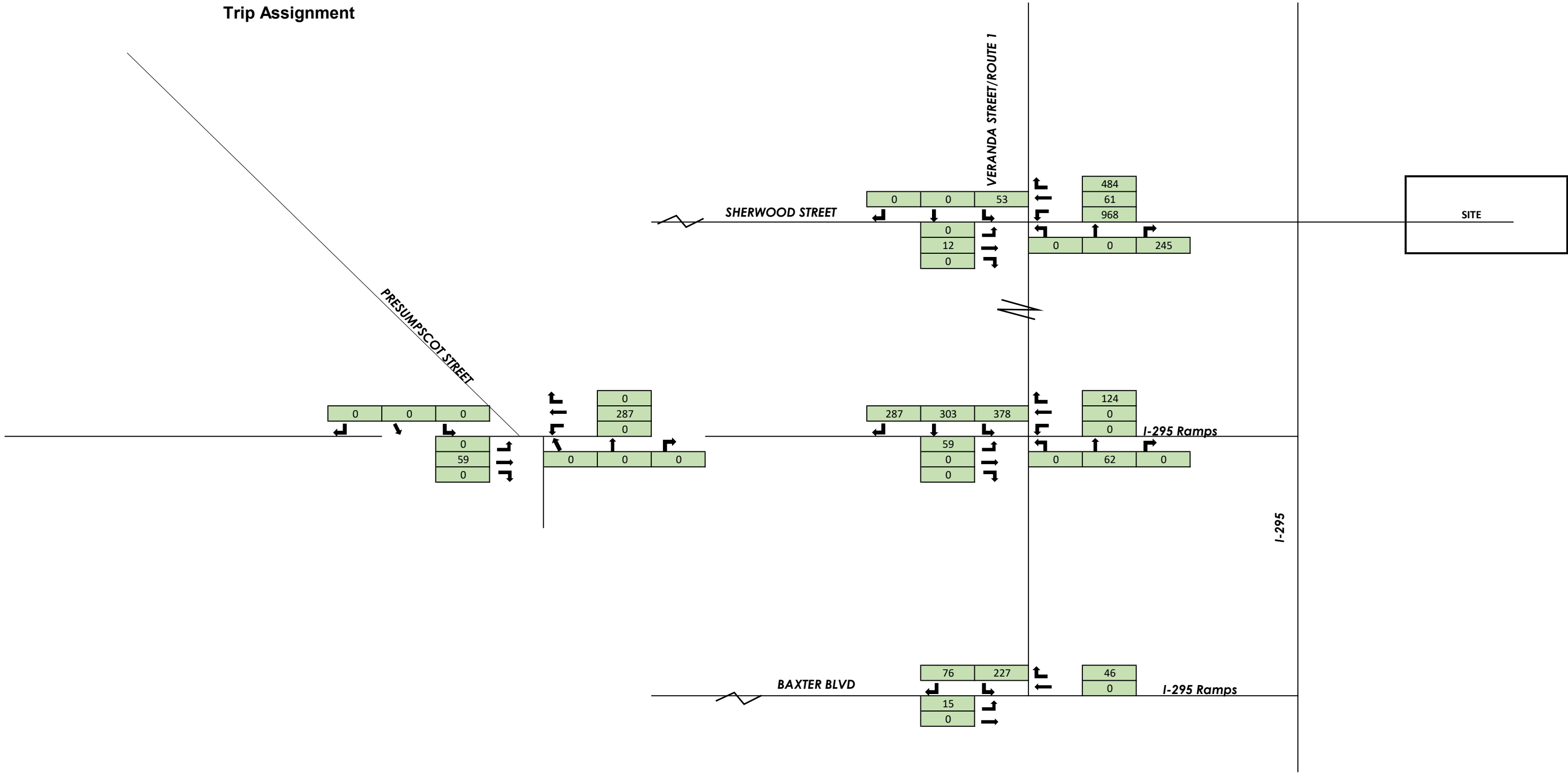
Existing Zoning Build Out, AM

Trip Assignment



Existing Zoning Build Out, PM

Trip Assignment





Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Bates St & Baxter Blvd

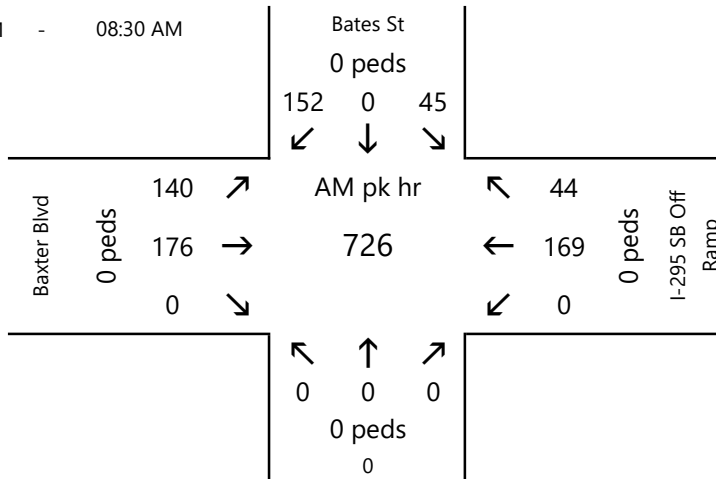
Intersection: Bates St & Baxter Blvd Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Bates St				I-295 SB Off Ramp								Baxter Blvd				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	152	0	45	0	44	169	0	0	0	0	0	0	0	176	140	0	726
PM pk hr	198	0	46	0	32	174	0	0	0	0	0	0	0	207	168	0	825

AM Peak Hour

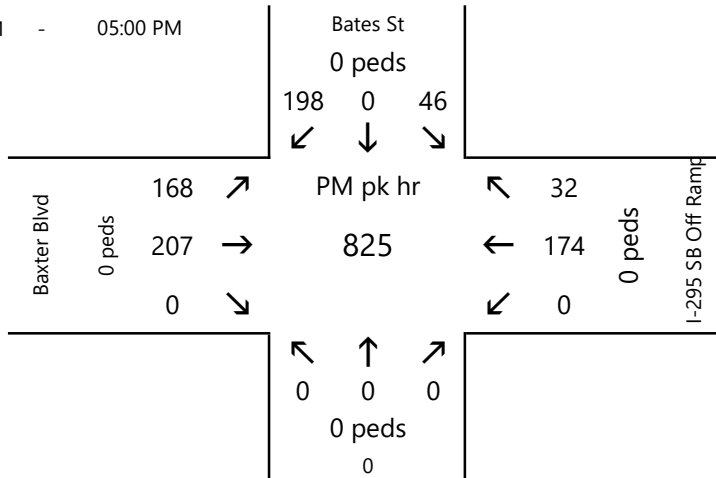
07:30 AM - 08:30 AM



%	SB	WB	NB	EB
auto	96%	99%		100%
med	0%	0%		0%
heavy	4%	1%		0%
% trucks	4%	1%		0%

PM Peak Hour

04:00 PM - 05:00 PM



%	SB	WB	NB	EB
auto	98%	100%		99%
med	0%	0%		0%
heavy	2%	0%		1%
% trucks	2%	0%		1%



Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Washington Ave & Bates St

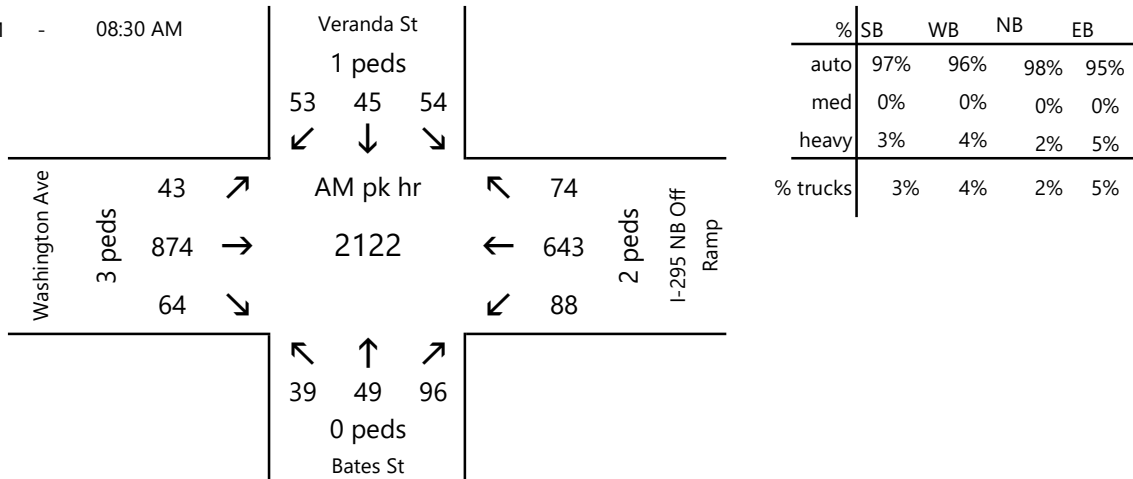
Intersection: Washington Ave & Bates St Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Veranda St				I-295 NB Off Ramp				Bates St				Washington Ave				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	53	45	54	1	74	643	88	2	96	49	39	0	64	874	43	3	2122
PM pk hr	68	82	59	2	105	874	80	0	103	53	44	9	82	768	41	9	2359

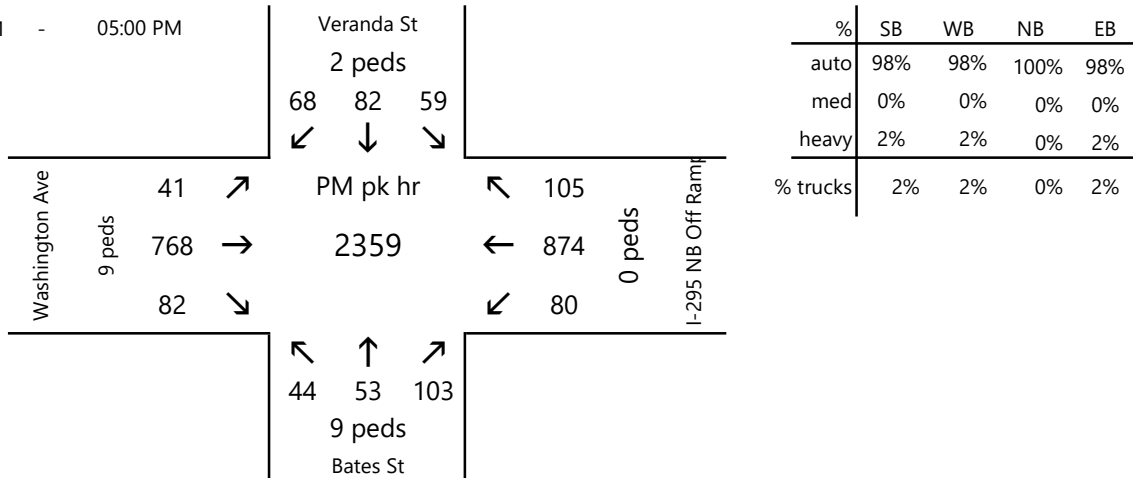
AM Peak Hour

07:30 AM - 08:30 AM



PM Peak Hour

04:00 PM - 05:00 PM





Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Washington Ave & Presumpscot St

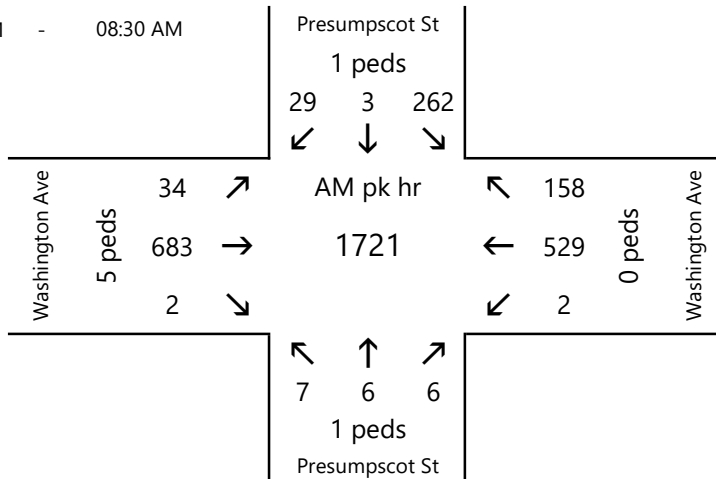
Intersection: Washington Ave & Presumpscot St Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Presumpscot St				Washington Ave				Presumpscot St				Washington Ave				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	29	3	262	1	158	529	2	0	6	6	7	1	2	683	34	5	1721
PM pk hr	40	1	207	0	250	739	8	3	7	2	8	13	3	651	28	1	1944

AM Peak Hour

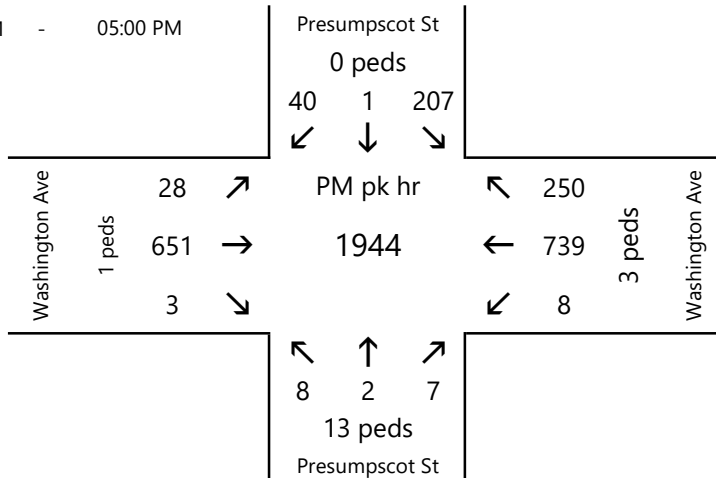
07:30 AM - 08:30 AM



%	SB	WB	NB	EB
auto	93%	96%	95%	95%
med	0%	0%	0%	0%
heavy	7%	4%	5%	5%
% trucks	7%	4%	5%	5%

PM Peak Hour

04:00 PM - 05:00 PM



%	SB	WB	NB	EB
auto	97%	98%	100%	97%
med	0%	0%	0%	0%
heavy	3%	2%	0%	3%
% trucks	3%	2%	0%	3%



Computations - Traffic Volumes

Project: Northeastern Roux Institute Project #: 58570.00
 Location: Portland, ME Sheet: _____
 Calculated by: EPH Date: 8/15/22
 Checked by: _____ Date: _____
 Title: Traffic Data Calculations
 Intersection: Veranda St & Sherwood St

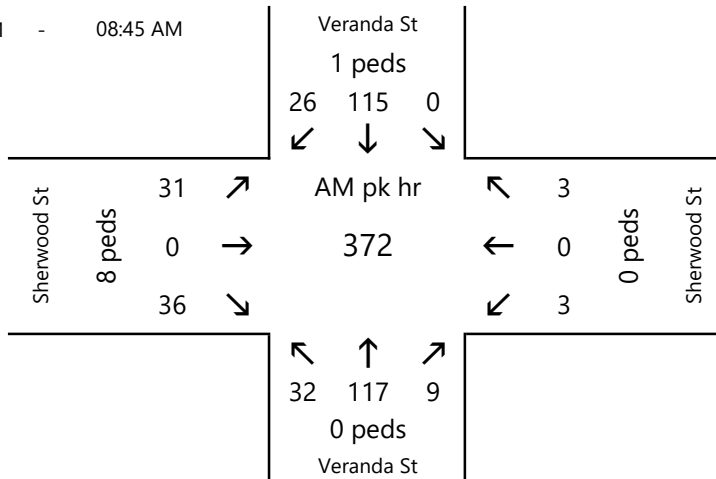
Intersection: Veranda St & Sherwood St Town: Portland, ME
 Count Date(s): 3/9/2021 Counter: Boston Traffic

Peak Hour Volumes

	SB				WB				NB				EB				Total
	Veranda St				Sherwood St				Veranda St				Sherwood St				
	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	RT	Thru	LT	Ped	
AM pk hr	26	115	0	1	3	0	3	0	9	117	32	0	36	0	31	8	372
PM pk hr	21	164	0	5	3	3	14	5	13	152	30	1	29	2	33	8	464

AM Peak Hour

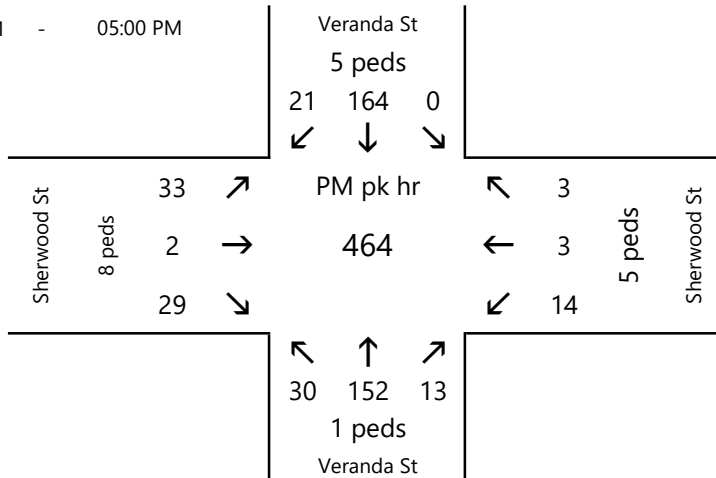
07:45 AM - 08:45 AM



%	SB	WB	NB	EB
auto	95%	50%	94%	100%
med	0%	0%	0%	0%
heavy	5%	50%	6%	0%
% trucks	5%	50%	6%	0%

PM Peak Hour

04:00 PM - 05:00 PM



%	SB	WB	NB	EB
auto	98%	96%	99%	100%
med	0%	0%	0%	0%
heavy	2%	4%	1%	0%
% trucks	2%	4%	1%	0%

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

	Start Time	SB Bates St				WB I-295 SB Off Ramp				NB 0				EB Baxter Blvd				1 HR TOTALS					
		Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Begin Time	SB	WB	NB	EB	TOTAL
1	06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
2	06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	17	39	0	55	111
3	06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	56	87	0	117	260
4	06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	107	140	0	185	432
5	07:00 AM	10	0	7	0	6	33	0	0	0	0	0	0	0	31	24	0	07:00 AM	150	216	0	283	649
6	07:15 AM	27	0	12	0	6	42	0	0	0	0	0	0	0	25	37	0	07:15 AM	181	217	0	299	697
7	07:30 AM	40	0	11	0	10	43	0	0	0	0	0	0	0	31	37	0	07:30 AM	197	213	0	316	726
8	07:45 AM	32	0	11	0	14	62	0	0	0	0	0	0	0	53	45	0	07:45 AM	207	205	0	314	726
9	08:00 AM	37	0	11	0	8	32	0	0	0	0	0	0	0	43	28	0	08:00 AM	208	170	0	276	654
10	08:15 AM	43	0	12	0	12	32	0	0	0	0	0	0	0	49	30	0	08:15 AM	160	130	0	205	495
11	08:30 AM	52	0	9	0	10	35	0	0	0	0	0	0	0	33	33	0	08:30 AM	105	86	0	126	317
12	08:45 AM	40	0	4	0	8	33	0	0	0	0	0	0	0	33	27	0	08:45 AM	44	41	0	60	145
13	09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
14	09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
15	09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
16	09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
17	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
18	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
19	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
20	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
21	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
22	11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
23	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
24	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
25	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
26	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
27	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
28	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
29	01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
30	01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
31	01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
32	01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
33	02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
34	02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
35	02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
36	02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
37	03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
38	03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	63	58	0	98	219
39	03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	129	106	0	179	414
40	03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	202	156	0	269	627
41	04:00 PM	53	0	10	0	8	50	0	0	0	0	0	0	0	54	44	0	04:00 PM	244	206	0	375	825
42	04:15 PM	55	0	11	0	9	39	0	0	0	0	0	0	0	39	42	0	04:15 PM	230	196	0	349	775
43	04:30 PM	56	0	17	0	10	40	0	0	0	0	0	0	0	47	43	0	04:30 PM	237	187	0	341	765
44	04:45 PM	34	0	8	0	5	45	0	0	0	0	0	0	0	67	39	0	04:45 PM	220	184	0	328	732
45	05:00 PM	41	0	8	0	7	41	0	0	0	0	0	0	0	39	33	0	05:00 PM	217	162	0	278	657
46	05:15 PM	58	0	15	0	10	29	0	0	0	0	0	0	0	41	32	0						
47	05:30 PM	45	0	11	0	10	37	0	0	0	0	0	0	0	42	35	0						
48	05:45 PM	31	0	8	0	5	23	0	0	0	0	0	0	0	30	26	0						

Cell ref.: 7
AM Peak Hr
07:30 AM - 8:30 AM
Vol. = 726

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 825

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

	Start Time	SB				WB				NB				EB				1 HR TOTALS					
		Veranda St				I-295 NB Off Ramp				Bates St				Washington Ave				Begin Time	SB	WB	NB	EB	TOTAL
		Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds						
1	06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
2	06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	22	113	30	173	338
3	06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	50	239	73	375	737
4	06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	88	448	120	613	1269
5	07:00 AM	5	4	13	0	11	98	4	0	20	4	6	2	9	159	5	4	07:00 AM	123	660	179	888	1850
6	07:15 AM	6	10	12	0	5	110	11	0	27	9	7	0	18	183	1	2	07:15 AM	133	724	185	976	2018
7	07:30 AM	16	8	14	0	16	165	28	0	26	15	6	0	15	213	10	1	07:30 AM	152	805	184	981	2122
8	07:45 AM	11	9	15	0	19	173	20	0	31	15	13	0	14	251	10	2	07:45 AM	153	746	180	959	2038
9	08:00 AM	12	12	8	0	20	137	20	1	18	10	8	0	16	233	12	0	08:00 AM	161	694	156	878	1889
10	08:15 AM	14	16	17	1	19	168	20	1	21	9	12	0	19	177	11	0	08:15 AM	129	517	120	617	1383
11	08:30 AM	8	20	11	0	16	113	21	0	28	9	6	1	20	186	10	1	08:30 AM	82	310	78	410	880
12	08:45 AM	14	15	14	0	14	130	16	0	21	5	9	2	13	172	9	0	08:45 AM	43	160	35	194	432
13	09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
14	09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
15	09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
16	09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
17	10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
18	10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
19	10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
20	10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
21	11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
22	11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
23	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
24	11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
25	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
26	12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
27	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
28	12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
29	01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
30	01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
31	01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
32	01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
33	02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
34	02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
35	02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
36	02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
37	03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
38	03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	47	253	52	243	595
39	03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	102	522	103	452	1179
40	03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	159	774	156	669	1758
41	04:00 PM	18	17	12	2	33	199	21	0	24	15	13	2	25	208	10	4	04:00 PM	209	1059	200	891	2359
42	04:15 PM	19	20	16	0	23	225	21	0	27	12	12	1	25	175	9	1	04:15 PM	201	1060	188	862	2311
43	04:30 PM	14	29	14	0	22	208	22	0	26	14	13	3	22	188	7	2	04:30 PM	192	1068	179	850	2289
44	04:45 PM	17	16	17	0	27	242	16	0	26	12	6	3	10	197	15	2	04:45 PM	174	1060	171	786	2191
45	05:00 PM	15	17	7	4	29	207	18	1	24	9	7	2	14	186	14	1	05:00 PM	154	990	158	714	2016
46	05:15 PM	14	22	10	0	31	221	25	0	18	14	10	2	26	160	11	6						
47	05:30 PM	11	21	7	1	26	201	17	1	21	15	9	2	16	126	11	5						
48	05:45 PM	12	7	11	0	18	176	21	0	16	7	8	4	11	127	12	0						

Cell ref.: 7
AM Peak Hr
07:30 AM - 8:30 AM
Vol. = 2122

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 2359

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

Start Time	SB Presumpscot St				WB Washington Ave				NB Presumpscot St				EB Washington Ave				1 HR TOTALS					
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Begin Time	SB	WB	NB	EB	TOTAL
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	44	107	3	147	301
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	92	232	6	307	637
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	161	413	12	488	1074
07:00 AM	3	0	41	0	26	81	0	0	1	0	2	0	0	139	8	0	07:00 AM	239	609	15	686	1549
07:15 AM	4	0	44	0	28	97	0	0	1	0	2	0	1	155	4	0	07:15 AM	264	620	16	726	1626
07:30 AM	5	0	64	0	44	136	1	0	2	1	3	1	1	178	2	2	07:30 AM	294	689	19	719	1721
07:45 AM	7	1	70	0	53	143	0	0	3	0	0	0	1	185	12	0	07:45 AM	312	627	17	703	1659
08:00 AM	4	2	63	1	7	111	0	0	1	0	3	0	0	180	7	1	08:00 AM	290	586	18	661	1555
08:15 AM	13	0	65	0	54	139	1	0	0	5	1	0	0	140	13	2	08:15 AM	221	468	14	474	1177
08:30 AM	15	2	70	1	30	88	1	1	1	3	0	1	1	149	15	0	08:30 AM	143	274	8	321	746
08:45 AM	11	0	45	0	42	112	1	0	2	0	2	3	1	142	13	1	08:45 AM	56	155	4	156	371
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	62	228	3	187	480
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	123	485	5	346	959
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	174	732	11	514	1431
04:00 PM	10	0	52	0	59	167	2	0	2	0	1	2	1	171	15	1	04:00 PM	248	997	17	682	1944
04:15 PM	6	0	55	0	68	187	2	1	0	1	1	4	2	155	2	0	04:15 PM	251	1006	18	658	1933
04:30 PM	11	0	40	0	53	194	0	2	2	0	4	3	0	163	5	0	04:30 PM	227	988	20	664	1899
04:45 PM	13	1	60	0	70	191	4	0	3	1	2	4	0	162	6	0	04:45 PM	215	960	17	610	1802
05:00 PM	7	3	55	0	53	184	0	0	1	0	3	4	1	156	6	2	05:00 PM	176	898	14	563	1651
05:15 PM	10	0	27	3	57	180	2	0	2	0	2	1	2	157	6	0						
05:30 PM	5	0	34	2	59	159	1	1	2	0	1	2	2	110	2	0						
05:45 PM	2	1	32	0	52	151	0	0	2	0	1	3	0	120	1	0						

Cell ref.: 7
AM Peak Hr
07:30 AM - 8:30 AM
Vol. = 1721

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 1944

TURNING MOVEMENT COUNT DATA - Totals by Movement

PEAK HOUR CALCULATIONS

Start Time	SB				WB				NB				EB				1 HR TOTALS					
	Veranda St				Sherwood St				Veranda St				Sherwood St				Begin Time	SB	WB	NB	EB	TOTAL
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds						
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:00 AM	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:15 AM	15	1	18	12	46
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:30 AM	38	2	33	24	97
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	06:45 AM	70	4	75	42	191
07:00 AM	2	13	0	0	0	0	1	0	3	13	2	0	7	0	5	5	07:00 AM	98	6	117	56	277
07:15 AM	4	19	0	0	0	0	1	0	1	12	2	0	7	0	5	2	07:15 AM	112	6	138	59	315
07:30 AM	5	27	0	0	0	1	1	0	2	31	9	0	10	0	8	0	07:30 AM	131	6	164	64	365
07:45 AM	3	25	0	0	1	0	1	0	2	30	10	0	8	0	6	1	07:45 AM	141	6	158	67	372
08:00 AM	6	23	0	0	1	0	0	0	3	30	6	0	9	0	6	3	08:00 AM	145	9	144	68	366
08:15 AM	6	36	0	1	0	0	1	0	3	29	9	0	9	0	8	1	08:15 AM	116	8	105	53	282
08:30 AM	11	31	0	0	1	0	1	0	1	28	7	0	10	0	11	3	08:30 AM	74	7	64	36	181
08:45 AM	3	29	0	0	0	0	5	0	2	23	3	0	8	1	6	1	08:45 AM	32	5	28	15	80
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00 AM	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15 AM	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30 AM	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45 AM	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:00 AM	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:15 AM	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:30 AM	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10:45 AM	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:00 AM	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:15 AM	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:30 AM	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11:45 AM	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:00 PM	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:15 PM	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:30 PM	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12:45 PM	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:00 PM	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:15 PM	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:30 PM	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	01:45 PM	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:00 PM	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:15 PM	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:30 PM	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	02:45 PM	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:00 PM	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:15 PM	48	6	58	16	128
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:30 PM	97	11	101	28	237
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03:45 PM	148	16	144	46	354
04:00 PM	8	40	0	2	2	1	3	1	2	46	10	0	2	1	13	2	04:00 PM	185	20	195	64	464
04:15 PM	4	45	0	1	0	1	4	0	2	34	7	0	6	0	6	2	04:15 PM	178	16	188	60	442
04:30 PM	7	44	0	1	0	1	4	3	8	33	2	1	9	0	9	2	04:30 PM	174	12	201	56	443
04:45 PM	2	35	0	1	1	0	3	1	1	39	11	0	12	1	5	2	04:45 PM	163	9	207	44	423
05:00 PM	8	32	1	0	0	1	1	1	0	42	9	0	6	0	6	3	05:00 PM	155	8	192	38	393
05:15 PM	5	40	0	1	1	0	0	1	1	41	14	1	6	0	2	2						
05:30 PM	4	36	0	2	0	1	1	1	1	38	10	0	2	0	4	5						
05:45 PM	4	25	0	0	2	0	1	0	1	31	4	0	4	0	8	0						

Cell ref.: 8
AM Peak Hr
07:45 AM - 8:45 AM
Vol. = 372

Cell ref.: 19
Midday Peak Hr
10:30 AM - 11:30 AM
Vol. = 0

Cell ref.: 41
PM Peak Hr
04:00 PM - 5:00 PM
Vol. = 464

	Short Term No Build				Short Term Build				Medium Term No Build				Medium Term Build				Long Term No Build			
	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*
Veranda and Washington Ave																				
Overall	24.4		C		33.5		C		31.2		C		31.5		C		86.6		F	
EBL	0.54	53.2	D	122	0.54	48.0	D	133	0.24	38.5	D	98	0.55	46.7	D	135	0.58	85.2	F	149
EBTR	0.90	53.4	D	214	0.92	59.8	E	267	0.90	52.4	D	213	0.98	64.7	E	290	0.91	52.3	D	237
WBL	0.83	48.7	D	144	0.84	53.0	D	147	0.65	38.9	D	136	0.85	49.7	D	149	0.84	67.7	E	153
WBTR	0.42	47.1	D	193	0.44	48.7	D	248	0.38	42.5	D	178	0.46	47.4	D	250	0.42	77.6	E	360
NBL	0.37	56.5	E	163	0.69	49.3	D	168	0.70	48.4	D	167	0.48	57.8	E	168	0.73	205.8	F	225
NBT	0.50	15.3	B	243	0.55	20.9	C	303	0.51	18.6	B	261	0.59	18.1	B	272	0.54	165.0	F	1357
NBTR	0.50	9.8	A	214	0.55	12.6	B	296	0.51	13.4	B	251	0.59	14.1	B	252	0.54	128.4	F	1345
SBL	0.17	59.4	E	103	0.39	65.8	E	131	0.22	56.3	E	104	0.55	84.0	F	146	0.21	59.4	E	95
SBT	0.96	19.4	B	347	0.85	33.6	C	420	0.87	34.5	C	443	0.98	27.7	C	445	0.90	47.9	D	616
SBTR	0.96	17.5	B	367	0.85	35.4	D	452	0.87	32.0	C	477	0.99	25.6	C	470	0.90	49.3	D	653
Driveway at Veranda and Sherwood St																				
Overall	2.2		A		8.5		A		2.1		A		8.6		A		10.1		B	
EBLTR	0.03	4.0	A	48	0.03	4.2	A	47	0.04	3.7	A	37	0.04	4.4	A	47	0.04	4.0	A	45
WBLTR	-	0.5	A	-	0.02	4.8	A	-	-	0.5	A	-	0.04	5.3	A	-	-	13.0	B	-
NBLTR	0.01	5.2	A	2	0.15	8.1	A	42	0.01	6.7	A	16	0.25	9.0	A	45	0.01	11.8	B	117
SBLTR	0.15	7.3	A	15	0.19	9.7	A	52	0.16	7.7	A	64	0.23	7.5	A	59	0.17	11.4	B	24
Bates and Baxter Blvd																				
Overall	1.8		A		1.9		A		1.8		A		2.0		A		1.9		A	
EBL	0.14	2.9	A	57	0.15	3.4	A	62	0.14	2.8	A	62	0.16	3.1	A	63	0.15	3.4	A	72
EBT	-	0.1	A	-	-	0.1	A	-	-	0.4	A	-	-	0.4	A	-	-	0.4	A	-
WBTR	-	0.6	A	4	-	0.9	A	7	-	0.7	A	7	-	0.9	A	11	-	0.8	A	9
SBL	0.23	8.6	A	66	0.25	9.3	A	66	0.22	9.3	A	60	0.30	9.3	A	68	0.25	8.3	A	58
Washington and Presumpscot St																				
Overall	27.6		C		76.0		E		31.3		C		34.7		C		95.4		F	
EBLTR	0.34	61.7	E	55	0.41	64.6	E	55	0.24	60.6	E	38	0.24	82.1	F	41	0.50	71.5	E	65
WBL	2.54	76.2	E	284	0.96	28.0	C	311	2.37	139.9	F	595	2.37	111.4	F	604	1.07	32.9	C	428
WBTR	0.03	45.3	D	95	0.03	16.7	B	93	0.03	72.5	E	89	0.03	85.3	F	97	0.03	25.3	C	102
NBT	0.66	31.9	C	274	1.32	127.7	F	783	0.64	19.6	B	158	0.67	44.9	D	248	1.77	244.1	F	1339
NBR	0.19	3.9	A	63	0.21	8.6	A	483	0.19	3.4	A	33	0.19	3.4	A	48	0.24	35.8	D	1386
SBL	0.12	24.7	C	97	0.32	151.0	F	103	0.10	22.9	C	92	0.11	20.7	C	113	0.34	118.9	F	148
SBTR	0.80	18.2	B	463	1.11	134.5	F	1456	0.79	16.3	B	406	0.84	17.9	B	467	1.16	94.6	F	957

Control Delay: m: Volume for 95th percentile queue is metered by upstream signal #: 95th %tile volume exceeds capacity, queue may be longer

^ Exceeds methodology limits

* Simulation result

	Long Term Build				Long Term Existing Zoning					Medium Term Build w/Mitigation				Long Term Build with Mitigation				Long Term Existing Zoning with Mitigation			
	v/c ⁺	Delay [*]	LOS [*]	Queue Length [*]	v/c ⁺	Delay [*]	LOS [*]	Queue Length [*]		v/c ⁺	Delay [*]	LOS [*]	Queue Length [*]	v/c ⁺	Delay [*]	LOS [*]	Queue Length [*]	v/c ⁺	Delay [*]	LOS [*]	Queue Length [*]
Veranda and Washington Ave																					
Overall	127.6 F				157.2 F					33.5 C				22.5 C				110.4 F			
EBL	0.58	104.6	F	309	0.28	142.0	F	321	EBL	0.28	48.9	D	112	0.33	41.1	D	113	0.29	162.7	F	369
EBTR	1.14	106.0	F	436	1.52	262.6	F	381	EBT	0.41	44.4	D	120	0.62	66.5	E	203	0.90	402.1	F	388
									EBR	0.86	17.1	B	121	0.97	20.8	C	144	0.69	47.2	D	423
WBL	0.87	66.9	E	152	0.97	54.1	E	151	WBL	0.54	41.6	D	148	0.65	54.5	D	148	0.97	59.8	E	152
WBTR	0.51	64.0	E	396	0.53	57.9	E	413	WBTR	0.52	48.9	D	233	0.61	52.1	D	339	0.86	42.2	D	355
NBL	0.73	200.3	F	243	0.90	214.8	F	226	NBL	0.70	54.9	D	201	-	51.1	D	175	0.62	59.2	E	177
NBT	0.67	179.3	F	1411	0.95	195.7	F	1256	NBT	0.47	33.2	C	486	0.43	18.7	B	249	0.53	29.4	C	773
NBTR	0.67	143.2	F	1412	0.97	195.7	F	1223	NBR	0.26	10.0	A	181	0.33	6.2	A	222	0.86	58.5	E	376
SBL	0.91	198.2	F	151	1.30	364.3	F	238	SBL	0.44	73.6	E	208	0.38	30.4	C	243	0.71	441.6	F	230
SBT	0.96	113.6	F	1081	0.92	55.9	E	1019	SBT	0.85	31.3	C	414	0.86	23.9	C	382	0.90	113.1	F	1186
SBTR	0.97	105.3	F	1097	0.92	51.1	E	994	SBR	0.85	28.6	C	438	0.86	22.5	C	407	0.91	101.1	F	1195
Driveway at Veranda and Sherwood St																					
Overall	16.3 C				86.4 F					4.1 A				32.3 C				79.9 E			
EBLTR	0.04	5.6	A	67	1.49	65.0	E	500	EBLTR	0.04	4.9	A	58	0.89	36.0	D	406	1.49	53.2	D	426
WBLTR	0.08	8.7	A	-	2.09	252.2	F	394	WBLTR	0.04	5.9	A	69	0.72	44.9	D	273	2.09	190.3	F	817
NBLTR	0.54	19.0	C	101	0.32	41.7	D	177	NBL	0.20	11.0	B	57	0.15	38.1	D	130	0.20	57.8	E	141
									NBT	0.05	6.8	A	49	0.10	30.3	C	59	0.12	56.0	E	84
SBLTR	0.34	17.7	C	108	0.85	56.1	E	199	SBLTR	0.23	15.9	C	74	0.81	52.6	D	159	0.84	52.4	D	166
Bates and Baxter Blvd																					
Overall	4.3 A				200.8 F					6.2 A				6.4 A				209.4 E			
EBL	0.18	9.5	A	108	0.23	919.8	F	184	EBL	0.30	5.1	A	74	0.33	5.4	A	85	0.40	152.1	E	206
EBT	-	0.5	A	-	-	1.4	A		EBT	0.33	5.9	A	85	0.35	6.0	A	84	0.36	9.1	A	116
WBTR	-	2.9	A	4	-	193.0	F	781	WBTR	0.40	8.2	A	87	0.46	8.6	A	96	0.60	509.4	E	708
SBL	0.39	10.8	B	69	0.50	27.2	D	84	SBL	0.12	4.7	A	58	0.15	4.6	A	61	0.16	4.9	A	61
Washington and Presumpscot St																					
Overall	106.5 F				88.1 F					71.8 E				36.0 D				100.0 F			
EBLTR	0.50	63.2	E	61	0.50	55.1	E	55	EBLTR	0.25	67.9	E	42	0.26	63.9	E	66	0.26	65.5	E	58
WBL	1.07	32.9	C	414	1.07	31.6	C	384	WBL	0.89	37.3	D	370	0.12	124.6	F	582	0.12	134.6	F	623
WBTR	0.03	23.7	C	89	0.03	18.6	B	89	WBTR	0.03	16.8	B	75	0.00	63.5	E	693	0.00	21.1	C	692
NBT	1.85	332.1	F	1277	1.85	360.4	F	1063	NBT	1.40	159.8	F	1026	0.79	12.7	B	219	0.78	32.4	C	237
NBR	0.25	31.2	C	1369	0.26	16.4	B	824	NBR	0.22	13.2	B	847	0.36	3.2	A	37	0.37	47.0	D	261
SBL	0.34	126.6	F	103	0.34	52.7	D	852	SBL	0.30	118.3	F	113	0.17	22.2	C	90	0.16	38.6	D	1051
SBTR	1.27	119.4	F	809	1.45	129.2	F	774	SBTR	1.19	106.9	F	774	0.51	15.1	B	261	0.58	157.1	F	989

	Short Term No Build				Short Term Build				Medium Term No Build				Medium Term Build				Long Term No Build			
	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*
Veranda and Washington Ave																				
Overall		30.8	C			37.5	D			30.8	C			54.9	D			37.3	D	
EBL	0.58	45.3	D	115	0.58	47.2	D	133	0.59	42.7	D	107	0.59	51.3	D	219	0.63	42.4	D	132
EBTR	0.94	56.6	E	257	1.03	60.3	E	298	0.97	50.3	D	253	1.08	72.4	E	353	1.02	56.4	E	282
WBL	0.65	47.1	D	126	0.82	51.6	D	151	0.66	48.5	D	129	0.85	56.6	E	150	0.68	50.4	D	136
WBTR	0.58	44.7	D	177	0.77	48.0	D	319	0.59	44.4	D	205	0.86	50.3	D	396	0.62	47.9	D	228
NBL	1.02	60.2	E	214	1.02	78.5	E	222	1.05	61.7	E	221	1.05	110.5	F	221	1.10	77.6	E	229
NBT	0.89	22.9	C	482	0.93	33.8	C	617	0.91	23.7	C	483	0.96	53.3	D	936	0.96	32.4	C	668
NBTR	0.90	19.9	B	444	0.94	27.9	C	581	0.92	19.6	B	440	0.98	47.8	D	909	0.97	27.3	C	636
SBL	0.23	54.3	D	115	0.41	70.2	E	135	0.24	57.9	E	125	0.56	118.8	F	153	0.25	60.0	E	118
SBT	0.68	29.6	C	371	0.72	29.4	C	365	0.70	30.0	C	379	0.77	47.1	D	657	0.74	33.4	C	447
SBTR	0.68	26.6	C	392	0.72	25.3	C	392	0.70	26.9	C	394	0.77	38.7	D	675	0.74	31.8	C	468
Driveway at Veranda and Sherwood St																				
Overall		0.0	A			9.9	A			0.0	A			11.6	B			9.3	A	
EBLTR	0.04	4.6	A	50	0.04	4.4	A	47	0.04	4.8	A	56	0.04	4.8	A	60	0.05	4.2	A	51
WBLTR	-	8.6	A	-	0.02	3.6	A	-	-	0.5	A	-	0.03	5.0	A	-	-	0.5	A	-
NBLTR	0.00	9.3	A	2	0.56	13.4	B	30	0.00	7.7	A	10	0.99	22.2	C	49	0.01	10.9	B	2
SBLTR	0.15	2.0	A	11	0.21	15.6	C	105	0.16	4.5	A	59	0.26	26.6	D	214	0.18	8.5	A	23
Bates and Baxter Blvd																				
Overall		1.9	A			2.6	A			1.8	A			3.1	A			2.1	A	
EBL	0.17	3.1	A	63	0.18	3.5	A	71	0.17	2.8	A	74	0.19	3.9	A	81	0.19	2.9	A	67
EBT	-	0.1	A	-	-	0.2	A	-	-	0.5	A	-	-	0.5	A	-	-	0.4	A	-
WBTR	-	0.7	A	5	-	0.8	A	8	-	0.7	A	7	-	1.0	A	6	-	0.8	A	10
SBL	0.26	10.7	B	67	0.43	13.1	B	78	0.29	9.4	A	62	0.56	12.2	B	22	0.32	12.0	B	69
Washington and Presumpscot St																				
Overall		17.3	B			21.8	C			16.5	B			17.5	B			27.9	C	
EBLTR	0.32	62.7	E	61	0.32	67.4	E	57	0.27	89.6	F	45	0.27	74.1	E	45	0.36	61.1	E	56
WBL	1.96	49.0	D	300	1.96	56.5	E	304	1.80	54.2	D	350	1.80	55.3	E	364	2.22	64.5	E	426
WBTR	0.03	25.6	C	102	0.03	31.6	C	110	0.03	34.4	C	107	0.03	33.4	C	96	0.03	41.9	D	112
NBT	0.93	12.4	B	250	0.98	38.6	D	601	0.91	10.5	B	234	0.98	32.6	C	287	1.01	43.7	D	756
NBR	0.41	5.6	A	86	0.42	6.1	A	298	0.41	5.1	A	97	0.42	5.3	A	74	0.46	7.9	A	459
SBL	0.19	32.9	C	85	0.28	36.0	D	98	0.15	38.9	D	55	0.21	43.7	D	67	0.20	44.0	D	89
SBTR	0.74	16.0	B	430	0.77	15.1	B	411	0.75	13.5	B	360	0.78	14.6	B	412	0.80	16.9	B	476

Control Delay: m: Volume for 95th percentile queue is metered by upstream signal

#: 95th %tile volume exceeds capacity, queue may be longer

^ Exceeds methodology limits

	Long Term Build				Long Term Existing Zoning					Medium Term Build w/Mitigation				Long Term Build with Mitigation				Long Term Existing Zoning with Mitigation			
	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*		v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*	v/c ⁺	Delay*	LOS*	Queue Length*
Veranda and Washington Ave																					
Overall		102.8	F			104.8	F				35.1	D			45.8	D			103.8	F	
EBL	0.54	51.6	D	298	0.63	58.8	E	274	EBL	0.52	41.1	D	92	0.55	41.6	D	128	0.65	110.0	F	176
EBTR	1.16	87.9	F	427	1.15	96.8	F	427	EBT	0.54	48.1	D	161	0.50	78.7	E	269	0.49	52.8	D	213
									EBR	0.77	13.4	B	104	0.68	16.2	B	146	0.68	16.1	B	119
WBL	0.84	63.1	E	147	1.27	83.1	F	156	WBL	0.57	64.7	E	156	0.62	67.8	E	154	1.23	168.4	F	178
WBTR	0.93	56.4	E	479	1.36	68.8	E	484	WBTR	0.93	71.4	E	487	0.94	62.1	E	519	1.36	238.3	F	452
NBL	1.10	231.8	F	232	1.10	234.0	F	226	NBL	0.77	74.7	E	311	0.81	87.8	F	324	0.81	183.9	F	339
NBT	1.02	150.0	F	1246	1.01	163.5	F	1206	NBT	0.75	30.3	C	584	0.83	49.2	D	896	0.83	169.9	F	1426
NBTR	1.05	143.3	F	1259	1.04	160.6	F	1209	NBR	0.37	9.2	A	239	0.44	28.6	C	365	0.43	109.2	F	440
SBL	1.05	136.4	F	152	1.15	155.2	F	271	SBL	0.63	57.0	E	211	0.53	57.4	E	220	0.55	62.1	E	239
SBT	0.88	59.9	E	790	0.89	37.7	D	561	SBT	0.80	26.9	C	351	0.87	33.3	C	460	0.88	35.8	D	486
SBTR	0.88	57.8	E	804	0.89	37.7	D	580	SBR	0.80	25.6	C	360	0.88	30.6	C	474	0.89	33.5	C	497
Driveway at Veranda and Sherwood St																					
Overall		13.6	B			105.7	F				13.1	B			52.1	D			230.8	F	
EBLTR	0.05	5.2	A	67	0.89	77.4	E	457	EBLTR	0.04	5.6	A	82	0.92	58.5	E	472	0.89	61.8	E	441
WBLTR	0.04	5.4	A	-	0.63	81.2	F	401	WBLTR	0.03	7.4	A	82	0.66	65.9	E	424	0.63	415.7	F	816
NBLTR	1.68	184.4	E	77	1.29	178.5	F	734	NBL	0.79	43.2	E	374	0.43	74.4	E	647	0.80	586.4	F	729
									NBT	0.20	27.6	D	159	0.26	49.5	D	276	0.50	464.1	F	308
SBLTR	0.35	181.9	E	885	0.80	64.4	E	142	SBLTR	0.26	19.1	C	67	0.77	63.9	E	125	0.77	180.9	F	368
Bates and Baxter Blvd																					
Overall		3.5	A			6.5	A				6.4	A			10.7	B			7.7	A	
EBL	0.20	4.0	A	90	0.20	10.5	B	120	EBL	0.37	5.5	A	82	0.40	10.1	B	111	0.42	7.7	A	105
EBT	-	0.6	A	-	-	0.6	A		EBT	0.39	6.4	A	88	0.43	6.7	A	97	0.45	6.5	A	92
WBTR	-	1.2	A	27	-	3.7	A	109	WBTR	0.42	8.6	A	90	0.46	19.6	C	231	0.49	10.7	B	137
SBL	0.78	14.0	B	95	1.16	16.3	C	114	SBL	0.20	5.2	A	72	0.26	5.4	A	72	0.39	5.3	A	70
Washington and Presumpscot St																					
Overall		23.8	C			27.4	C				24.3	C			30.7	C			88.6	F	
EBLTR	0.36	63.6	E	56	0.36	66.5	E	61	EBLTR	0.27	64.8	E	50	0.25	61.0	E	56	0.25	60.4	E	57
WBL	2.22	59.3	E	402	2.22	52.9	D	387	WBL	1.61	58.4	E	307	0.12	72.5	E	459	0.12	61.1	E	396
WBTR	0.03	38.5	D	105	0.03	64.0	E	117	WBTR	0.03	32.2	C	107	0.00	56.8	E	138	0.00	21.7	C	72
NBT	1.13	37.8	D	599	1.23	67.3	E	822	NBT	1.04	30.2	C	851	1.15	44.1	D	1096	1.23	68.2	E	1192
NBR	0.48	6.7	A	369	0.49	6.7	A	590	NBR	0.45	7.3	A	556	1.08	8.6	A	882	1.12	377.3	F	1096
SBL	0.20	39.6	D	73	0.20	34.0	C	33	SBL	0.18	52.5	D	73	0.20	39.6	D	64	0.23	42.0	D	42
SBTR	0.84	17.9	B	501	0.84	17.7	B	443	SBTR	0.81	16.9	B	448	0.45	11.4	B	228	0.45	12.2	B	248

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.3	0.4	1.0	0.1	0.2	2.5	0.3	0.3	0.4	0.0	0.0
Total Del/Veh (s)	53.2	53.4	30.4	48.7	47.1	25.7	56.5	15.3	9.8	59.4	19.4	17.5

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	24.4

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	121.5	116.1	115.0	0.0	0.0	0.0	2.5	0.7	1.1
Total Del/Veh (s)	57.6	61.7	10.6	69.2	76.2	45.3	31.9	16.4	3.9	24.7	18.2	14.9

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	28.4
Total Del/Veh (s)	27.6

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.2
Total Del/Veh (s)	0.3	0.6	2.2	0.8

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.0	0.1
Total Del/Veh (s)	2.9	0.1	0.6	0.3	8.6	1.8

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.3	2.5	0.9	1.9	1.2

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1
Total Del/Veh (s)	4.0	1.7	1.5	0.5	0.2	4.5	5.2	7.3	4.0	2.2

Total Network Performance

Denied Del/Veh (s)	18.1
Total Del/Veh (s)	39.4

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	182	261	124	251	184	274	221	124	376	412
Average Queue (ft)	55	117	86	94	86	154	128	42	249	266
95th Queue (ft)	122	214	144	193	163	243	214	103	347	367
Link Distance (ft)		364		425		1100	1100		1015	1015
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		1	16	8	1	6		0	23	
Queuing Penalty (veh)		0	20	11	2	6		1	8	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	69	289	100	370	85	174	519
Average Queue (ft)	22	268	31	138	27	24	261
95th Queue (ft)	55	284	95	274	63	97	463
Link Distance (ft)	607	252		1015	1015		1160
Upstream Blk Time (%)		67					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		73	0			0	17
Queuing Penalty (veh)		30	0			0	5

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	74
Average Queue (ft)	26
95th Queue (ft)	61
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	71	9	78
Average Queue (ft)	28	0	35
95th Queue (ft)	57	4	66
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement			
Directions Served			
Maximum Queue (ft)			
Average Queue (ft)			
95th Queue (ft)			
Link Distance (ft)			
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	79	3	24	68
Average Queue (ft)	11	0	2	35
95th Queue (ft)	48	2	15	58
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 84

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	46	164	138	72	51	103	669	74	36	1230	72
Future Volume (veh/h)	67	46	164	138	72	51	103	669	74	36	1230	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	50	178	150	78	55	112	727	80	39	1337	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	56	199	180	184	129	303	1453	160	229	1394	81
Arrive On Green	0.04	0.16	0.16	0.07	0.18	0.18	0.17	0.45	0.45	0.13	0.41	0.41
Sat Flow, veh/h	1781	360	1280	1781	1021	720	1781	3228	355	1781	3413	199
Grp Volume(v), veh/h	73	0	228	150	0	133	112	400	407	39	695	720
Grp Sat Flow(s),veh/h/ln	1781	0	1640	1781	0	1741	1781	1777	1806	1781	1777	1835
Q Serve(g_s), s	4.5	0.0	16.4	5.7	0.0	8.1	6.7	19.2	19.2	2.3	45.6	45.9
Cycle Q Clear(g_c), s	4.5	0.0	16.4	5.7	0.0	8.1	6.7	19.2	19.2	2.3	45.6	45.9
Prop In Lane	1.00		0.78	1.00		0.41	1.00		0.20	1.00		0.11
Lane Grp Cap(c), veh/h	134	0	254	180	0	313	303	800	813	229	726	749
V/C Ratio(X)	0.54	0.00	0.90	0.83	0.00	0.42	0.37	0.50	0.50	0.17	0.96	0.96
Avail Cap(c_a), veh/h	134	0	287	285	0	450	303	800	813	229	726	749
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.55	0.55	0.55
Uniform Delay (d), s/veh	48.6	0.0	49.7	53.8	0.0	43.7	44.1	23.4	23.4	46.6	34.5	34.6
Incr Delay (d2), s/veh	4.5	0.0	26.4	11.0	0.0	0.9	3.4	2.2	2.2	0.9	16.5	16.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	8.6	5.0	0.0	3.6	3.2	8.5	8.6	1.1	22.5	23.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.1	0.0	76.1	64.8	0.0	44.6	47.5	25.7	25.6	47.5	51.0	51.3
LnGrp LOS	D	A	E	E	A	D	D	C	C	D	D	D
Approach Vol, veh/h	301			283			919			1454		
Approach Delay, s/veh	70.6			55.3			28.3			51.1		
Approach LOS	E			E			C			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.4	55.0	11.0	27.6	21.4	60.0	14.0	24.6				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+l1), s	8.7	47.9	6.5	10.1	4.3	21.2	7.7	18.4				
Green Ext Time (p_c), s	0.1	0.8	0.0	0.5	0.0	4.1	0.3	0.2				
Intersection Summary												
HCM 6th Ctrl Delay	46.4											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	425	5	41	2	543	236	31	769	5
Future Volume (vph)	10	5	10	425	5	41	2	543	236	31	769	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1725			1775	1583		1862	1583	1770	1861	
Flt Permitted		0.67			0.41	1.00		1.00	1.00	0.23	1.00	
Satd. Flow (perm)		1174			764	1583		1859	1583	428	1861	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	462	5	45	2	590	257	34	836	5
RTOR Reduction (vph)	0	11	0	0	0	34	0	0	114	0	0	0
Lane Group Flow (vph)	0	16	0	0	467	11	0	592	143	34	841	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		5.0			29.0	29.0		57.7	57.7	68.0	68.0	
Effective Green, g (s)		5.0			29.0	29.0		57.7	57.7	68.0	68.0	
Actuated g/C Ratio		0.04			0.24	0.24		0.48	0.48	0.57	0.57	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		48			184	382		893	761	290	1054	
v/s Ratio Prot										0.00	c0.45	
v/s Ratio Perm		c0.01			c0.61	0.01		0.32	0.09	0.06		
v/c Ratio		0.34			2.54	0.03		0.66	0.19	0.12	0.80	
Uniform Delay, d1		55.9			45.5	34.7		23.7	17.8	15.5	20.6	
Progression Factor		1.00			1.00	1.00		0.67	0.21	1.00	1.00	
Incremental Delay, d2		4.2			707.9	0.1		3.6	0.5	0.2	6.3	
Delay (s)		60.1			753.4	34.9		19.5	4.2	15.7	26.9	
Level of Service		E			F	C		B	A	B	C	
Approach Delay (s)		60.1			690.3			14.9			26.4	
Approach LOS		E			F			B			C	
Intersection Summary												
HCM 2000 Control Delay		172.7										
HCM 2000 Volume to Capacity ratio		1.35										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		81.3%										
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	164	210	200	51	61	0
Future Vol, veh/h	164	210	200	51	61	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	178	228	217	55	66	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	272	0	-	0	829	-
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	584	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1291	-	-	-	340	0
Stage 1	-	-	-	-	796	0
Stage 2	-	-	-	-	557	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1291	-	-	-	293	-
Mov Cap-2 Maneuver	-	-	-	-	293	-
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	557	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.6	0		20.8		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1291	-	-	-	293	
HCM Lane V/C Ratio	0.138	-	-	-	0.226	
HCM Control Delay (s)	8.2	-	-	-	20.8	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9	

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	43	138	15	0	138	31	1	1	0	36	0	61
Future Vol, veh/h	43	138	15	0	138	31	1	1	0	36	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	150	16	0	150	34	1	1	0	39	0	66
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	184	0	0	166	0	0	452	436	158	420	427	167
Stage 1	-	-	-	-	-	-	252	252	-	167	167	-
Stage 2	-	-	-	-	-	-	200	184	-	253	260	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1391	-	-	1412	-	-	518	514	887	544	520	877
Stage 1	-	-	-	-	-	-	752	698	-	835	760	-
Stage 2	-	-	-	-	-	-	802	747	-	751	693	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1391	-	-	1412	-	-	465	495	887	528	501	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	465	495	-	528	501	-
Stage 1	-	-	-	-	-	-	724	672	-	804	760	-
Stage 2	-	-	-	-	-	-	741	747	-	722	667	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			12.5			11		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	480	1391	-	-	1412	-	-	704				
HCM Lane V/C Ratio	0.005	0.034	-	-	-	-	-	0.15				
HCM Control Delay (s)	12.5	7.7	0	-	0	-	-	11				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.3	1.1	1.0	1.3	0.1	0.6	2.4	0.3	0.3	0.5	0.0	0.1
Total Del/Veh (s)	48.0	59.8	38.5	53.0	48.7	26.2	49.3	20.9	12.6	65.8	33.6	35.4

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	33.5

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	1.9	1.9	4.3	0.0	0.0	0.0	92.9	86.1	100.7
Total Del/Veh (s)	54.5	64.6	13.5	28.0	24.2	16.7	127.7	59.1	8.6	151.0	134.5	107.2

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	34.4
Total Del/Veh (s)	76.0

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWT	SWR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.0	0.2
Total Del/Veh (s)	0.3	0.6	0.4	2.1	0.8

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.3	0.0	0.1
Total Del/Veh (s)	3.4	0.1	0.9	0.5	9.3	1.9

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	0.4	2.0	1.0	1.8	1.1

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.0	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1
Total Del/Veh (s)	4.2	2.7	1.6	4.8	1.5	0.9	8.1	9.7	4.0	8.5	10.3	6.1

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	3.4

Total Network Performance

Denied Del/Veh (s)	21.1
Total Del/Veh (s)	75.4

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	182	304	125	307	185	346	330	125	480	489
Average Queue (ft)	56	151	96	113	80	182	171	63	286	308
95th Queue (ft)	133	267	147	248	168	303	296	131	420	452
Link Distance (ft)		364		425		1100	1100		1015	1015
Upstream Blk Time (%)		0		1						
Queuing Penalty (veh)		0		2						
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	23	9	0	11		3	43	
Queuing Penalty (veh)		2	34	14	1	11		17	28	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	72	275	100	737	548	174	1171
Average Queue (ft)	21	205	29	359	109	25	1032
95th Queue (ft)	55	311	93	783	483	103	1456
Link Distance (ft)	607	252		1015	1015		1160
Upstream Blk Time (%)		8		2	1		50
Queuing Penalty (veh)		0		6	3		0
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		36	0				54
Queuing Penalty (veh)		15	1				17

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	82
Average Queue (ft)	23
95th Queue (ft)	58
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	72	12	76
Average Queue (ft)	31	1	33
95th Queue (ft)	62	7	66
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	5
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	96
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	78	76	60	84
Average Queue (ft)	11	10	31	38
95th Queue (ft)	47	42	52	66
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 152

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	77	164	153	83	62	103	669	135	65	1230	72
Future Volume (veh/h)	67	77	164	153	83	62	103	669	135	65	1230	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	84	178	166	90	67	112	727	147	71	1337	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	136	92	194	196	205	153	163	1325	268	182	1571	91
Arrive On Green	0.04	0.17	0.17	0.08	0.21	0.21	0.09	0.45	0.45	0.10	0.46	0.46
Sat Flow, veh/h	1781	534	1132	1781	996	741	1781	2945	595	1781	3413	199
Grp Volume(v), veh/h	73	0	262	166	0	157	112	439	435	71	695	720
Grp Sat Flow(s),veh/h/ln	1781	0	1667	1781	0	1737	1781	1777	1763	1781	1777	1835
Q Serve(g_s), s	4.4	0.0	18.5	6.9	0.0	9.5	7.3	21.6	21.6	4.5	41.6	41.9
Cycle Q Clear(g_c), s	4.4	0.0	18.5	6.9	0.0	9.5	7.3	21.6	21.6	4.5	41.6	41.9
Prop In Lane	1.00		0.68	1.00		0.43	1.00		0.34	1.00		0.11
Lane Grp Cap(c), veh/h	136	0	286	196	0	358	163	800	793	182	818	845
V/C Ratio(X)	0.54	0.00	0.92	0.84	0.00	0.44	0.69	0.55	0.55	0.39	0.85	0.85
Avail Cap(c_a), veh/h	136	0	292	283	0	449	163	800	793	182	818	845
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	47.0	0.0	48.8	53.1	0.0	41.6	52.8	24.1	24.1	50.4	28.7	28.8
Incr Delay (d2), s/veh	4.2	0.0	31.4	14.5	0.0	0.8	21.0	2.7	2.7	0.6	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	10.2	5.7	0.0	4.2	4.2	9.6	9.5	2.0	17.5	18.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.2	0.0	80.3	67.6	0.0	42.4	73.8	26.8	26.8	51.0	29.8	29.9
LnGrp LOS	D	A	F	E	A	D	E	C	C	D	C	C
Approach Vol, veh/h	335			323			986			1486		
Approach Delay, s/veh	74.0			55.4			32.1			30.8		
Approach LOS	E			E			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	61.2	11.0	30.8	18.2	60.0	15.2	26.6				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	9.3	43.9	6.4	11.5	6.5	23.6	8.9	20.5				
Green Ext Time (p_c), s	0.1	3.2	0.0	0.6	0.0	4.5	0.3	0.1				
Intersection Summary												
HCM 6th Ctrl Delay	38.4											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	425	5	41	2	555	236	31	798	5
Future Volume (vph)	10	5	10	425	5	41	2	555	236	31	798	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1725			1775	1583		1862	1583	1770	1861	
Flt Permitted		0.39			0.71	1.00		0.71	1.00	0.08	1.00	
Satd. Flow (perm)		679			1320	1583		1324	1583	157	1861	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	462	5	45	2	603	257	34	867	5
RTOR Reduction (vph)	0	10	0	0	0	28	0	0	141	0	0	0
Lane Group Flow (vph)	0	17	0	0	467	17	0	605	116	34	872	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		7.3			44.1	44.1		41.6	41.6	50.6	50.6	
Effective Green, g (s)		7.3			44.1	44.1		41.6	41.6	50.6	50.6	
Actuated g/C Ratio		0.06			0.37	0.37		0.35	0.35	0.42	0.42	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		41			485	581		458	548	106	784	
v/s Ratio Prot										0.01	c0.47	
v/s Ratio Perm		c0.02			c0.35	0.01		c0.46	0.07	0.13		
v/c Ratio		0.41			0.96	0.03		1.32	0.21	0.32	1.11	
Uniform Delay, d1		54.3			37.1	24.3		39.2	27.6	27.3	34.7	
Progression Factor		1.00			1.00	1.00		0.68	0.68	1.00	1.00	
Incremental Delay, d2		6.5			32.6	0.1		157.7	0.8	1.8	67.5	
Delay (s)		60.7			69.8	24.3		184.4	19.6	29.0	102.2	
Level of Service		E			E	C		F	B	C	F	
Approach Delay (s)		60.7			65.8			135.3			99.5	
Approach LOS		E			E			F			F	
Intersection Summary												
HCM 2000 Control Delay		104.9										
HCM 2000 Volume to Capacity ratio		1.12										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		82.8%										
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	172	210	200	74	65	0
Future Vol, veh/h	172	210	200	74	65	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	228	217	80	71	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	297	0	-	0	859	-
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	602	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1264	-	-	-	327	0
Stage 1	-	-	-	-	786	0
Stage 2	-	-	-	-	547	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1264	-	-	-	279	-
Mov Cap-2 Maneuver	-	-	-	-	279	-
Stage 1	-	-	-	-	670	-
Stage 2	-	-	-	-	547	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		22.2		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1264	-	-	-	279	
HCM Lane V/C Ratio	0.148	-	-	-	0.253	
HCM Control Delay (s)	8.3	-	-	-	22.2	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	1	

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	138	136	26	138	31	39	3	19	36	6	61
Future Vol, veh/h	43	138	136	26	138	31	39	3	19	36	6	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	150	148	28	150	34	42	3	21	39	7	66
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	184	0	0	298	0	0	578	558	224	553	615	167
Stage 1	-	-	-	-	-	-	318	318	-	223	223	-
Stage 2	-	-	-	-	-	-	260	240	-	330	392	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1391	-	-	1263	-	-	427	438	815	444	407	877
Stage 1	-	-	-	-	-	-	693	654	-	780	719	-
Stage 2	-	-	-	-	-	-	745	707	-	683	606	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1391	-	-	1263	-	-	370	410	815	409	381	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	370	410	-	409	381	-
Stage 1	-	-	-	-	-	-	665	627	-	748	701	-
Stage 2	-	-	-	-	-	-	665	689	-	635	581	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			1.1			14.4			12.5		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	448	1391	-	-	1263	-	-	594				
HCM Lane V/C Ratio	0.148	0.034	-	-	0.022	-	-	0.188				
HCM Control Delay (s)	14.4	7.7	0	-	7.9	0	-	12.5				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0.1	-	-	0.7				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.4	0.6	1.4	0.0	0.0	0.0	2.2	0.5	0.5	0.4	0.0	0.1
Total Del/Veh (s)	45.3	56.6	35.8	47.1	44.7	30.7	60.2	22.9	19.9	54.3	29.6	26.6

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	30.8

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	1.8	1.9	4.2	0.0	0.0	0.0	2.7	0.7	0.6
Total Del/Veh (s)	62.2	62.7	18.2	49.0	46.3	25.6	11.4	12.4	5.6	32.9	16.0	12.2

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	17.3

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.2
Total Del/Veh (s)	0.4	0.7	2.3	1.0

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.0	0.1
Total Del/Veh (s)	3.1	0.1	0.7	0.4	10.7	1.9

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	2.5	1.3	2.0	1.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.1	0.1	0.2	0.1
Total Del/Veh (s)	4.6	1.4	0.5	0.3	8.6	9.3	4.8	2.0

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	39.5

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	141	286	125	201	185	540	505	125	398	424
Average Queue (ft)	52	151	66	99	124	306	281	52	260	284
95th Queue (ft)	115	257	126	177	214	482	444	115	371	392
Link Distance (ft)		364		425		1100	1100		1015	1015
Upstream Blk Time (%)		0								
Queuing Penalty (veh)		1								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		2	4	14	7	20		1	37	
Queuing Penalty (veh)		2	6	11	38	31		4	19	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	82	291	100	296	118	172	446
Average Queue (ft)	23	193	38	126	37	19	248
95th Queue (ft)	61	300	102	250	86	85	430
Link Distance (ft)	607	252		1015	1015		1160
Upstream Blk Time (%)		7					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		46	0				14
Queuing Penalty (veh)		21	1				3

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	93
Average Queue (ft)	31
95th Queue (ft)	71
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	66	13	80
Average Queue (ft)	32	0	36
95th Queue (ft)	63	5	67
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	14
Average Queue (ft)	0
95th Queue (ft)	10
Link Distance (ft)	96
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	68	3	18	73
Average Queue (ft)	15	0	1	35
95th Queue (ft)	50	2	11	63
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 137

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	97	159	77	99	62	154	1133	185	51	1026	92
Future Volume (veh/h)	72	97	159	77	99	62	154	1133	185	51	1026	92
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	105	173	84	108	67	167	1232	201	55	1115	100
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	111	183	130	186	116	163	1378	223	242	1630	146
Arrive On Green	0.04	0.17	0.17	0.04	0.17	0.17	0.09	0.45	0.45	0.14	0.49	0.49
Sat Flow, veh/h	1781	635	1047	1781	1080	670	1781	3061	496	1781	3298	296
Grp Volume(v), veh/h	78	0	278	84	0	175	167	712	721	55	600	615
Grp Sat Flow(s),veh/h/ln	1781	0	1682	1781	0	1750	1781	1777	1781	1781	1777	1817
Q Serve(g_s), s	4.7	0.0	19.6	1.5	0.0	11.0	11.0	44.1	44.9	3.3	31.0	31.0
Cycle Q Clear(g_c), s	4.7	0.0	19.6	1.5	0.0	11.0	11.0	44.1	44.9	3.3	31.0	31.0
Prop In Lane	1.00		0.62	1.00		0.38	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	294	130	0	302	163	800	801	242	878	898
V/C Ratio(X)	0.58	0.00	0.94	0.65	0.00	0.58	1.02	0.89	0.90	0.23	0.68	0.68
Avail Cap(c_a), veh/h	134	0	294	283	0	452	163	800	801	242	878	898
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.62	0.62	0.62
Uniform Delay (d), s/veh	46.8	0.0	48.9	55.6	0.0	45.7	54.5	30.3	30.5	46.2	23.2	23.2
Incr Delay (d2), s/veh	6.2	0.0	37.8	5.3	0.0	1.8	76.5	14.2	15.1	1.4	2.7	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	11.3	2.7	0.0	5.0	8.4	21.5	22.1	1.6	13.3	13.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.0	0.0	86.7	60.9	0.0	47.4	131.0	44.5	45.6	47.6	25.9	25.8
LnGrp LOS	D	A	F	E	A	D	F	D	D	D	C	C
Approach Vol, veh/h	356			259			1600			1270		
Approach Delay, s/veh	79.3			51.8			54.0			26.8		
Approach LOS	E			D			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	65.3	11.0	26.7	22.3	60.0	10.7	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	13.0	33.0	6.7	13.0	5.3	46.9	3.5	21.6				
Green Ext Time (p_c), s	0.0	5.8	0.0	0.6	0.0	4.2	0.2	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	46.5											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	5	10	282	5	46	2	820	436	21	748	15
Future Volume (vph)	10	5	10	282	5	46	2	820	436	21	748	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1725			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.73			0.41	1.00		1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1286			767	1583		1861	1583	109	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	307	5	50	2	891	474	23	813	16
RTOR Reduction (vph)	0	11	0	0	0	40	0	0	137	0	0	0
Lane Group Flow (vph)	0	16	0	0	312	10	0	893	337	23	829	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.9			25.0	25.0		62.1	62.1	72.1	72.1	
Effective Green, g (s)		4.9			25.0	25.0		62.1	62.1	72.1	72.1	
Actuated g/C Ratio		0.04			0.21	0.21		0.52	0.52	0.60	0.60	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		52			159	329		963	819	120	1115	
v/s Ratio Prot										0.01	c0.45	
v/s Ratio Perm		c0.01			c0.41	0.01		c0.48	0.21	0.11		
v/c Ratio		0.32			1.96	0.03		0.93	0.41	0.19	0.74	
Uniform Delay, d1		55.9			47.5	37.9		26.9	17.7	23.7	17.3	
Progression Factor		1.00			1.00	1.00		0.40	0.05	1.00	1.00	
Incremental Delay, d2		3.5			455.0	0.2		12.1	1.1	0.8	4.5	
Delay (s)		59.4			502.5	38.0		22.7	1.9	24.5	21.8	
Level of Service		E			F	D		C	A	C	C	
Approach Delay (s)		59.4			438.3			15.5			21.8	
Approach LOS		E			F			B			C	
Intersection Summary												
HCM 2000 Control Delay		76.7			HCM 2000 Level of Service				E			
HCM 2000 Volume to Capacity ratio		1.18										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		86.4%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	200	246	205	51	58	0
Future Vol, veh/h	200	246	205	51	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	217	267	223	55	63	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	278	0	-	0	952	-
Stage 1	-	-	-	-	251	-
Stage 2	-	-	-	-	701	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1285	-	-	-	288	0
Stage 1	-	-	-	-	791	0
Stage 2	-	-	-	-	492	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1285	-	-	-	239	-
Mov Cap-2 Maneuver	-	-	-	-	239	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	492	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		25.4		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1285	-	-	-	239	
HCM Lane V/C Ratio	0.169	-	-	-	0.264	
HCM Control Delay (s)	8.4	-	-	-	25.4	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.6	-	-	-	1	

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	179	0	0	195	26	1	0	0	41	0	38
Future Vol, veh/h	51	179	0	0	195	26	1	0	0	41	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	195	0	0	212	28	1	0	0	45	0	41
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	240	0	0	195	0	0	552	545	195	531	531	226
Stage 1	-	-	-	-	-	-	305	305	-	226	226	-
Stage 2	-	-	-	-	-	-	247	240	-	305	305	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1327	-	-	1378	-	-	444	446	846	459	454	813
Stage 1	-	-	-	-	-	-	705	662	-	777	717	-
Stage 2	-	-	-	-	-	-	757	707	-	705	662	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1327	-	-	1378	-	-	407	425	846	443	433	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	407	425	-	443	433	-
Stage 1	-	-	-	-	-	-	673	632	-	741	717	-
Stage 2	-	-	-	-	-	-	719	707	-	673	632	-
Approach	EB		WB				NB		SB			
HCM Control Delay, s	1.7		0				13.9		12.5			
HCM LOS							B		B			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	407	1327	-	-	1378	-	-	567				
HCM Lane V/C Ratio	0.003	0.042	-	-	-	-	-	0.151				
HCM Control Delay (s)	13.9	7.8	0	-	0	-	-	12.5				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.1	2.4	2.1	0.1	0.0	0.0	2.0	0.5	0.5	0.4	0.0	0.1
Total Del/Veh (s)	47.2	60.3	43.2	51.6	48.0	34.3	78.5	33.8	27.9	70.2	29.4	25.3

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	37.5

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	3.2	1.5	6.1	0.0	0.0	0.0	2.9	0.8	0.8
Total Del/Veh (s)	67.4	51.0	15.6	51.6	56.5	31.6	38.6	24.0	6.1	36.0	15.1	13.5

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	21.8

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.3	0.0	0.0	0.2
Total Del/Veh (s)	0.4	0.7	2.7	1.1

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.0	0.1
Total Del/Veh (s)	3.5	0.2	0.8	0.4	13.1	2.6

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	0.5	2.9	1.5	2.2	1.5

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1
Total Del/Veh (s)	4.4	1.9	1.5	3.6	0.8	0.5	13.4	15.6	7.7	9.9	15.3	6.3

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	4.5

Total Network Performance

Denied Del/Veh (s)	1.0
Total Del/Veh (s)	47.2

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	157	312	125	374	185	660	608	125	416	438
Average Queue (ft)	57	177	92	171	138	392	366	72	263	282
95th Queue (ft)	133	298	151	319	222	617	581	135	365	392
Link Distance (ft)		364		425		1100	1100		1015	1015
Upstream Blk Time (%)				0						
Queuing Penalty (veh)				1						
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	13	26	7	30		5	36	
Queuing Penalty (veh)		2	31	34	40	46		26	27	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	74	272	100	754	447	174	431
Average Queue (ft)	23	196	43	243	71	25	233
95th Queue (ft)	57	304	110	601	298	98	411
Link Distance (ft)	607	252		1015	1015		1160
Upstream Blk Time (%)		10		0	0		
Queuing Penalty (veh)		0		1	0		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		47	1			0	12
Queuing Penalty (veh)		22	2			0	4

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	101
Average Queue (ft)	36
95th Queue (ft)	76
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	95	18	96
Average Queue (ft)	39	1	45
95th Queue (ft)	71	8	78
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			1
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	SW
Directions Served	LR
Maximum Queue (ft)	23
Average Queue (ft)	1
95th Queue (ft)	16
Link Distance (ft)	364
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	69	45	128	89
Average Queue (ft)	13	7	62	40
95th Queue (ft)	47	30	105	70
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 237

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	123	159	129	141	101	154	1133	236	75	1026	92
Future Volume (veh/h)	72	123	159	129	141	101	154	1133	236	75	1026	92
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	134	173	140	153	110	167	1232	257	82	1115	100
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	130	167	170	198	142	163	1320	273	201	1555	139
Arrive On Green	0.04	0.17	0.17	0.06	0.20	0.20	0.09	0.45	0.45	0.11	0.47	0.47
Sat Flow, veh/h	1781	741	957	1781	1012	728	1781	2933	606	1781	3298	296
Grp Volume(v), veh/h	78	0	307	140	0	263	167	742	747	82	600	615
Grp Sat Flow(s),veh/h/ln	1781	0	1698	1781	0	1739	1781	1777	1761	1781	1777	1817
Q Serve(g_s), s	4.7	0.0	21.0	5.2	0.0	17.2	11.0	47.3	48.6	5.1	32.3	32.4
Cycle Q Clear(g_c), s	4.7	0.0	21.0	5.2	0.0	17.2	11.0	47.3	48.6	5.1	32.3	32.4
Prop In Lane	1.00		0.56	1.00		0.42	1.00		0.34	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	297	170	0	340	163	800	793	201	838	857
V/C Ratio(X)	0.58	0.00	1.03	0.82	0.00	0.77	1.02	0.93	0.94	0.41	0.72	0.72
Avail Cap(c_a), veh/h	134	0	297	283	0	449	163	800	793	201	838	857
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.59	0.59	0.59
Uniform Delay (d), s/veh	46.8	0.0	49.5	54.1	0.0	45.8	54.5	31.2	31.5	49.5	25.3	25.3
Incr Delay (d2), s/veh	6.2	0.0	61.0	9.5	0.0	6.0	76.5	18.4	20.8	3.6	3.1	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	13.9	4.6	0.0	8.0	8.4	23.7	24.6	2.5	14.1	14.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.0	0.0	110.5	63.6	0.0	51.8	131.0	49.6	52.3	53.0	28.4	28.4
LnGrp LOS	D	A	F	E	A	D	F	D	D	D	C	C
Approach Vol, veh/h		385			403			1656			1297	
Approach Delay, s/veh		98.9			55.9			59.0			30.0	
Approach LOS		F			E			E			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	62.6	11.0	29.4	19.6	60.0	13.4	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	13.0	34.4	6.7	19.2	7.1	50.6	7.2	23.0				
Green Ext Time (p_c), s	0.0	5.5	0.0	0.9	0.0	2.3	0.3	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			52.7									
HCM 6th LOS			D									

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Short Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔	↔	↔	↔	
Traffic Volume (vph)	10	5	10	282	5	46	2	860	436	32	773	15
Future Volume (vph)	10	5	10	282	5	46	2	860	436	32	773	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1725			1775	1583		1863	1583	1770	1858	
Flt Permitted		0.73			0.41	1.00		1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1286			767	1583		1861	1583	110	1858	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	5	11	307	5	50	2	935	474	35	840	16
RTOR Reduction (vph)	0	11	0	0	0	40	0	0	131	0	0	0
Lane Group Flow (vph)	0	16	0	0	312	10	0	937	343	35	856	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.9			25.0	25.0		61.8	61.8	72.1	72.1	
Effective Green, g (s)		4.9			25.0	25.0		61.8	61.8	72.1	72.1	
Actuated g/C Ratio		0.04			0.21	0.21		0.51	0.51	0.60	0.60	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		52			159	329		958	815	125	1116	
v/s Ratio Prot										0.01	c0.46	
v/s Ratio Perm		c0.01			c0.41	0.01		c0.50	0.22	0.16		
v/c Ratio		0.32			1.96	0.03		0.98	0.42	0.28	0.77	
Uniform Delay, d1		55.9			47.5	37.9		28.4	18.0	26.8	17.7	
Progression Factor		1.00			1.00	1.00		0.42	0.18	1.00	1.00	
Incremental Delay, d2		3.5			455.0	0.2		17.3	0.9	1.2	5.1	
Delay (s)		59.4			502.5	38.0		29.2	4.1	28.0	22.8	
Level of Service		E			F	D		C	A	C	C	
Approach Delay (s)		59.4			438.3			20.8			23.0	
Approach LOS		E			F			C			C	
Intersection Summary												
HCM 2000 Control Delay			78.1				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.22									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			87.8%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	206	246	205	70	90	0
Future Vol, veh/h	206	246	205	70	90	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	224	267	223	76	98	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	299	0	-	0	976	-
Stage 1	-	-	-	-	261	-
Stage 2	-	-	-	-	715	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1262	-	-	-	279	0
Stage 1	-	-	-	-	783	0
Stage 2	-	-	-	-	485	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1262	-	-	-	230	-
Mov Cap-2 Maneuver	-	-	-	-	230	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	485	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.9	0		31.8		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1262	-	-	-	230	
HCM Lane V/C Ratio	0.177	-	-	-	0.425	
HCM Control Delay (s)	8.5	-	-	-	31.8	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.6	-	-	-	2	

Intersection												
Int Delay, s/veh	8.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	179	101	22	195	26	135	9	67	41	5	38
Future Vol, veh/h	51	179	101	22	195	26	135	9	67	41	5	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	195	110	24	212	28	147	10	73	45	5	41
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	240	0	0	305	0	0	657	648	250	676	689	226
Stage 1	-	-	-	-	-	-	360	360	-	274	274	-
Stage 2	-	-	-	-	-	-	297	288	-	402	415	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1327	-	-	1256	-	-	378	389	789	367	369	813
Stage 1	-	-	-	-	-	-	658	626	-	732	683	-
Stage 2	-	-	-	-	-	-	712	674	-	625	592	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1327	-	-	1256	-	-	335	361	789	308	342	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	335	361	-	308	342	-
Stage 1	-	-	-	-	-	-	624	594	-	695	668	-
Stage 2	-	-	-	-	-	-	656	659	-	530	562	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.2			0.7			24.3			15.6		
HCM LOS							C			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	411	1327	-	-	1256	-	-	432				
HCM Lane V/C Ratio	0.558	0.042	-	-	0.019	-	-	0.211				
HCM Control Delay (s)	24.3	7.8	0	-	7.9	0	-	15.6				
HCM Lane LOS	C	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	3.3	0.1	-	-	0.1	-	-	0.8				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.8	0.4	1.1	0.1	0.1	2.6	0.3	0.3	0.4	0.0	0.1
Total Del/Veh (s)	38.5	52.4	30.7	38.9	42.5	23.3	48.4	18.6	13.4	56.3	34.5	32.0

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	31.2

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	28.7	24.3	25.2	0.0	0.0	0.0	2.9	0.8	0.5
Total Del/Veh (s)	60.6	57.1	13.0	103.1	139.9	72.5	19.6	8.0	3.4	22.9	15.4	16.3

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	6.7
Total Del/Veh (s)	31.3

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.2	0.5	2.1	0.9

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.2	0.0	0.1
Total Del/Veh (s)	2.8	0.4	0.7	0.4	9.3	1.8

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	2.3	1.3	1.9	1.2

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	3.7	1.5	1.0	0.5	0.2	2.5	6.7	7.7	4.1	2.1

Total Network Performance

Denied Del/Veh (s)	4.4
Total Del/Veh (s)	47.2

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	124	254	124	242	184	298	289	125	476	497
Average Queue (ft)	46	118	87	87	79	164	147	38	315	346
95th Queue (ft)	98	213	136	178	167	261	251	104	443	477
Link Distance (ft)		364		424		1102	1102		1015	1015
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		0	11	7	0	8		0	44	
Queuing Penalty (veh)		0	13	9	1	9		1	16	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	43	519	100	213	44	174	470
Average Queue (ft)	12	426	31	70	13	22	253
95th Queue (ft)	38	595	89	158	33	92	406
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		35					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		69	0				14
Queuing Penalty (veh)		28	1				4

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	93
Average Queue (ft)	26
95th Queue (ft)	66
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	75	17	68
Average Queue (ft)	28	1	31
95th Queue (ft)	62	7	60
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement			
Directions Served			
Maximum Queue (ft)			
Average Queue (ft)			
95th Queue (ft)			
Link Distance (ft)			
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	61	30	82
Average Queue (ft)	10	2	37
95th Queue (ft)	37	16	64
Link Distance (ft)	424	696	640
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 84

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	47	168	142	73	53	105	686	76	37	1261	73
Future Volume (veh/h)	68	47	168	142	73	53	105	686	76	37	1261	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	51	183	154	79	58	114	746	83	40	1371	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	306	57	203	238	205	151	163	1451	161	184	1577	91
Arrive On Green	0.04	0.16	0.16	0.09	0.20	0.20	0.09	0.45	0.45	0.10	0.46	0.46
Sat Flow, veh/h	1781	357	1282	1781	1002	736	1781	3224	359	1781	3416	196
Grp Volume(v), veh/h	74	0	234	154	0	137	114	411	418	40	712	738
Grp Sat Flow(s),veh/h/ln	1781	0	1640	1781	0	1738	1781	1777	1806	1781	1777	1835
Q Serve(g_s), s	4.2	0.0	16.8	8.4	0.0	8.2	7.5	19.9	19.9	2.5	43.2	43.5
Cycle Q Clear(g_c), s	4.2	0.0	16.8	8.4	0.0	8.2	7.5	19.9	19.9	2.5	43.2	43.5
Prop In Lane	1.00		0.78	1.00		0.42	1.00		0.20	1.00		0.11
Lane Grp Cap(c), veh/h	306	0	260	238	0	356	163	800	813	184	820	847
V/C Ratio(X)	0.24	0.00	0.90	0.65	0.00	0.38	0.70	0.51	0.51	0.22	0.87	0.87
Avail Cap(c_a), veh/h	306	0	287	304	0	449	163	800	813	184	820	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.57	0.57	0.57
Uniform Delay (d), s/veh	40.1	0.0	49.6	37.6	0.0	41.2	52.9	23.6	23.6	49.3	29.0	29.1
Incr Delay (d2), s/veh	0.4	0.0	27.5	3.1	0.0	0.7	22.0	2.4	2.3	1.5	7.3	7.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	8.8	3.9	0.0	3.6	4.3	8.8	8.9	1.2	19.5	20.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.5	0.0	77.0	40.7	0.0	41.9	74.8	26.0	25.9	50.9	36.3	36.4
LnGrp LOS	D	A	E	D	A	D	E	C	C	D	D	D
Approach Vol, veh/h	308			291			943			1490		
Approach Delay, s/veh	68.3			41.2			31.9			36.7		
Approach LOS	E			D			C			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	61.4	11.0	30.6	18.4	60.0	16.6	25.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+l1), s	9.5	45.5	6.2	10.2	4.5	21.9	10.4	18.8				
Green Ext Time (p_c), s	0.1	2.4	0.0	0.5	0.0	4.2	0.2	0.2				
Intersection Summary												
HCM 6th Ctrl Delay	38.8											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	553	238	29	786	3
Future Volume (vph)	7	2	7	435	4	41	2	553	238	29	786	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1713			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.90			0.45	1.00		1.00	1.00	0.28	1.00	
Satd. Flow (perm)		1581			832	1583		1859	1583	523	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	601	259	32	854	3
RTOR Reduction (vph)	0	8	0	0	0	34	0	0	108	0	0	0
Lane Group Flow (vph)	0	10	0	0	477	11	0	603	151	32	857	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		3.2			29.0	29.0		60.8	60.8	69.8	69.8	
Effective Green, g (s)		3.2			29.0	29.0		60.8	60.8	69.8	69.8	
Actuated g/C Ratio		0.03			0.24	0.24		0.51	0.51	0.58	0.58	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			201	382		941	802	335	1083	
v/s Ratio Prot										0.00	c0.46	
v/s Ratio Perm		c0.01			c0.57	0.01		0.32	0.10	0.05		
v/c Ratio		0.24			2.37	0.03		0.64	0.19	0.10	0.79	
Uniform Delay, d1		57.2			45.5	34.7		21.6	16.1	23.8	19.5	
Progression Factor		1.00			1.00	1.00		0.44	0.06	1.00	1.00	
Incremental Delay, d2		3.0			633.0	0.1		3.1	0.5	0.1	5.9	
Delay (s)		60.2			678.5	34.9		12.7	1.4	23.9	25.4	
Level of Service		E			F	C		B	A	C	C	
Approach Delay (s)		60.2			623.0			9.3			25.3	
Approach LOS		E			F			A			C	
Intersection Summary												
HCM 2000 Control Delay		155.7			HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio		1.30										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		82.5%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	168	215	205	53	58	0
Future Vol, veh/h	168	215	205	53	58	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	183	234	223	58	63	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	281	0	-	0	852	-
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	600	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1282	-	-	-	330	0
Stage 1	-	-	-	-	790	0
Stage 2	-	-	-	-	548	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1282	-	-	-	283	-
Mov Cap-2 Maneuver	-	-	-	-	283	-
Stage 1	-	-	-	-	677	-
Stage 2	-	-	-	-	548	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.6	0		21.3		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1282	-	-	-	283	
HCM Lane V/C Ratio	0.142	-	-	-	0.223	
HCM Control Delay (s)	8.3	-	-	-	21.3	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.8	

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	44	142	16	0	142	32	1	1	0	37	0	62
Future Vol, veh/h	44	142	16	0	142	32	1	1	0	37	0	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	154	17	0	154	35	1	1	0	40	0	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	171	0	0	464	448	163	431	439	172
Stage 1	-	-	-	-	-	-	259	259	-	172	172	-
Stage 2	-	-	-	-	-	-	205	189	-	259	267	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1385	-	-	1406	-	-	508	506	882	535	512	872
Stage 1	-	-	-	-	-	-	746	694	-	830	756	-
Stage 2	-	-	-	-	-	-	797	744	-	746	688	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1385	-	-	1406	-	-	455	487	882	518	493	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	455	487	-	518	493	-
Stage 1	-	-	-	-	-	-	718	668	-	798	756	-
Stage 2	-	-	-	-	-	-	735	744	-	716	662	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0	12.7	11.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	470	1385	-	-	1406	-	-	695
HCM Lane V/C Ratio	0.005	0.035	-	-	-	-	-	0.155
HCM Control Delay (s)	12.7	7.7	0	-	0	-	-	11.1
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.5

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.7	1.9	2.2	1.0	0.3	0.1	2.4	0.3	0.3	0.5	0.0	0.1
Total Del/Veh (s)	46.7	64.7	46.0	49.7	47.4	27.9	57.8	18.1	14.1	84.0	27.7	25.6

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	31.5

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	39.3	54.1	36.3	0.0	0.0	0.0	3.1	0.9	2.0
Total Del/Veh (s)	65.0	82.1	12.3	111.4	110.1	85.3	44.9	11.9	3.4	20.7	17.9	14.9

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	8.9
Total Del/Veh (s)	34.7

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.2	0.6	2.4	1.0

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.3	0.0	0.2
Total Del/Veh (s)	3.1	0.4	0.9	0.6	9.3	2.0

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.1	0.4	2.3	1.2	1.9	1.2

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2
Total Del/Veh (s)	4.4	3.2	1.9	5.3	1.1	0.6	9.0	7.5	3.7	8.6	12.0	5.6

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	3.6

Total Network Performance

Denied Del/Veh (s)	5.7
Total Del/Veh (s)	48.5

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	183	351	125	280	184	292	288	125	492	523
Average Queue (ft)	52	162	101	125	89	179	170	83	291	313
95th Queue (ft)	135	290	149	250	168	272	252	146	445	470
Link Distance (ft)		364		424		1102	1102		1015	1015
Upstream Blk Time (%)		0								
Queuing Penalty (veh)		1								
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		5	18	13	1	8		11	35	
Queuing Penalty (veh)		3	29	22	2	9		70	29	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	48	525	100	353	65	174	560
Average Queue (ft)	14	446	34	105	21	27	306
95th Queue (ft)	41	604	97	248	48	113	467
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		45					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		70	0				18
Queuing Penalty (veh)		29	0				5

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	78
Average Queue (ft)	30
95th Queue (ft)	69
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	77	26	86
Average Queue (ft)	31	1	38
95th Queue (ft)	63	11	68
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	27
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	96
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	67	68	76	87
Average Queue (ft)	13	13	36	42
95th Queue (ft)	47	45	59	70
Link Distance (ft)	424	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 199

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	104	183	177	98	75	114	746	189	90	1371	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	106	187	207	212	162	239	1264	320	164	1395	80
Arrive On Green	0.04	0.17	0.17	0.08	0.22	0.22	0.13	0.45	0.45	0.09	0.41	0.41
Sat Flow, veh/h	1781	608	1070	1781	983	752	1781	2808	711	1781	3416	196
Grp Volume(v), veh/h	74	0	287	177	0	173	114	472	463	90	712	738
Grp Sat Flow(s),veh/h/ln	1781	0	1678	1781	0	1735	1781	1777	1742	1781	1777	1835
Q Serve(g_s), s	4.5	0.0	20.4	7.7	0.0	10.4	7.1	23.9	23.9	5.8	47.4	47.8
Cycle Q Clear(g_c), s	4.5	0.0	20.4	7.7	0.0	10.4	7.1	23.9	23.9	5.8	47.4	47.8
Prop In Lane	1.00		0.64	1.00		0.43	1.00		0.41	1.00		0.11
Lane Grp Cap(c), veh/h	134	0	294	207	0	375	239	800	784	164	726	749
V/C Ratio(X)	0.55	0.00	0.98	0.85	0.00	0.46	0.48	0.59	0.59	0.55	0.98	0.99
Avail Cap(c_a), veh/h	134	0	294	283	0	448	239	800	784	164	726	749
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50
Uniform Delay (d), s/veh	46.7	0.0	49.3	52.7	0.0	41.0	48.1	24.7	24.7	52.1	35.0	35.1
Incr Delay (d2), s/veh	4.8	0.0	46.2	16.7	0.0	0.9	6.7	3.2	3.3	6.4	19.5	20.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	12.3	6.2	0.0	4.6	3.6	10.6	10.4	2.9	23.9	24.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.5	0.0	95.5	69.4	0.0	41.8	54.8	27.9	28.0	58.5	54.5	55.2
LnGrp LOS	D	A	F	E	A	D	D	C	C	E	D	E
Approach Vol, veh/h	361			350			1049			1540		
Approach Delay, s/veh	86.4			55.8			30.9			55.1		
Approach LOS	F			E			C			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.1	55.0	11.0	31.9	17.1	60.0	15.9	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	9.1	49.8	6.5	12.4	7.8	25.9	9.7	22.4				
Green Ext Time (p_c), s	0.1	0.0	0.0	0.6	0.0	4.9	0.3	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	50.9											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Future Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1713			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.90			0.45	1.00		1.00	1.00	0.22	1.00	
Satd. Flow (perm)		1581			832	1583		1859	1583	413	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	618	259	32	905	3
RTOR Reduction (vph)	0	8	0	0	0	34	0	0	107	0	0	0
Lane Group Flow (vph)	0	10	0	0	477	11	0	620	152	32	908	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		3.2			29.0	29.0		59.6	59.6	69.8	69.8	
Effective Green, g (s)		3.2			29.0	29.0		59.6	59.6	69.8	69.8	
Actuated g/C Ratio		0.03			0.24	0.24		0.50	0.50	0.58	0.58	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			201	382		923	786	287	1083	
v/s Ratio Prot										0.00	c0.49	
v/s Ratio Perm		c0.01			c0.57	0.01		0.33	0.10	0.06		
v/c Ratio		0.24			2.37	0.03		0.67	0.19	0.11	0.84	
Uniform Delay, d1		57.2			45.5	34.7		22.8	16.8	15.1	20.5	
Progression Factor		1.00			1.00	1.00		0.47	0.14	1.00	1.00	
Incremental Delay, d2		3.0			633.0	0.1		3.4	0.5	0.2	7.8	
Delay (s)		60.2			678.5	34.9		14.2	2.8	15.2	28.3	
Level of Service		E			F	C		B	A	B	C	
Approach Delay (s)		60.2			623.0			10.8			27.8	
Approach LOS		E			F			B			C	
Intersection Summary												
HCM 2000 Control Delay		153.4			HCM 2000 Level of Service				F			
HCM 2000 Volume to Capacity ratio		1.33										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)				24.0			
Intersection Capacity Utilization		85.0%			ICU Level of Service				E			
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	180	215	205	89	71	0
Future Vol, veh/h	180	215	205	89	71	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	234	223	97	77	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	320	0	-	0	898	-
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	626	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1240	-	-	-	310	0
Stage 1	-	-	-	-	774	0
Stage 2	-	-	-	-	533	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1240	-	-	-	261	-
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	533	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		24.5		
HCM LOS				C		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1240	-	-	-	261	
HCM Lane V/C Ratio	0.158	-	-	-	0.296	
HCM Control Delay (s)	8.4	-	-	-	24.5	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.6	-	-	-	1.2	

Intersection												
Int Delay, s/veh	4.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	44	142	210	42	142	32	56	4	28	37	10	62
Future Vol, veh/h	44	142	210	42	142	32	56	4	28	37	10	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	154	228	46	154	35	61	4	30	40	11	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	382	0	0	667	645	268	645	742	172
Stage 1	-	-	-	-	-	-	364	364	-	264	264	-
Stage 2	-	-	-	-	-	-	303	281	-	381	478	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1385	-	-	1176	-	-	372	391	771	385	344	872
Stage 1	-	-	-	-	-	-	655	624	-	741	690	-
Stage 2	-	-	-	-	-	-	706	678	-	641	556	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1385	-	-	1176	-	-	312	357	771	342	314	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	312	357	-	342	314	-
Stage 1	-	-	-	-	-	-	626	596	-	708	660	-
Stage 2	-	-	-	-	-	-	613	648	-	584	531	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			1.6			17.3			14		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	388	1385	-	-	1176	-	-	516
HCM Lane V/C Ratio	0.247	0.035	-	-	0.039	-	-	0.23
HCM Control Delay (s)	17.3	7.7	0	-	8.2	0	-	14
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1	0.1	-	-	0.1	-	-	0.9

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.3	0.0	0.1	1.4	0.3	0.2	2.4	0.4	2.5	0.5	0.0	0.1
Total Del/Veh (s)	48.9	44.4	17.1	41.6	48.9	31.4	54.9	33.2	10.0	73.6	31.3	28.6

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	33.5

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.6	0.5	3.3	0.0	0.0	0.0	134.3	136.6	153.8
Total Del/Veh (s)	56.5	67.9	12.9	28.3	37.3	16.8	159.8	87.1	13.2	118.3	102.4	106.9

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	54.9
Total Del/Veh (s)	71.8

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	2.8	1.8	1.6

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.3	0.0	0.2
Total Del/Veh (s)	5.1	5.9	8.2	5.4	4.7	6.2

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.4	0.7	2.6	1.2	2.0	1.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.0	0.2	0.2	0.2	0.2	3.4	4.0	0.1	0.1	0.2
Total Del/Veh (s)	4.9	3.2	2.0	5.9	2.0	1.8	11.0	6.8	3.7	11.7	15.9	6.3

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	4.1

Total Network Performance

Denied Del/Veh (s)	32.4
Total Del/Veh (s)	72.4

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	140	151	158	124	298	199	432	405	172	224	465	484
Average Queue (ft)	51	63	63	88	106	95	209	176	54	96	272	292
95th Queue (ft)	112	120	121	148	233	201	486	464	181	208	414	438
Link Distance (ft)		364	364		404		1105	1105			1015	1015
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					1							
Storage Bay Dist (ft)	250			100		160			160	200		
Storage Blk Time (%)	0			11	11	1	16	8		0	20	
Queuing Penalty (veh)	0			17	18	3	16	15		0	17	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	56	417	100	968	881	174	789
Average Queue (ft)	13	212	20	484	240	30	759
95th Queue (ft)	42	370	75	1026	847	113	774
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		0		6	2		62
Queuing Penalty (veh)		0		24	9		0
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		33	0				55
Queuing Penalty (veh)		14	0				16

Intersection: 6: BAXTER BLVD

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	7	73
Average Queue (ft)	0	23
95th Queue (ft)	5	55
Link Distance (ft)	181	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	89	104	100	67
Average Queue (ft)	47	52	56	33
95th Queue (ft)	74	85	87	58
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement				
Directions Served				
Maximum Queue (ft)				
Average Queue (ft)				
95th Queue (ft)				
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	84	90	72	55	93
Average Queue (ft)	17	21	29	22	42
95th Queue (ft)	58	69	57	49	74
Link Distance (ft)	404	608	696		640
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)				200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 150

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Medium Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Future Volume (veh/h)	68	96	168	163	90	69	105	686	174	83	1261	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	74	104	183	177	98	75	114	746	189	90	1371	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	260	252	213	330	190	145	163	1599	713	205	1616	93
Arrive On Green	0.04	0.13	0.13	0.10	0.19	0.19	0.09	0.45	0.45	0.23	0.95	0.95
Sat Flow, veh/h	1781	1870	1585	1781	983	752	1781	3554	1585	1781	3416	196
Grp Volume(v), veh/h	74	104	183	177	0	173	114	746	189	90	712	738
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1735	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	4.3	6.1	13.6	9.9	0.0	10.7	7.5	17.5	5.7	5.2	12.9	13.2
Cycle Q Clear(g_c), s	4.3	6.1	13.6	9.9	0.0	10.7	7.5	17.5	5.7	5.2	12.9	13.2
Prop In Lane	1.00		1.00	1.00		0.43	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	260	252	213	330	0	336	163	1599	713	205	841	868
V/C Ratio(X)	0.28	0.41	0.86	0.54	0.00	0.52	0.70	0.47	0.26	0.44	0.85	0.85
Avail Cap(c_a), veh/h	260	327	277	374	0	448	163	1599	713	205	841	868
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	42.5	47.6	50.8	37.6	0.0	43.4	52.9	23.0	8.3	42.9	2.0	2.0
Incr Delay (d2), s/veh	0.6	1.1	18.4	1.4	0.0	1.2	22.0	1.0	0.9	0.6	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.9	6.5	4.5	0.0	4.7	4.3	7.5	3.3	2.2	1.4	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	48.7	69.3	39.0	0.0	44.6	74.8	24.0	9.2	43.5	3.1	3.1
LnGrp LOS	D	D	E	D	A	D	E	C	A	D	A	A
Approach Vol, veh/h		361			350			1049			1540	
Approach Delay, s/veh		58.0			41.7			26.8			5.4	
Approach LOS		E			D			C			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	62.8	11.0	29.2	19.8	60.0	18.1	22.1				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	9.5	15.2	6.3	12.7	7.2	19.5	11.9	15.6				
Green Ext Time (p_c), s	0.1	9.6	0.0	0.6	0.0	5.5	0.2	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			21.8									
HCM 6th LOS			C									

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Medium Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Future Volume (vph)	7	2	7	435	4	41	2	569	238	29	833	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1713			1775	1583		1862	1583	1770	1862	
Flt Permitted		0.66			0.72	1.00		0.71	1.00	0.09	1.00	
Satd. Flow (perm)		1150			1332	1583		1316	1583	161	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	2	8	473	4	45	2	618	259	32	905	3
RTOR Reduction (vph)	0	8	0	0	0	27	0	0	141	0	0	0
Lane Group Flow (vph)	0	10	0	0	477	18	0	620	118	32	908	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Effective Green, g (s)		4.4			48.2	48.2		40.4	40.4	49.4	49.4	
Actuated g/C Ratio		0.04			0.40	0.40		0.34	0.34	0.41	0.41	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			535	635		443	532	106	766	
v/s Ratio Prot										0.01	c0.49	
v/s Ratio Perm		c0.01			c0.36	0.01		c0.47	0.07	0.12		
v/c Ratio		0.25			0.89	0.03		1.40	0.22	0.30	1.19	
Uniform Delay, d1		56.2			33.5	21.7		39.8	28.5	28.6	35.3	
Progression Factor		1.00			1.00	1.00		0.64	0.20	1.00	1.00	
Incremental Delay, d2		3.0			19.7	0.1		192.3	0.9	1.6	96.4	
Delay (s)		59.2			53.2	21.8		217.6	6.6	30.2	131.7	
Level of Service		E			D	C		F	A	C	F	
Approach Delay (s)		59.2			50.5			155.5			128.3	
Approach LOS		E			D			F			F	
Intersection Summary												
HCM 2000 Control Delay		120.7		HCM 2000 Level of Service				F				
HCM 2000 Volume to Capacity ratio		1.13										
Actuated Cycle Length (s)		120.0		Sum of lost time (s)				24.0				
Intersection Capacity Utilization		85.0%		ICU Level of Service				E				
Analysis Period (min)		15										
c Critical Lane Group												

Intersection

Intersection Delay, s/veh 10.4

Intersection LOS B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	180	215	205	89	71	0
Future Vol, veh/h	180	215	205	89	71	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	196	234	223	97	77	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left SB			WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	10.3	10.6	9.6
HCM LOS	B	B	A

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	70%	0%
Vol Right, %	0%	0%	30%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	215	294	71
LT Vol	180	0	0	71
Through Vol	0	215	205	0
RT Vol	0	0	89	0
Lane Flow Rate	196	234	320	77
Geometry Grp	7	7	5	2
Degree of Util (X)	0.299	0.324	0.401	0.123
Departure Headway (Hd)	5.497	4.994	4.522	5.736
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	653	720	796	623
Service Time	3.233	2.73	2.556	3.791
HCM Lane V/C Ratio	0.3	0.325	0.402	0.124
HCM Control Delay	10.6	10.1	10.6	9.6
HCM Lane LOS	B	B	B	A
HCM 95th-tile Q	1.3	1.4	1.9	0.4

Intersection												
Int Delay, s/veh	4.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↖	↗			↕	
Traffic Vol, veh/h	44	142	210	42	142	32	56	4	28	37	10	62
Future Vol, veh/h	44	142	210	42	142	32	56	4	28	37	10	62
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	154	228	46	154	35	61	4	30	40	11	67
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	382	0	0	667	645	268	645	742	172
Stage 1	-	-	-	-	-	-	364	364	-	264	264	-
Stage 2	-	-	-	-	-	-	303	281	-	381	478	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1385	-	-	1176	-	-	372	391	771	385	344	872
Stage 1	-	-	-	-	-	-	655	624	-	741	690	-
Stage 2	-	-	-	-	-	-	706	678	-	641	556	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1385	-	-	1176	-	-	312	357	771	342	314	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	312	357	-	342	314	-
Stage 1	-	-	-	-	-	-	626	596	-	708	660	-
Stage 2	-	-	-	-	-	-	613	648	-	584	531	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.9			1.6			16.1			14		
HCM LOS							C			B		
Minor Lane/Major Mvmt	NBLn1 NBLn2		EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)	312	673	1385	-	-	1176	-	-	516			
HCM Lane V/C Ratio	0.195	0.052	0.035	-	-	0.039	-	-	0.23			
HCM Control Delay (s)	19.3	10.6	7.7	0	-	8.2	0	-	14			
HCM Lane LOS	C	B	A	A	-	A	A	-	B			
HCM 95th %tile Q(veh)	0.7	0.2	0.1	-	-	0.1	-	-	0.9			

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.2	0.4	0.1	0.0	0.0	2.1	0.5	0.5	0.5	0.0	0.1
Total Del/Veh (s)	42.7	50.3	31.9	48.5	44.4	30.7	61.7	23.7	19.6	57.9	30.0	26.9

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	30.8

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.5	0.3	3.6		0.0	0.0	3.0	0.8	0.9
Total Del/Veh (s)	60.4	89.6	13.3	54.2	34.7	34.4		10.5	5.1	38.9	13.5	11.5

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	16.5

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	0.7	2.4	1.2

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.2	0.0	0.1
Total Del/Veh (s)	2.8	0.5	0.7	0.3	9.4	1.8

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.4	2.8	1.2	2.0	1.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1
Total Del/Veh (s)	4.8	1.5	1.0	0.5	0.3	5.8	7.7	4.5	1.9

Total Network Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	38.4

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	141	289	125	258	185	526	457	125	419	434
Average Queue (ft)	52	148	65	110	130	312	291	56	265	278
95th Queue (ft)	107	253	129	205	221	483	440	125	379	394
Link Distance (ft)		364		424		1102	1102		1015	1015
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		1	4	15	4	22		1	40	
Queuing Penalty (veh)		1	6	12	22	35		3	21	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	60	413	100	358	166	105	420
Average Queue (ft)	14	204	39	100	25	16	223
95th Queue (ft)	45	350	107	234	97	55	360
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		0					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		48	1			0	11
Queuing Penalty (veh)		21	2			0	2

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	74
Average Queue (ft)	33
95th Queue (ft)	66
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	96	13	82
Average Queue (ft)	34	1	33
95th Queue (ft)	74	7	62
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement			
Directions Served			
Maximum Queue (ft)			
Average Queue (ft)			
95th Queue (ft)			
Link Distance (ft)			
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	76	18	71
Average Queue (ft)	17	1	33
95th Queue (ft)	56	10	59
Link Distance (ft)	424	696	640
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 125

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	100	163	79	102	63	158	1161	190	53	1052	95
Future Volume (veh/h)	73	100	163	79	102	63	158	1161	190	53	1052	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	79	109	177	86	111	68	172	1262	207	58	1143	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	112	182	130	187	115	163	1377	224	242	1629	147
Arrive On Green	0.04	0.17	0.17	0.04	0.17	0.17	0.09	0.45	0.45	0.14	0.49	0.49
Sat Flow, veh/h	1781	641	1042	1781	1086	665	1781	3059	498	1781	3297	297
Grp Volume(v), veh/h	79	0	286	86	0	179	172	729	740	58	615	631
Grp Sat Flow(s),veh/h/ln	1781	0	1683	1781	0	1751	1781	1777	1781	1781	1777	1817
Q Serve(g_s), s	4.8	0.0	20.3	1.6	0.0	11.3	11.0	45.9	46.9	3.5	32.2	32.3
Cycle Q Clear(g_c), s	4.8	0.0	20.3	1.6	0.0	11.3	11.0	45.9	46.9	3.5	32.2	32.3
Prop In Lane	1.00		0.62	1.00		0.38	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	295	130	0	302	163	800	801	242	878	898
V/C Ratio(X)	0.59	0.00	0.97	0.66	0.00	0.59	1.05	0.91	0.92	0.24	0.70	0.70
Avail Cap(c_a), veh/h	134	0	295	283	0	452	163	800	801	242	878	898
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.64	0.64	0.64
Uniform Delay (d), s/veh	46.9	0.0	49.2	55.6	0.0	45.8	54.5	30.8	31.1	46.3	23.5	23.5
Incr Delay (d2), s/veh	6.6	0.0	44.4	5.6	0.0	1.9	85.3	16.5	17.8	1.5	3.0	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	12.1	2.7	0.0	5.1	8.8	22.7	23.5	1.7	13.9	14.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.4	0.0	93.6	61.2	0.0	47.6	139.8	47.2	48.9	47.8	26.5	26.5
LnGrp LOS	D	A	F	E	A	D	F	D	D	D	C	C
Approach Vol, veh/h	365			265			1641			1304		
Approach Delay, s/veh	84.9			52.0			57.7			27.4		
Approach LOS	F			D			E			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	65.3	11.0	26.7	22.3	60.0	10.7	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+l1), s	13.0	34.3	6.8	13.3	5.5	48.9	3.6	22.3				
Green Ext Time (p_c), s	0.0	5.7	0.0	0.7	0.0	3.3	0.2	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	49.0											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	838	443	20	767	16
Future Volume (vph)	8	2	8	288	2	44	1	838	443	20	767	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.88			0.45	1.00		1.00	1.00	0.09	1.00	
Satd. Flow (perm)		1538			842	1583		1862	1583	172	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	911	482	22	834	17
RTOR Reduction (vph)	0	9	0	0	0	38	0	0	130	0	0	0
Lane Group Flow (vph)	0	11	0	0	315	10	0	912	352	22	851	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		3.3			25.0	25.0		64.7	64.7	73.7	73.7	
Effective Green, g (s)		3.3			25.0	25.0		64.7	64.7	73.7	73.7	
Actuated g/C Ratio		0.03			0.21	0.21		0.54	0.54	0.61	0.61	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			175	329		1003	853	145	1140	
v/s Ratio Prot										0.00	c0.46	
v/s Ratio Perm		c0.01			c0.37	0.01		c0.49	0.22	0.09		
v/c Ratio		0.27			1.80	0.03		0.91	0.41	0.15	0.75	
Uniform Delay, d1		57.2			47.5	37.8		25.0	16.4	40.8	16.5	
Progression Factor		1.00			1.00	1.00		0.37	0.07	1.00	1.00	
Incremental Delay, d2		3.4			381.8	0.2		9.7	1.0	0.5	4.5	
Delay (s)		60.6			429.3	38.0		18.9	2.2	41.2	21.0	
Level of Service		E			F	D		B	A	D	C	
Approach Delay (s)		60.6			377.6			13.1			21.5	
Approach LOS		E			F			B			C	
Intersection Summary												
HCM 2000 Control Delay			66.1				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			87.9%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	4.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	205	252	210	52	60	0
Future Vol, veh/h	205	252	210	52	60	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	223	274	228	57	65	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	285	0	-	0	977	-
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	720	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1277	-	-	-	278	0
Stage 1	-	-	-	-	786	0
Stage 2	-	-	-	-	482	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1277	-	-	-	229	-
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	648	-
Stage 2	-	-	-	-	482	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.8	0		26.9		
HCM LOS				D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1277	-	-	-	229	
HCM Lane V/C Ratio	0.174	-	-	-	0.285	
HCM Control Delay (s)	8.4	-	-	-	26.9	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.6	-	-	-	1.1	

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	184	1	0	200	26	1	0	0	42	0	39
Future Vol, veh/h	52	184	1	0	200	26	1	0	0	42	0	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	200	1	0	217	28	1	0	0	46	0	42
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	245	0	0	201	0	0	567	560	201	546	546	231
Stage 1	-	-	-	-	-	-	315	315	-	231	231	-
Stage 2	-	-	-	-	-	-	252	245	-	315	315	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1321	-	-	1371	-	-	434	437	840	448	445	808
Stage 1	-	-	-	-	-	-	696	656	-	772	713	-
Stage 2	-	-	-	-	-	-	752	703	-	696	656	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1321	-	-	1371	-	-	396	416	840	431	423	808
Mov Cap-2 Maneuver	-	-	-	-	-	-	396	416	-	431	423	-
Stage 1	-	-	-	-	-	-	662	624	-	734	713	-
Stage 2	-	-	-	-	-	-	713	703	-	662	624	-
Approach	EB		WB				NB			SB		
HCM Control Delay, s	1.7		0				14.1			12.7		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	396	1321	-	-	1371	-	-	556				
HCM Lane V/C Ratio	0.003	0.043	-	-	-	-	-	0.158				
HCM Control Delay (s)	14.1	7.8	0	-	0	-	-	12.7				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	2.4	4.6	4.5	0.1	0.0	0.0	2.1	0.5	0.5	3.2	2.5	6.2
Total Del/Veh (s)	51.3	72.4	53.4	56.6	50.3	40.0	110.5	53.3	47.8	118.8	47.1	38.7

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	1.7
Total Del/Veh (s)	54.9

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.5	0.9	3.5	0.0	0.0	0.0	3.1	0.8	1.0
Total Del/Veh (s)	74.1	41.3	14.7	55.3	49.3	33.4	32.6	12.3	5.3	43.7	14.6	11.3

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	17.5

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	0.8	2.3	1.1

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.2	0.1	0.2	0.2	0.0	0.2
Total Del/Veh (s)	3.9	0.5	1.0	0.6	12.2	3.1

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.5	3.1	1.5	2.3	2.0

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.2	0.4	0.3	0.3	0.1	0.2	0.2
Total Del/Veh (s)	4.8	2.3	1.8	5.0	1.4	0.7	22.2	26.6	17.8	11.6	15.3	8.4

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	8.6

Total Network Performance

Denied Del/Veh (s)	1.7
Total Del/Veh (s)	59.5

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	248	361	125	423	185	930	910	125	585	605
Average Queue (ft)	86	216	104	235	148	544	529	86	366	385
95th Queue (ft)	219	353	150	396	221	936	909	153	657	675
Link Distance (ft)		364		424		1102	1102		1015	1015
Upstream Blk Time (%)		3		1		0	0			
Queuing Penalty (veh)		9		4		0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)	0	12	17	37	16	36		19	44	
Queuing Penalty (veh)	0	9	50	60	95	57		98	37	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	61	405	100	410	119	120	456
Average Queue (ft)	15	214	35	121	27	15	260
95th Queue (ft)	45	364	96	287	74	67	412
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		0					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		48	1				14
Queuing Penalty (veh)		21	2				3

Intersection: 6: BAXTER BLVD

Movement	EB	SW
Directions Served	T	R
Maximum Queue (ft)	11	80
Average Queue (ft)	0	34
95th Queue (ft)	8	66
Link Distance (ft)	552	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	92	12	50	112
Average Queue (ft)	39	0	3	55
95th Queue (ft)	81	6	22	95
Link Distance (ft)	181	181	600	96
Upstream Blk Time (%)	0			1
Queuing Penalty (veh)	0			1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	NB	SW
Directions Served	R	LR
Maximum Queue (ft)	73	46
Average Queue (ft)	6	3
95th Queue (ft)	43	30
Link Distance (ft)	96	364
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	4	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	92	88	240	83
Average Queue (ft)	18	12	119	40
95th Queue (ft)	60	49	214	68
Link Distance (ft)	424	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 450

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	79	146	177	178	185	139	172	1262	280	92	1143	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	135	163	208	215	161	163	1304	286	163	1484	134
Arrive On Green	0.04	0.17	0.17	0.08	0.22	0.22	0.09	0.45	0.45	0.03	0.15	0.15
Sat Flow, veh/h	1781	770	933	1781	991	745	1781	2898	635	1781	3297	297
Grp Volume(v), veh/h	79	0	323	178	0	324	172	767	775	92	615	631
Grp Sat Flow(s),veh/h/ln	1781	0	1702	1781	0	1736	1781	1777	1756	1781	1777	1817
Q Serve(g_s), s	4.8	0.0	21.0	7.7	0.0	21.6	11.0	50.2	52.1	6.1	40.0	40.1
Cycle Q Clear(g_c), s	4.8	0.0	21.0	7.7	0.0	21.6	11.0	50.2	52.1	6.1	40.0	40.1
Prop In Lane	1.00		0.55	1.00		0.43	1.00		0.36	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	298	208	0	376	163	800	790	163	800	818
V/C Ratio(X)	0.59	0.00	1.08	0.85	0.00	0.86	1.05	0.96	0.98	0.56	0.77	0.77
Avail Cap(c_a), veh/h	134	0	298	283	0	449	163	800	790	163	800	818
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.59	0.59	0.59
Uniform Delay (d), s/veh	46.9	0.0	49.5	52.7	0.0	45.3	54.5	31.9	32.5	55.8	45.1	45.1
Incr Delay (d2), s/veh	6.6	0.0	76.4	16.9	0.0	13.8	85.3	23.4	27.6	8.0	4.3	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	15.2	6.2	0.0	10.7	8.8	26.0	27.4	3.2	20.0	20.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.4	0.0	125.9	69.6	0.0	59.0	139.8	55.4	60.0	63.9	49.4	49.4
LnGrp LOS	D	A	F	E	A	E	F	E	E	E	D	D
Approach Vol, veh/h	402			502			1714			1338		
Approach Delay, s/veh	111.7			62.8			65.9			50.4		
Approach LOS	F			E			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	60.0	11.0	32.0	17.0	60.0	16.0	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+l1), s	13.0	42.1	6.8	23.6	8.1	54.1	9.7	23.0				
Green Ext Time (p_c), s	0.0	3.6	0.0	0.9	0.0	0.0	0.3	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	64.9											
HCM 6th LOS	E											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Future Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.88			0.45	1.00		1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1538			842	1583		1862	1583	105	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	982	482	22	870	17
RTOR Reduction (vph)	0	9	0	0	0	38	0	0	121	0	0	0
Lane Group Flow (vph)	0	11	0	0	315	10	0	983	361	22	887	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		3.3			25.0	25.0		64.7	64.7	73.7	73.7	
Effective Green, g (s)		3.3			25.0	25.0		64.7	64.7	73.7	73.7	
Actuated g/C Ratio		0.03			0.21	0.21		0.54	0.54	0.61	0.61	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			175	329		1003	853	106	1140	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.01			c0.37	0.01		c0.53	0.23	0.12		
v/c Ratio		0.27			1.80	0.03		0.98	0.42	0.21	0.78	
Uniform Delay, d1		57.2			47.5	37.8		27.0	16.5	49.0	17.1	
Progression Factor		1.00			1.00	1.00		0.25	0.05	1.00	1.00	
Incremental Delay, d2		3.4			381.8	0.2		15.2	0.7	1.0	5.2	
Delay (s)		60.6			429.3	38.0		21.8	1.5	50.0	22.3	
Level of Service		E			F	D		C	A	D	C	
Approach Delay (s)		60.6			377.6			15.2			23.0	
Approach LOS		E			F			B			C	
Intersection Summary												
HCM 2000 Control Delay			65.8				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.18									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			89.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	7.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	213	252	210	78	111	0
Future Vol, veh/h	213	252	210	78	111	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	232	274	228	85	121	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	313	0	-	0	1009	-
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	738	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1247	-	-	-	266	0
Stage 1	-	-	-	-	775	0
Stage 2	-	-	-	-	473	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1247	-	-	-	217	-
Mov Cap-2 Maneuver	-	-	-	-	217	-
Stage 1	-	-	-	-	631	-
Stage 2	-	-	-	-	473	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.9	0		40.6		
HCM LOS				E		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1247	-	-	-	217	
HCM Lane V/C Ratio	0.186	-	-	-	0.556	
HCM Control Delay (s)	8.5	-	-	-	40.6	
HCM Lane LOS	A	-	-	-	E	
HCM 95th %tile Q(veh)	0.7	-	-	-	3	

Intersection												
Int Delay, s/veh	27.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	52	184	135	29	200	26	221	14	110	42	7	39
Future Vol, veh/h	52	184	135	29	200	26	221	14	110	42	7	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	200	147	32	217	28	240	15	120	46	8	42
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	245	0	0	347	0	0	708	697	274	750	756	231
Stage 1	-	-	-	-	-	-	388	388	-	295	295	-
Stage 2	-	-	-	-	-	-	320	309	-	455	461	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1321	-	-	1212	-	-	350	365	765	328	337	808
Stage 1	-	-	-	-	-	-	636	609	-	713	669	-
Stage 2	-	-	-	-	-	-	692	660	-	585	565	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1321	-	-	1212	-	-	305	334	765	250	309	808
Mov Cap-2 Maneuver	-	-	-	-	-	-	305	334	-	250	309	-
Stage 1	-	-	-	-	-	-	601	576	-	674	648	-
Stage 2	-	-	-	-	-	-	628	640	-	454	534	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.1			0.9			77.2			18.2		
HCM LOS							F			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	379	1321	-	-	1212	-	-	368				
HCM Lane V/C Ratio	0.989	0.043	-	-	0.026	-	-	0.26				
HCM Control Delay (s)	77.2	7.8	0	-	8.1	0	-	18.2				
HCM Lane LOS	F	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	11.6	0.1	-	-	0.1	-	-	1				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	0.0	0.0	2.2	0.6	2.0	0.4	0.0	0.1
Total Del/Veh (s)	41.1	48.1	13.4	64.7	71.4	60.5	74.7	30.3	9.2	57.0	26.9	25.6

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	35.1

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.1	0.1	0.4	0.3	3.6		0.0	0.0	3.1	0.8	0.7
Total Del/Veh (s)	64.8	54.0	17.3	46.4	58.4	32.2	13.5	30.2	7.3	52.5	16.9	11.4

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	24.3

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	3.0	2.2	1.8

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.2	0.0	0.2
Total Del/Veh (s)	5.5	6.4	8.6	5.4	5.2	6.4

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.7	3.2	1.7	2.4	1.8

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.3	0.2	0.7	4.0	3.7	0.1	0.1	0.2
Total Del/Veh (s)	5.6	2.4	2.2	7.4	2.9	2.0	43.2	27.6	13.6	12.4	19.1	11.9

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	13.1

Total Network Performance

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	49.7

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	105	186	137	125	430	260	592	583	320	224	380	384
Average Queue (ft)	50	89	56	108	288	179	347	302	83	94	249	265
95th Queue (ft)	92	161	104	156	487	311	584	536	239	211	351	360
Link Distance (ft)		364	364		404		1105	1105			1015	1015
Upstream Blk Time (%)					8		0	0				
Queuing Penalty (veh)					37		0	0				
Storage Bay Dist (ft)	250			100		160			160	200		
Storage Blk Time (%)				12	47	10	31	20	0	0	13	
Queuing Penalty (veh)				36	77	56	50	51	0	1	11	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	73	341	100	991	646	147	503
Average Queue (ft)	16	195	40	328	127	16	268
95th Queue (ft)	50	307	107	851	556	73	448
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)				1			
Queuing Penalty (veh)				3			
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		44	1			15	
Queuing Penalty (veh)		19	2			3	

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	78
Average Queue (ft)	34
95th Queue (ft)	69
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	99	109	115	89
Average Queue (ft)	52	56	59	41
95th Queue (ft)	82	88	90	72
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)				1
Queuing Penalty (veh)				1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	SW
Directions Served	LR
Maximum Queue (ft)	20
Average Queue (ft)	1
95th Queue (ft)	17
Link Distance (ft)	364
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	128	122	284	118	80
Average Queue (ft)	26	26	137	61	39
95th Queue (ft)	82	82	374	159	67
Link Distance (ft)	404	608	696		640
Upstream Blk Time (%)			1		
Queuing Penalty (veh)			0		
Storage Bay Dist (ft)				200	
Storage Blk Time (%)			10	0	
Queuing Penalty (veh)			13	0	

Network Summary

Network wide Queuing Penalty: 362

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

PM Build (Medium Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Future Volume (veh/h)	73	134	163	164	170	128	158	1161	258	85	1052	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	79	146	177	178	185	139	172	1262	280	92	1143	103
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	153	270	229	312	200	150	223	1688	753	146	1425	128
Arrive On Green	0.04	0.14	0.14	0.10	0.20	0.20	0.13	0.47	0.47	0.08	0.43	0.43
Sat Flow, veh/h	1781	1870	1585	1781	991	745	1781	3554	1585	1781	3297	297
Grp Volume(v), veh/h	79	146	177	178	0	324	172	1262	280	92	615	631
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1736	1781	1777	1585	1781	1777	1817
Q Serve(g_s), s	4.5	8.7	12.9	9.9	0.0	22.0	11.2	34.7	8.4	6.0	36.1	36.2
Cycle Q Clear(g_c), s	4.5	8.7	12.9	9.9	0.0	22.0	11.2	34.7	8.4	6.0	36.1	36.2
Prop In Lane	1.00		1.00	1.00		0.43	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	153	270	229	312	0	349	223	1688	753	146	768	785
V/C Ratio(X)	0.52	0.54	0.77	0.57	0.00	0.93	0.77	0.75	0.37	0.63	0.80	0.80
Avail Cap(c_a), veh/h	153	281	238	314	0	362	223	1688	753	146	768	785
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.55	0.55	0.55
Uniform Delay (d), s/veh	42.6	47.7	49.5	37.1	0.0	47.1	50.8	25.6	7.8	53.3	29.6	29.6
Incr Delay (d2), s/veh	3.0	1.9	14.2	2.4	0.0	29.1	22.5	3.1	1.4	10.8	4.9	4.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	4.2	6.0	4.5	0.0	12.3	6.4	15.0	3.0	3.1	16.2	16.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.6	49.6	63.7	39.6	0.0	76.1	73.3	28.7	9.2	64.1	34.5	34.5
LnGrp LOS	D	D	E	D	A	E	E	C	A	E	C	C
Approach Vol, veh/h		402			502			1714			1338	
Approach Delay, s/veh		55.0			63.2			30.0			36.6	
Approach LOS		E			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.0	57.8	11.0	30.2	15.8	63.0	17.8	23.3				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	15.0	51.0	5.0	25.0	9.0	57.0	12.0	18.0				
Max Q Clear Time (g_c+I1), s	13.2	38.2	6.5	24.0	8.0	36.7	11.9	14.9				
Green Ext Time (p_c), s	0.1	5.3	0.0	0.2	0.0	9.1	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay			39.0									
HCM 6th LOS			D									

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Medium Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Future Volume (vph)	8	2	8	288	2	44	1	903	443	20	800	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.94			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1711			1775	1583		1863	1583	1770	1857	
Flt Permitted		0.88			0.45	1.00		1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1538			841	1583		1862	1583	112	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	2	9	313	2	48	1	982	482	22	870	17
RTOR Reduction (vph)	0	9	0	0	0	37	0	0	124	0	0	0
Lane Group Flow (vph)	0	11	0	0	315	11	0	983	358	22	887	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		3.3			28.0	28.0		60.8	60.8	70.7	70.7	
Effective Green, g (s)		3.3			28.0	28.0		60.8	60.8	70.7	70.7	
Actuated g/C Ratio		0.03			0.23	0.23		0.51	0.51	0.59	0.59	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		42			196	369		943	802	119	1094	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.01			c0.37	0.01		c0.53	0.23	0.10		
v/c Ratio		0.27			1.61	0.03		1.04	0.45	0.18	0.81	
Uniform Delay, d1		57.2			46.0	35.5		29.6	18.9	26.9	19.4	
Progression Factor		1.00			1.00	1.00		0.35	0.07	1.00	1.00	
Incremental Delay, d2		3.4			295.7	0.2		36.0	1.2	0.8	6.5	
Delay (s)		60.6			341.7	35.7		46.2	2.5	27.6	25.9	
Level of Service		E			F	D		D	A	C	C	
Approach Delay (s)		60.6			301.2			31.8			26.0	
Approach LOS		E			F			C			C	
Intersection Summary												
HCM 2000 Control Delay			65.6				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.20									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			89.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection

Intersection Delay, s/veh 11.2

Intersection LOS B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	213	252	210	78	111	0
Future Vol, veh/h	213	252	210	78	111	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	232	274	228	85	121	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left SB			WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	11.4	11.2	10.4
HCM LOS	B	B	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	73%	0%
Vol Right, %	0%	0%	27%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	213	252	288	111
LT Vol	213	0	0	111
Through Vol	0	252	210	0
RT Vol	0	0	78	0
Lane Flow Rate	232	274	313	121
Geometry Grp	7	7	5	2
Degree of Util (X)	0.363	0.392	0.414	0.197
Departure Headway (Hd)	5.652	5.149	4.762	5.878
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	634	696	751	606
Service Time	3.411	2.907	2.818	3.957
HCM Lane V/C Ratio	0.366	0.394	0.417	0.2
HCM Control Delay	11.6	11.2	11.2	10.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.7	1.9	2	0.7

Intersection												
Int Delay, s/veh	13.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	52	184	135	29	200	26	221	14	110	42	7	39
Future Vol, veh/h	52	184	135	29	200	26	221	14	110	42	7	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	200	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	200	147	32	217	28	240	15	120	46	8	42
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	245	0	0	347	0	0	708	697	274	750	756	231
Stage 1	-	-	-	-	-	-	388	388	-	295	295	-
Stage 2	-	-	-	-	-	-	320	309	-	455	461	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1321	-	-	1212	-	-	350	365	765	328	337	808
Stage 1	-	-	-	-	-	-	636	609	-	713	669	-
Stage 2	-	-	-	-	-	-	692	660	-	585	565	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1321	-	-	1212	-	-	305	334	765	250	309	808
Mov Cap-2 Maneuver	-	-	-	-	-	-	305	334	-	250	309	-
Stage 1	-	-	-	-	-	-	601	576	-	674	648	-
Stage 2	-	-	-	-	-	-	628	640	-	454	534	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.1			0.9			35.8			18.2		
HCM LOS							E			C		
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1			
Capacity (veh/h)	305	668	1321	-	-	1212	-	-	368			
HCM Lane V/C Ratio	0.788	0.202	0.043	-	-	0.026	-	-	0.26			
HCM Control Delay (s)	49.4	11.7	7.8	0	-	8.1	0	-	18.2			
HCM Lane LOS	E	B	A	A	-	A	A	-	C			
HCM 95th %tile Q(veh)	6.3	0.8	0.1	-	-	0.1	-	-	1			

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.4	7.9	10.2	4.7	99.3	90.9	89.3	0.6	0.3	0.3
Total Del/Veh (s)	85.2	52.3	30.2	67.7	77.6	69.1	205.8	165.0	128.4	59.4	47.9	49.3

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	30.0
Total Del/Veh (s)	86.6

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.7	0.8	3.5	0.0	0.0	0.0	121.7	109.7	91.3
Total Del/Veh (s)	64.2	71.5	18.8	32.9	28.9	25.3	244.1	177.7	35.8	118.9	94.6	79.6

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	43.4
Total Del/Veh (s)	95.4

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.2	0.6	2.3	0.9

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.3	0.0	0.2
Total Del/Veh (s)	3.4	0.4	0.8	0.5	8.3	1.9

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	2.2	1.0	1.8	1.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1
Total Del/Veh (s)	4.0	1.6	1.0	6.7	13.0	11.8	8.1	3.6	11.4	10.1	6.1

Total Network Performance

Denied Del/Veh (s)	50.6
Total Del/Veh (s)	130.4

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	190	314	125	376	185	962	817	124	627	681
Average Queue (ft)	67	125	91	158	111	613	584	35	391	419
95th Queue (ft)	149	237	153	360	225	1357	1345	95	616	653
Link Distance (ft)		364		425		1104	1104		1015	1015
Upstream Blk Time (%)		1		5		33	29			
Queuing Penalty (veh)		2		10		0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)	1	1	19	24	1	51		0	49	
Queuing Penalty (veh)	3	1	26	35	4	56		1	19	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	81	483	100	1050	1055	174	823
Average Queue (ft)	26	248	35	810	648	43	733
95th Queue (ft)	65	428	102	1339	1386	148	957
Link Distance (ft)	607	481		1015	1015		772
Upstream Blk Time (%)		1		24	15		48
Queuing Penalty (veh)		0		103	63		0
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		38	0			0	53
Queuing Penalty (veh)		17	1			0	18

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	81
Average Queue (ft)	26
95th Queue (ft)	62
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	96	19	68
Average Queue (ft)	31	1	32
95th Queue (ft)	72	9	58
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	19
Average Queue (ft)	1
95th Queue (ft)	17
Link Distance (ft)	96
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	68	124	31	105
Average Queue (ft)	12	13	5	41
95th Queue (ft)	45	117	24	86
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 360

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM No Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	50	177	149	77	55	110	721	80	39	1325	77
Future Volume (veh/h)	72	50	177	149	77	55	110	721	80	39	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	54	192	162	84	60	120	784	87	42	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	136	59	211	193	200	143	163	1451	161	198	1602	93
Arrive On Green	0.04	0.17	0.17	0.07	0.20	0.20	0.09	0.45	0.45	0.22	0.94	0.94
Sat Flow, veh/h	1781	360	1280	1781	1015	725	1781	3225	358	1781	3413	198
Grp Volume(v), veh/h	78	0	246	162	0	144	120	432	439	42	747	777
Grp Sat Flow(s),veh/h/ln	1781	0	1640	1781	0	1740	1781	1777	1806	1781	1777	1835
Q Serve(g_s), s	4.8	0.0	17.7	6.6	0.0	8.7	7.9	21.2	21.2	2.3	19.4	20.2
Cycle Q Clear(g_c), s	4.8	0.0	17.7	6.6	0.0	8.7	7.9	21.2	21.2	2.3	19.4	20.2
Prop In Lane	1.00		0.78	1.00		0.42	1.00		0.20	1.00		0.11
Lane Grp Cap(c), veh/h	136	0	271	193	0	343	163	800	813	198	834	861
V/C Ratio(X)	0.58	0.00	0.91	0.84	0.00	0.42	0.73	0.54	0.54	0.21	0.90	0.90
Avail Cap(c_a), veh/h	136	0	287	284	0	449	163	800	813	198	834	861
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	47.8	0.0	49.2	53.3	0.0	42.2	53.1	24.0	24.0	42.4	2.5	2.6
Incr Delay (d2), s/veh	5.8	0.0	29.6	13.6	0.0	0.8	25.2	2.6	2.6	0.2	1.6	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	9.4	5.5	0.0	3.8	4.7	9.4	9.5	1.0	1.7	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.6	0.0	78.8	66.9	0.0	43.0	78.3	26.6	26.6	42.6	4.1	4.2
LnGrp LOS	D	A	E	E	A	D	E	C	C	D	A	A
Approach Vol, veh/h	324			306			991			1566		
Approach Delay, s/veh	72.8			55.6			32.8			5.2		
Approach LOS	E			E			C			A		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	62.3	11.0	29.7	19.3	60.0	14.8	25.8				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	9.9	22.2	6.8	10.7	4.3	23.2	8.6	19.7				
Green Ext Time (p_c), s	0.0	9.8	0.0	0.5	0.0	4.5	0.3	0.1				
Intersection Summary												
HCM 6th Ctrl Delay	25.5											
HCM 6th LOS	C											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM No Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	459	6	44	6	586	254	33	829	6
Future Volume (vph)	11	6	11	459	6	44	6	586	254	33	829	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1775	1583		1862	1583	1770	1861	
Flt Permitted		0.34			0.71	1.00		0.56	1.00	0.08	1.00	
Satd. Flow (perm)		605			1316	1583		1051	1583	157	1861	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	499	7	48	7	637	276	36	901	7
RTOR Reduction (vph)	0	11	0	0	0	31	0	0	142	0	0	0
Lane Group Flow (vph)	0	20	0	0	506	17	0	644	134	36	908	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		8.1			43.3	43.3		41.6	41.6	50.6	50.6	
Effective Green, g (s)		8.1			43.3	43.3		41.6	41.6	50.6	50.6	
Actuated g/C Ratio		0.07			0.36	0.36		0.35	0.35	0.42	0.42	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		40			474	571		364	548	106	784	
v/s Ratio Prot										0.01	c0.49	
v/s Ratio Perm		c0.03			c0.38	0.01		c0.61	0.08	0.13		
v/c Ratio		0.50			1.07	0.03		1.77	0.24	0.34	1.16	
Uniform Delay, d1		54.0			38.4	24.8		39.2	28.0	28.6	34.7	
Progression Factor		1.00			1.00	1.00		0.70	0.61	1.00	1.00	
Incremental Delay, d2		9.3			60.5	0.1		356.2	1.0	1.9	85.2	
Delay (s)		63.3			98.9	24.9		383.5	18.1	30.5	119.9	
Level of Service		E			F	C		F	B	C	F	
Approach Delay (s)		63.3			92.5			273.9			116.5	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		169.5			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.37										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			24.0				
Intersection Capacity Utilization		86.4%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	177	227	215	55	61	0
Future Vol, veh/h	177	227	215	55	61	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	192	247	234	60	66	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	294	0	-	0	895	-
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	631	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1268	-	-	-	311	0
Stage 1	-	-	-	-	780	0
Stage 2	-	-	-	-	530	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1268	-	-	-	264	-
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	530	-
Approach	EB	WB		SB		
HCM Control Delay, s	3.7	0		23.1		
HCM LOS	C					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1268	-	-	-	264	
HCM Lane V/C Ratio	0.152	-	-	-	0.251	
HCM Control Delay (s)	8.3	-	-	-	23.1	
HCM Lane LOS	A	-	-	-	C	
HCM 95th %tile Q(veh)	0.5	-	-	-	1	

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	149	16	0	149	33	2	1	1	39	0	65
Future Vol, veh/h	46	149	16	0	149	33	2	1	1	39	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	162	17	0	162	36	2	1	1	42	0	71
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	198	0	0	179	0	0	487	469	171	452	459	180
Stage 1	-	-	-	-	-	-	271	271	-	180	180	-
Stage 2	-	-	-	-	-	-	216	198	-	272	279	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1375	-	-	1397	-	-	491	492	873	518	499	863
Stage 1	-	-	-	-	-	-	735	685	-	822	750	-
Stage 2	-	-	-	-	-	-	786	737	-	734	680	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1375	-	-	1397	-	-	437	472	873	501	479	863
Mov Cap-2 Maneuver	-	-	-	-	-	-	437	472	-	501	479	-
Stage 1	-	-	-	-	-	-	706	658	-	789	750	-
Stage 2	-	-	-	-	-	-	722	737	-	703	653	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.7			0			12.1			11.4		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	510	1375	-	-	1397	-	-	679				
HCM Lane V/C Ratio	0.009	0.036	-	-	-	-	-	0.166				
HCM Control Delay (s)	12.1	7.7	0	-	0	-	-	11.4				
HCM Lane LOS	B	A	A	-	A	-	-	B				
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	26.4	35.1	46.3	4.3	2.8	6.0	101.4	108.9	98.2	42.8	53.0	35.5
Total Del/Veh (s)	104.6	106.0	85.6	66.9	64.0	54.0	200.3	179.3	143.2	198.2	113.6	105.3

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	62.7
Total Del/Veh (s)	127.6

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.7	0.9	3.4	0.0	0.0	0.0	364.5	385.8	388.0
Total Del/Veh (s)	63.2	47.0	21.1	32.9	32.8	23.7	332.1	192.9	31.2	126.6	113.3	119.4

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	163.5
Total Del/Veh (s)	106.5

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.2	0.8	2.0	0.9

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	1.1	0.2	0.3	0.3	0.0	0.4
Total Del/Veh (s)	9.5	0.5	2.6	2.9	10.8	4.3

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.6	3.3	1.1	2.4	4.2

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
Total Del/Veh (s)	5.6	4.3	2.6	8.7	4.4	3.1	19.0	17.7	11.6	16.3	22.2	12.0

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	7.2

Total Network Performance

Denied Del/Veh (s)	138.2
Total Del/Veh (s)	162.2

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	275	377	125	413	185	1135	1141	125	1006	1014
Average Queue (ft)	141	271	110	208	127	722	719	110	724	743
95th Queue (ft)	309	436	152	396	243	1411	1412	151	1081	1097
Link Distance (ft)		364		425		1104	1104		1015	1015
Upstream Blk Time (%)		13		4		37	36		1	1
Queuing Penalty (veh)		42		11		0	0		7	9
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)	0	36	30	30	5	60		38	54	
Queuing Penalty (veh)	0	26	57	54	19	66		253	64	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	74	471	100	1048	1069	174	826
Average Queue (ft)	28	251	28	909	706	24	792
95th Queue (ft)	61	414	89	1277	1369	103	809
Link Distance (ft)	607	481		1015	1015		772
Upstream Blk Time (%)		1		27	14		66
Queuing Penalty (veh)		0		119	59		0
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		39	0				57
Queuing Penalty (veh)		17	0				19

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	68
Average Queue (ft)	25
95th Queue (ft)	57
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	127	6	126	93
Average Queue (ft)	49	0	11	39
95th Queue (ft)	108	4	69	73
Link Distance (ft)	181	181	600	96
Upstream Blk Time (%)	0			1
Queuing Penalty (veh)	0			1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	NB	SW
Directions Served	R	LR
Maximum Queue (ft)	103	189
Average Queue (ft)	28	16
95th Queue (ft)	99	155
Link Distance (ft)	96	364
Upstream Blk Time (%)	7	0
Queuing Penalty (veh)	23	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	98	142	147	138
Average Queue (ft)	21	36	57	54
95th Queue (ft)	67	101	108	104
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 848

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	134	177	184	105	82	110	721	250	119	1325	77
Future Volume (veh/h)	72	134	177	184	105	82	110	721	250	119	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	146	192	200	114	89	120	784	272	129	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	128	169	230	223	174	163	1165	404	142	1495	87
Arrive On Green	0.04	0.17	0.17	0.10	0.23	0.23	0.09	0.45	0.45	0.16	0.88	0.88
Sat Flow, veh/h	1781	733	964	1781	974	760	1781	2588	898	1781	3413	198
Grp Volume(v), veh/h	78	0	338	200	0	203	120	538	518	129	747	777
Grp Sat Flow(s),veh/h/ln	1781	0	1697	1781	0	1734	1781	1777	1709	1781	1777	1835
Q Serve(g_s), s	4.7	0.0	21.0	9.2	0.0	12.3	7.9	28.7	28.7	8.5	39.4	41.0
Cycle Q Clear(g_c), s	4.7	0.0	21.0	9.2	0.0	12.3	7.9	28.7	28.7	8.5	39.4	41.0
Prop In Lane	1.00		0.57	1.00		0.44	1.00		0.53	1.00		0.11
Lane Grp Cap(c), veh/h	134	0	297	230	0	396	163	800	769	142	778	804
V/C Ratio(X)	0.58	0.00	1.14	0.87	0.00	0.51	0.73	0.67	0.67	0.91	0.96	0.97
Avail Cap(c_a), veh/h	134	0	297	283	0	448	163	800	769	142	778	804
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	46.8	0.0	49.5	51.9	0.0	40.4	53.1	26.0	26.0	50.0	6.6	6.7
Incr Delay (d2), s/veh	6.2	0.0	94.9	21.0	0.0	1.0	25.2	4.5	4.7	9.2	4.1	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	16.7	7.2	0.0	5.4	4.7	12.9	12.5	3.9	3.8	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.0	0.0	144.4	72.9	0.0	41.5	78.3	30.5	30.7	59.2	10.7	11.2
LnGrp LOS	D	A	F	E	A	D	E	C	C	E	B	B
Approach Vol, veh/h	416			403			1176			1653		
Approach Delay, s/veh	127.3			57.1			35.5			14.7		
Approach LOS	F			E			D			B		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	58.6	11.0	33.4	15.6	60.0	17.4	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+l1), s	9.9	43.0	6.7	14.3	10.5	30.7	11.2	23.0				
Green Ext Time (p_c), s	0.0	3.9	0.0	0.8	0.0	5.7	0.3	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	38.9											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	459	6	44	6	612	254	33	909	6
Future Volume (vph)	11	6	11	459	6	44	6	612	254	33	909	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1775	1583		1862	1583	1770	1861	
Flt Permitted		0.34			0.71	1.00		0.56	1.00	0.08	1.00	
Satd. Flow (perm)		605			1316	1583		1051	1583	157	1861	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	499	7	48	7	665	276	36	988	7
RTOR Reduction (vph)	0	11	0	0	0	31	0	0	137	0	0	0
Lane Group Flow (vph)	0	20	0	0	506	17	0	672	139	36	995	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		8.1			43.3	43.3		41.6	41.6	50.6	50.6	
Effective Green, g (s)		8.1			43.3	43.3		41.6	41.6	50.6	50.6	
Actuated g/C Ratio		0.07			0.36	0.36		0.35	0.35	0.42	0.42	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		40			474	571		364	548	106	784	
v/s Ratio Prot										0.01	c0.53	
v/s Ratio Perm		c0.03			c0.38	0.01		c0.64	0.09	0.13		
v/c Ratio		0.50			1.07	0.03		1.85	0.25	0.34	1.27	
Uniform Delay, d1		54.0			38.4	24.8		39.2	28.1	28.6	34.7	
Progression Factor		1.00			1.00	1.00		0.73	0.82	1.00	1.00	
Incremental Delay, d2		9.3			60.5	0.1		389.0	0.9	1.9	131.1	
Delay (s)		63.3			98.9	24.9		417.6	24.0	30.5	165.8	
Level of Service		E			F	C		F	C	C	F	
Approach Delay (s)		63.3			92.5			303.0			161.1	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay		197.6			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.41										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			24.0				
Intersection Capacity Utilization		90.6%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	198	227	215	119	82	0
Future Vol, veh/h	198	227	215	119	82	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	247	234	129	89	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	363	0	-	0	976	-
Stage 1	-	-	-	-	299	-
Stage 2	-	-	-	-	677	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1196	-	-	-	279	0
Stage 1	-	-	-	-	752	0
Stage 2	-	-	-	-	505	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1196	-	-	-	229	-
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	505	-
Approach	EB	WB		SB		
HCM Control Delay, s	4	0		30.4		
HCM LOS	D					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1196	-	-	-	229	
HCM Lane V/C Ratio	0.18	-	-	-	0.389	
HCM Control Delay (s)	8.7	-	-	-	30.4	
HCM Lane LOS	A	-	-	-	D	
HCM 95th %tile Q(veh)	0.7	-	-	-	1.7	

Intersection												
Int Delay, s/veh	7.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	149	351	72	149	33	91	7	45	39	17	65
Future Vol, veh/h	46	149	351	72	149	33	91	7	45	39	17	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	162	382	78	162	36	99	8	49	42	18	71
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	198	0	0	544	0	0	834	807	353	818	980	180
Stage 1	-	-	-	-	-	-	453	453	-	336	336	-
Stage 2	-	-	-	-	-	-	381	354	-	482	644	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1375	-	-	1025	-	-	288	315	691	295	250	863
Stage 1	-	-	-	-	-	-	586	570	-	678	642	-
Stage 2	-	-	-	-	-	-	641	630	-	565	468	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1375	-	-	1025	-	-	222	272	691	240	216	863
Mov Cap-2 Maneuver	-	-	-	-	-	-	222	272	-	240	216	-
Stage 1	-	-	-	-	-	-	554	539	-	641	587	-
Stage 2	-	-	-	-	-	-	521	576	-	489	442	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.7			2.5			31.6			19.3		
HCM LOS							D			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	286	1375	-	-	1025	-	-	382				
HCM Lane V/C Ratio	0.543	0.036	-	-	0.076	-	-	0.344				
HCM Control Delay (s)	31.6	7.7	0	-	8.8	0	-	19.3				
HCM Lane LOS	D	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	3	0.1	-	-	0.2	-	-	1.5				

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.3	0.1	1.6	0.9	1.4	2.5	0.4	2.4	0.4	0.0	0.1
Total Del/Veh (s)	41.1	66.5	20.8	54.5	52.1	40.4	51.1	18.7	6.2	30.4	23.9	22.5

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.6
Total Del/Veh (s)	27.6

2: WASHINGTON AVE & PRESUMPCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	29.7	29.0	24.3	0.0	0.0	2.8	0.2	0.3	6.5
Total Del/Veh (s)	63.9	48.4	22.0	124.6	63.5	25.5	12.7	3.2	22.2	15.1	9.8	36.0

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	2.8	2.0	1.7

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.3	0.0	0.2
Total Del/Veh (s)	5.4	6.0	8.6	5.9	4.6	6.4

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.7	2.8	1.4	2.0	1.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.2	0.6	1.1	0.2	0.3	0.3	0.3	4.1	4.0	0.2	0.2	0.2
Total Del/Veh (s)	36.0	35.2	26.2	44.9	36.6	30.4	38.1	30.3	6.3	52.6	49.6	23.1

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	32.3

Total Network Performance

Denied Del/Veh (s)	4.4
Total Del/Veh (s)	53.6

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	171	248	189	124	394	236	290	250	183	224	435	471
Average Queue (ft)	54	112	81	111	182	90	158	132	54	108	265	292
95th Queue (ft)	113	203	144	148	339	175	249	222	114	243	382	407
Link Distance (ft)		364	364		405		1096	1096			1010	1010
Upstream Blk Time (%)					0							
Queuing Penalty (veh)					0							
Storage Bay Dist (ft)	250			100		160			160	200		
Storage Blk Time (%)		0		22	19	1	9	3	0		14	
Queuing Penalty (veh)		0		41	34	5	10	6	0		17	

Intersection: 2: WASHINGTON AVE & PRESUMPSCOT

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	T	R	L	T	TR
Maximum Queue (ft)	86	540	523	314	63	153	291	268
Average Queue (ft)	28	475	328	102	11	26	170	131
95th Queue (ft)	66	582	693	219	37	90	261	227
Link Distance (ft)	608	483	483	1010	1010		748	748
Upstream Blk Time (%)		61	20					
Queuing Penalty (veh)		0	0					
Storage Bay Dist (ft)						150		
Storage Blk Time (%)							11	
Queuing Penalty (veh)							4	

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	93
Average Queue (ft)	26
95th Queue (ft)	63
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

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Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	106	101	121	71
Average Queue (ft)	50	54	62	37
95th Queue (ft)	85	84	96	61
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	SW
Directions Served	LR
Maximum Queue (ft)	29
Average Queue (ft)	1
95th Queue (ft)	15
Link Distance (ft)	364
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	417	317	141	77	194
Average Queue (ft)	231	142	69	25	86
95th Queue (ft)	406	273	130	59	159
Link Distance (ft)	405	608	696		640
Upstream Blk Time (%)	2				
Queuing Penalty (veh)	10				
Storage Bay Dist (ft)				200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 128

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

AM Build (Long Term) - Mitigation

09/27/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	134	177	184	105	82	110	721	250	119	1325	77
Future Volume (veh/h)	72	134	177	184	105	82	110	721	250	119	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	146	192	200	114	89	120	784	272	129	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	234	234	198	306	187	146	200	1836	819	343	1678	98
Arrive On Green	0.04	0.13	0.13	0.11	0.19	0.19	0.08	0.52	0.52	0.05	0.49	0.49
Sat Flow, veh/h	1781	1870	1585	1781	974	760	1781	3554	1585	1781	3413	198
Grp Volume(v), veh/h	78	146	192	200	0	203	120	784	272	129	747	777
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1734	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	4.6	8.9	14.5	11.4	0.0	12.9	4.5	16.4	6.8	0.0	44.3	44.8
Cycle Q Clear(g_c), s	4.6	8.9	14.5	11.4	0.0	12.9	4.5	16.4	6.8	0.0	44.3	44.8
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	234	234	198	306	0	332	200	1836	819	343	874	902
V/C Ratio(X)	0.33	0.62	0.97	0.65	0.00	0.61	0.60	0.43	0.33	0.38	0.86	0.86
Avail Cap(c_a), veh/h	234	234	198	306	0	332	200	1836	819	343	874	902
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.74	0.00	0.74	1.00	1.00	1.00	0.64	0.64	0.64
Uniform Delay (d), s/veh	43.7	49.8	52.3	38.6	0.0	44.4	27.1	18.0	5.5	27.2	26.8	26.9
Incr Delay (d2), s/veh	0.8	5.1	54.8	3.7	0.0	2.4	12.6	0.7	1.1	2.0	7.0	7.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	4.5	8.8	5.3	0.0	5.7	2.5	6.8	4.2	3.0	19.8	20.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.5	54.9	107.1	42.3	0.0	46.8	39.7	18.7	6.6	29.2	33.8	34.0
LnGrp LOS	D	D	F	D	A	D	D	B	A	C	C	C
Approach Vol, veh/h		416			403			1176			1653	
Approach Delay, s/veh		77.1			44.6			18.0			33.5	
Approach LOS		E			D			B			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	65.0	11.0	29.0	12.0	68.0	19.0	21.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	59.0	5.0	23.0	6.0	62.0	13.0	15.0				
Max Q Clear Time (g_c+I1), s	6.5	46.8	6.6	14.9	2.0	18.4	13.4	16.5				
Green Ext Time (p_c), s	0.1	6.6	0.0	0.5	0.1	6.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			34.7									
HCM 6th LOS			C									

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Build (Long Term) - Mitigation

09/27/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	459	6	44	0	612	254	33	909	6
Future Volume (vph)	11	6	11	459	6	44	0	612	254	33	909	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00	1.00	0.95	
Frt		0.95		1.00	0.87			1.00	0.85	1.00	1.00	
Flt Protected		0.98		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732		1770	1619			1863	1583	1770	3535	
Flt Permitted		0.85		0.95	1.00			1.00	1.00	0.15	1.00	
Satd. Flow (perm)		1499		1770	1619			1863	1583	281	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	499	7	48	0	665	276	36	988	7
RTOR Reduction (vph)	0	11	0	0	46	0	0	0	79	0	0	0
Lane Group Flow (vph)	0	20	0	499	9	0	0	665	197	36	995	0
Turn Type	Perm	NA		Prot	NA			NA	pm+ov	pm+pt	NA	
Protected Phases		4		3	4			6	3	5	2	
Permitted Phases	4								6	2		
Actuated Green, G (s)		6.1		31.0	6.1			54.5	85.5	64.9	64.9	
Effective Green, g (s)		6.1		31.0	6.1			54.5	85.5	64.9	64.9	
Actuated g/C Ratio		0.05		0.26	0.05			0.45	0.71	0.54	0.54	
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		76		457	82			846	1207	206	1911	
v/s Ratio Prot				c0.28	0.01			c0.36	0.04	0.01	c0.28	
v/s Ratio Perm		c0.01							0.08	0.09		
v/c Ratio		0.26		1.09	0.12			0.79	0.16	0.17	0.52	
Uniform Delay, d1		54.8		44.5	54.4			27.8	5.6	19.4	17.6	
Progression Factor		1.00		1.00	1.00			0.62	1.50	1.00	1.00	
Incremental Delay, d2		1.8		69.3	0.6			6.7	0.1	0.4	1.0	
Delay (s)		56.6		113.8	55.0			23.9	8.5	19.8	18.6	
Level of Service		E		F	E			C	A	B	B	
Approach Delay (s)		56.6			108.0			19.4			18.7	
Approach LOS		E			F			B			B	
Intersection Summary												
HCM 2000 Control Delay			38.7			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			74.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	198	227	215	119	82	0
Future Vol, veh/h	198	227	215	119	82	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	247	234	129	89	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	10.8	11.5	10
HCM LOS	B	B	A

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	64%	0%
Vol Right, %	0%	0%	36%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	198	227	334	82
LT Vol	198	0	0	82
Through Vol	0	227	215	0
RT Vol	0	0	119	0
Lane Flow Rate	215	247	363	89
Geometry Grp	7	7	5	2
Degree of Util (X)	0.334	0.348	0.461	0.146
Departure Headway (Hd)	5.579	5.075	4.568	5.881
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	644	706	788	606
Service Time	3.324	2.821	2.61	3.952
HCM Lane V/C Ratio	0.334	0.35	0.461	0.147
HCM Control Delay	11.1	10.5	11.5	10
HCM Lane LOS	B	B	B	A
HCM 95th-tile Q	1.5	1.6	2.5	0.5

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

AM Build (Long Term) - Mitigation

09/27/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	149	351	72	149	33	91	7	45	39	17	65
Future Volume (veh/h)	46	149	351	72	149	33	91	7	45	39	17	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	50	162	382	78	162	36	99	8	49	42	18	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	71	187	407	114	223	45	647	83	505	52	22	87
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.36	0.36	0.36	0.10	0.10	0.10
Sat Flow, veh/h	99	478	1039	192	570	114	1781	227	1392	538	231	910
Grp Volume(v), veh/h	594	0	0	276	0	0	99	0	57	131	0	0
Grp Sat Flow(s),veh/h/ln	1616	0	0	877	0	0	1781	0	1620	1680	0	0
Q Serve(g_s), s	7.4	0.0	0.0	0.0	0.0	0.0	4.5	0.0	2.8	9.2	0.0	0.0
Cycle Q Clear(g_c), s	42.4	0.0	0.0	35.0	0.0	0.0	4.5	0.0	2.8	9.2	0.0	0.0
Prop In Lane	0.08		0.64	0.28		0.13	1.00		0.86	0.32		0.54
Lane Grp Cap(c), veh/h	665	0	0	381	0	0	647	0	588	161	0	0
V/C Ratio(X)	0.89	0.00	0.00	0.72	0.00	0.00	0.15	0.00	0.10	0.81	0.00	0.00
Avail Cap(c_a), veh/h	733	0	0	440	0	0	647	0	588	252	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	35.0	0.0	0.0	30.3	0.0	0.0	25.8	0.0	25.2	53.2	0.0	0.0
Incr Delay (d2), s/veh	11.8	0.0	0.0	4.9	0.0	0.0	0.5	0.0	0.3	10.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.5	0.0	0.0	7.5	0.0	0.0	2.0	0.0	1.1	4.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.8	0.0	0.0	35.2	0.0	0.0	26.3	0.0	25.6	63.9	0.0	0.0
LnGrp LOS	D	A	A	D	A	A	C	A	C	E	A	A
Approach Vol, veh/h		594			276			156			131	
Approach Delay, s/veh		46.8			35.2			26.0			63.9	
Approach LOS		D			D			C			E	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		49.6		52.9		17.5		52.9				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		32.0		52.0		18.0		52.0				
Max Q Clear Time (g_c+I1), s		6.5		44.4		11.2		37.0				
Green Ext Time (p_c), s		0.6		2.5		0.3		1.6				
Intersection Summary												
HCM 6th Ctrl Delay				43.2								
HCM 6th LOS				D								

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	353.1	472.0	461.4	6.0	3.5	3.9	323.1	331.5	333.9	71.1	56.7	48.3
Total Del/Veh (s)	142.0	262.6	250.9	54.1	57.9	46.2	214.8	195.7	291.8	364.3	55.9	51.1

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	197.4
Total Del/Veh (s)	157.2

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.1	0.6	0.5	3.3	0.0	0.0	0.0	642.8	619.6	652.8
Total Del/Veh (s)	55.1	48.9	12.1	30.1	31.6	18.6	360.4	129.9	16.4	52.7	119.0	129.2

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	307.4
Total Del/Veh (s)	88.1

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	1077.8	0.0	0.0	408.3
Total Del/Veh (s)	1143.9	5.3	2.5	188.9

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	1703.3	1651.5	289.2	307.5	0.0	807.8
Total Del/Veh (s)	919.8	1.4	176.9	193.0	27.2	200.8

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	56.4	3.9	1.1	2.9	27.9

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	29.5	45.9	48.7	1041.7	1031.0	998.4	0.2	0.3	0.2	0.2	0.2	0.2
Total Del/Veh (s)	64.2	65.0	53.9	248.7	243.9	252.2	41.7	33.5	29.8	56.1	53.0	34.0

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	307.3
Total Del/Veh (s)	86.4

Total Network Performance

Movement	All
Denied Del/Veh (s)	542.4
Total Del/Veh (s)	254.5

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	275	381	125	441	185	1145	1150	225	905	878
Average Queue (ft)	110	372	89	191	119	1086	1099	222	672	634
95th Queue (ft)	321	381	151	413	226	1256	1223	238	1019	994
Link Distance (ft)		364		424		1098	1098		1015	1015
Upstream Blk Time (%)		77		4		66	79		1	1
Queuing Penalty (veh)		349		13		0	0		6	5
Storage Bay Dist (ft)	250		100		160			200		
Storage Blk Time (%)	0	92	17	18	2	50		84	9	
Queuing Penalty (veh)	0	66	33	34	7	55		555	23	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	74	431	100	1031	1033	782	784
Average Queue (ft)	21	231	28	525	220	752	760
95th Queue (ft)	55	384	89	1063	824	852	774
Link Distance (ft)	607	482		1015	1015	741	741
Upstream Blk Time (%)		0		12	8	55	92
Queuing Penalty (veh)		0		53	37	0	0
Storage Bay Dist (ft)			75				
Storage Blk Time (%)		40	0				
Queuing Penalty (veh)		17	0				

Intersection: 6: BAXTER BLVD

Movement	EB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	571	148	92
Average Queue (ft)	488	15	18
95th Queue (ft)	745	112	59
Link Distance (ft)	552	181	219
Upstream Blk Time (%)	79	1	
Queuing Penalty (veh)	0	2	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	186	636	103
Average Queue (ft)	181	549	41
95th Queue (ft)	184	781	84
Link Distance (ft)	181	600	96
Upstream Blk Time (%)	93	63	3
Queuing Penalty (veh)	106	0	3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB	SW
Directions Served	R	LR
Maximum Queue (ft)	118	66
Average Queue (ft)	101	3
95th Queue (ft)	114	35
Link Distance (ft)	96	364
Upstream Blk Time (%)	73	
Queuing Penalty (veh)	331	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	442	405	217	238
Average Queue (ft)	413	378	94	118
95th Queue (ft)	500	394	177	199
Link Distance (ft)	424	362	696	639
Upstream Blk Time (%)	19	97		
Queuing Penalty (veh)	201	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 1897

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

AM Long Term Existing Zoning

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	295	192	202	116	91	120	784	567	270	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	275	194	126	208	219	171	134	827	587	208	1564	91
Arrive On Green	0.04	0.18	0.18	0.08	0.22	0.22	0.08	0.42	0.42	0.12	0.46	0.46
Sat Flow, veh/h	1781	1058	689	1781	971	762	1781	1985	1409	1781	3413	198
Grp Volume(v), veh/h	78	0	487	202	0	207	120	700	651	270	747	777
Grp Sat Flow(s),veh/h/ln	1781	0	1746	1781	0	1733	1781	1777	1617	1781	1777	1835
Q Serve(g_s), s	4.3	0.0	22.0	10.0	0.0	12.6	8.0	45.5	47.1	14.0	47.2	47.7
Cycle Q Clear(g_c), s	4.3	0.0	22.0	10.0	0.0	12.6	8.0	45.5	47.1	14.0	47.2	47.7
Prop In Lane	1.00		0.39	1.00		0.44	1.00		0.87	1.00		0.11
Lane Grp Cap(c), veh/h	275	0	320	208	0	390	134	740	674	208	814	841
V/C Ratio(X)	0.28	0.00	1.52	0.97	0.00	0.53	0.90	0.95	0.97	1.30	0.92	0.92
Avail Cap(c_a), veh/h	275	0	320	208	0	390	134	740	674	208	814	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.09	0.00	0.09	1.00	1.00	1.00	0.09	0.09	0.09
Uniform Delay (d), s/veh	37.9	0.0	49.0	39.4	0.0	40.9	55.0	33.7	34.2	53.0	30.4	30.5
Incr Delay (d2), s/veh	0.6	0.0	249.9	12.3	0.0	0.1	54.4	22.2	27.2	138.0	2.1	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	31.8	5.5	0.0	5.4	5.6	23.7	23.1	14.2	20.0	20.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.5	0.0	298.9	51.7	0.0	41.0	109.4	55.9	61.4	191.0	32.5	32.7
LnGrp LOS	D	A	F	D	A	D	F	E	E	F	C	C
Approach Vol, veh/h	565			409			1471			1794		
Approach Delay, s/veh	262.9			46.3			62.7			56.4		
Approach LOS	F			D			E			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	61.0	11.0	33.0	20.0	56.0	16.0	28.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	55.0	5.0	27.0	14.0	50.0	10.0	22.0				
Max Q Clear Time (g_c+l1), s	10.0	49.7	6.3	14.6	16.0	49.1	12.0	24.0				
Green Ext Time (p_c), s	0.0	3.5	0.0	0.7	0.0	0.6	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	85.2											
HCM 6th LOS	F											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Long Term Existing Zoning

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔	↔	↔	↔	
Traffic Volume (vph)	11	6	11	459	6	44	6	614	254	33	1038	6
Future Volume (vph)	11	6	11	459	6	44	6	614	254	33	1038	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1775	1583		1862	1583	1770	1861	
Flt Permitted		0.34			0.71	1.00		0.56	1.00	0.08	1.00	
Satd. Flow (perm)		605			1316	1583		1051	1583	157	1861	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	499	7	48	7	667	276	36	1128	7
RTOR Reduction (vph)	0	11	0	0	0	31	0	0	136	0	0	0
Lane Group Flow (vph)	0	20	0	0	506	17	0	674	140	36	1135	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		8.1			43.3	43.3		41.6	41.6	50.6	50.6	
Effective Green, g (s)		8.1			43.3	43.3		41.6	41.6	50.6	50.6	
Actuated g/C Ratio		0.07			0.36	0.36		0.35	0.35	0.42	0.42	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		40			474	571		364	548	106	784	
v/s Ratio Prot										0.01	c0.61	
v/s Ratio Perm		c0.03			c0.38	0.01		c0.64	0.09	0.13		
v/c Ratio		0.50			1.07	0.03		1.85	0.26	0.34	1.45	
Uniform Delay, d1		54.0			38.4	24.8		39.2	28.1	28.6	34.7	
Progression Factor		1.00			1.00	1.00		0.98	1.51	1.00	1.00	
Incremental Delay, d2		9.3			60.5	0.1		389.1	0.6	1.9	208.6	
Delay (s)		63.3			98.9	24.9		427.6	43.1	30.5	243.3	
Level of Service		E			F	C		F	D	C	F	
Approach Delay (s)		63.3			92.5			315.9			236.8	
Approach LOS		E			F			F			F	
Intersection Summary												
HCM 2000 Control Delay			233.0				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.42									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		24.0			
Intersection Capacity Utilization			97.4%				ICU Level of Service		F			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	5.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	232	227	215	221	83	0
Future Vol, veh/h	232	227	215	221	83	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	252	247	234	240	90	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	474	0	-	0	1105	-
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	751	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1088	-	-	-	233	0
Stage 1	-	-	-	-	710	0
Stage 2	-	-	-	-	466	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1088	-	-	-	179	-
Mov Cap-2 Maneuver	-	-	-	-	179	-
Stage 1	-	-	-	-	545	-
Stage 2	-	-	-	-	466	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.7	0		44		
HCM LOS	E					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1088	-	-	-	179	
HCM Lane V/C Ratio	0.232	-	-	-	0.504	
HCM Control Delay (s)	9.3	-	-	-	44	
HCM Lane LOS	A	-	-	-	E	
HCM 95th %tile Q(veh)	0.9	-	-	-	2.5	

HCM 6th Signalized Intersection Summary

9: VERANDA & SHERWOOD

AM Long Term Existing Zoning

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Future Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	50	162	965	204	162	36	107	8	53	42	48	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	56	113	622	113	67	13	334	25	166	50	57	84
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.31	0.31	0.31	0.11	0.11	0.11
Sat Flow, veh/h	56	260	1436	156	154	30	1094	82	542	447	510	755
Grp Volume(v), veh/h	1177	0	0	402	0	0	168	0	0	161	0	0
Grp Sat Flow(s),veh/h/ln	1752	0	0	340	0	0	1718	0	0	1712	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	11.1	0.0	0.0
Cycle Q Clear(g_c), s	52.0	0.0	0.0	52.0	0.0	0.0	9.0	0.0	0.0	11.1	0.0	0.0
Prop In Lane	0.04		0.82	0.51		0.09	0.64		0.32	0.26		0.44
Lane Grp Cap(c), veh/h	790	0	0	193	0	0	525	0	0	190	0	0
V/C Ratio(X)	1.49	0.00	0.00	2.09	0.00	0.00	0.32	0.00	0.00	0.85	0.00	0.00
Avail Cap(c_a), veh/h	790	0	0	193	0	0	525	0	0	257	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	35.5	0.0	0.0	38.5	0.0	0.0	32.1	0.0	0.0	52.3	0.0	0.0
Incr Delay (d2), s/veh	220.7	0.0	0.0	506.2	0.0	0.0	1.6	0.0	0.0	17.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	71.5	0.0	0.0	33.0	0.0	0.0	4.0	0.0	0.0	5.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	256.2	0.0	0.0	544.7	0.0	0.0	33.7	0.0	0.0	69.6	0.0	0.0
LnGrp LOS	F	A	A	F	A	A	C	A	A	E	A	A
Approach Vol, veh/h	1177			402			168			161		
Approach Delay, s/veh	256.2			544.7			33.7			69.6		
Approach LOS	F			F			C			E		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	42.7			58.0			19.3			58.0		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	32.0			52.0			18.0			52.0		
Max Q Clear Time (g_c+I1), s	11.0			54.0			13.1			54.0		
Green Ext Time (p_c), s	0.9			0.0			0.3			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	281.6											
HCM 6th LOS	F											

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	489.1	516.6	381.6	2.2	1.2	1.7	4.5	3.0	4.3	193.0	157.3	136.2
Total Del/Veh (s)	162.7	402.1	47.2	59.8	42.2	29.1	59.2	29.4	58.5	441.6	113.1	101.1

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	109.8
Total Del/Veh (s)	110.4

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	109.5	120.7	109.7	0.0	0.0	0.0	99.1	92.4	124.6
Total Del/Veh (s)	65.5	56.3	30.4	134.6	80.2	21.1	32.4	12.9	47.0	38.6	157.1	153.9

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	64.3
Total Del/Veh (s)	100.0

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	1.6	0.0	0.0	0.7
Total Del/Veh (s)	59.1	3.0	1.5	27.7

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	737.6	763.0	1137.0	1116.3	0.0	863.2
Total Del/Veh (s)	152.1	9.1	457.2	509.4	4.9	209.4

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	36.4	2.4	1.4	1.9	17.3

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	64.9	55.4	64.1	137.2	161.3	138.3	0.3	4.0	3.9	0.2	0.2	0.2
Total Del/Veh (s)	53.2	53.1	46.7	190.3	185.5	182.1	57.8	56.0	9.0	52.4	50.5	27.6

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	71.0
Total Del/Veh (s)	79.9

Total Network Performance

Denied Del/Veh (s)	308.4
Total Del/Veh (s)	205.2

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	275	396	415	124	411	239	639	721	320	225	1043	1064
Average Queue (ft)	156	373	157	106	170	89	294	335	254	224	982	984
95th Queue (ft)	369	388	423	152	355	177	674	773	376	230	1186	1195
Link Distance (ft)		364	364		404		1099	1099			1010	1010
Upstream Blk Time (%)		75	19		1		1	3			19	14
Queuing Penalty (veh)		170	43		3		0	0			146	106
Storage Bay Dist (ft)	250			100		160			160	200		
Storage Blk Time (%)	0	97		25	9	1	15	5	39	94	9	
Queuing Penalty (veh)	0	70		48	17	4	17	28	141	623	22	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	LT	R	L	T	TR
Maximum Queue (ft)	66	525	510	350	297	785	793	798
Average Queue (ft)	24	455	325	90	162	438	603	579
95th Queue (ft)	58	623	692	237	261	1051	989	998
Link Distance (ft)	608	484	484	1010	1010	749	749	749
Upstream Blk Time (%)		64	22			38	54	43
Queuing Penalty (veh)		0	0			0	0	0
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 6: BAXTER BLVD

Movement	EB	SW
Directions Served	T	R
Maximum Queue (ft)	405	74
Average Queue (ft)	147	13
95th Queue (ft)	400	45
Link Distance (ft)	552	219
Upstream Blk Time (%)	2	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	187	135	635	70
Average Queue (ft)	174	54	607	35
95th Queue (ft)	206	116	708	61
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)	46	0	97	0
Queuing Penalty (veh)	53	0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	73
Average Queue (ft)	66
95th Queue (ft)	70
Link Distance (ft)	66
Upstream Blk Time (%)	72
Queuing Penalty (veh)	325
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	421	647	160	104	195
Average Queue (ft)	412	520	84	36	93
95th Queue (ft)	426	817	141	84	166
Link Distance (ft)	404	608	696		640
Upstream Blk Time (%)	21	60			
Queuing Penalty (veh)	219	0			
Storage Bay Dist (ft)				200	
Storage Blk Time (%)			1		
Queuing Penalty (veh)			0		

Network Summary

Network wide Queuing Penalty: 2034

HCM 6th Signalized Intersection Summary

1: BATES/VERANDA & WASHINGTON AVE

AM Long Term Existing Zoning - Mitigation

09/26/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Future Volume (veh/h)	72	271	177	186	107	84	110	721	522	248	1325	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	295	192	202	116	91	120	784	567	270	1440	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	273	326	276	208	135	106	194	1481	660	379	1595	93
Arrive On Green	0.12	0.17	0.17	0.08	0.14	0.14	0.08	0.42	0.42	0.13	0.47	0.47
Sat Flow, veh/h	1781	1870	1585	1781	971	762	1781	3554	1585	1781	3413	198
Grp Volume(v), veh/h	78	295	192	202	0	207	120	784	567	270	747	777
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1733	1781	1777	1585	1781	1777	1835
Q Serve(g_s), s	0.5	18.6	13.7	10.0	0.0	14.0	5.3	19.8	26.7	6.5	46.4	46.9
Cycle Q Clear(g_c), s	0.5	18.6	13.7	10.0	0.0	14.0	5.3	19.8	26.7	6.5	46.4	46.9
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	273	326	276	208	0	240	194	1481	660	379	830	857
V/C Ratio(X)	0.29	0.90	0.69	0.97	0.00	0.86	0.62	0.53	0.86	0.71	0.90	0.91
Avail Cap(c_a), veh/h	273	343	291	208	0	390	194	1481	660	379	830	857
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.00	0.09	1.00	1.00	1.00	0.58	0.58	0.58
Uniform Delay (d), s/veh	46.6	48.6	46.5	54.4	0.0	50.6	30.2	26.2	14.9	41.9	29.4	29.5
Incr Delay (d2), s/veh	0.6	25.6	6.6	12.3	0.0	1.1	14.0	1.4	13.6	6.5	9.4	9.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	10.9	5.9	6.9	0.0	6.1	3.0	8.6	11.7	8.1	21.4	22.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.2	74.2	53.2	66.7	0.0	51.6	44.2	27.6	28.6	48.4	38.8	39.1
LnGrp LOS	D	E	D	E	A	D	D	C	C	D	D	D
Approach Vol, veh/h		565			409			1471			1794	
Approach Delay, s/veh		63.3			59.1			29.3			40.3	
Approach LOS		E			E			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	15.0	62.1	20.3	22.6	21.1	56.0	16.0	26.9				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	9.0	55.0	5.0	27.0	14.0	50.0	10.0	22.0				
Max Q Clear Time (g_c+l1), s	7.3	48.9	2.5	16.0	8.5	28.7	12.0	20.6				
Green Ext Time (p_c), s	0.1	3.9	0.0	0.6	0.5	7.9	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay			41.4									
HCM 6th LOS			D									

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

AM Long Term Existing Zoning - Mitigation

09/26/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	459	6	44	6	614	254	33	1038	6
Future Volume (vph)	11	6	11	459	6	44	6	614	254	33	1038	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00	1.00	0.95	
Frt		0.95		1.00	0.87			1.00	0.85	1.00	1.00	
Flt Protected		0.98		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732		1770	1619			1862	1583	1770	3536	
Flt Permitted		0.85		0.95	1.00			0.99	1.00	0.16	1.00	
Satd. Flow (perm)		1499		1770	1619			1837	1583	298	3536	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	499	7	48	7	667	276	36	1128	7
RTOR Reduction (vph)	0	11	0	0	46	0	0	0	135	0	0	0
Lane Group Flow (vph)	0	20	0	499	9	0	0	674	141	36	1135	0
Turn Type	Perm	NA		Prot	NA		Perm	NA	Over	pm+pt	NA	
Protected Phases		4		3	4			6	3	5	2	
Permitted Phases	4						6			2		
Actuated Green, G (s)		6.1		29.0	6.1			56.5	29.0	66.9	66.9	
Effective Green, g (s)		6.1		29.0	6.1			56.5	29.0	66.9	66.9	
Actuated g/C Ratio		0.05		0.24	0.05			0.47	0.24	0.56	0.56	
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		76		427	82			864	382	220	1971	
v/s Ratio Prot				c0.28	0.01				0.09	0.01	c0.32	
v/s Ratio Perm		c0.01						c0.37		0.09		
v/c Ratio		0.26		1.17	0.12			0.78	0.37	0.16	0.58	
Uniform Delay, d1		54.8		45.5	54.4			26.6	37.9	18.3	17.3	
Progression Factor		1.00		1.00	1.00			0.39	1.91	1.00	1.00	
Incremental Delay, d2		1.8		98.4	0.6			6.1	0.5	0.4	1.2	
Delay (s)		56.6		143.9	55.0			16.4	72.9	18.7	18.5	
Level of Service		E		F	E			B	E	B	B	
Approach Delay (s)		56.6			135.1			32.8			18.5	
Approach LOS		E			F			C			B	
Intersection Summary												
HCM 2000 Control Delay			47.8			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			79.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	232	227	215	221	83	0
Future Vol, veh/h	232	227	215	221	83	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	252	247	234	240	90	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	11.5	14.1	10.4
HCM LOS	B	B	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	49%	0%
Vol Right, %	0%	0%	51%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	232	227	436	83
LT Vol	232	0	0	83
Through Vol	0	227	215	0
RT Vol	0	0	221	0
Lane Flow Rate	252	247	474	90
Geometry Grp	7	7	5	2
Degree of Util (X)	0.397	0.354	0.596	0.154
Departure Headway (Hd)	5.672	5.168	4.528	6.143
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	633	693	796	578
Service Time	3.432	2.927	2.576	4.235
HCM Lane V/C Ratio	0.398	0.356	0.595	0.156
HCM Control Delay	12.2	10.8	14.1	10.4
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.9	1.6	4	0.5

HCM 6th Signalized Intersection Summary 9: VERANDA & SHERWOOD

AM Long Term Existing Zoning - Mitigation

09/26/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Future Volume (veh/h)	46	149	888	188	149	33	98	7	49	39	44	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	50	162	965	204	162	36	107	8	53	42	48	71
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	56	113	622	113	67	13	543	65	429	50	57	84
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.31	0.31	0.31	0.11	0.11	0.11
Sat Flow, veh/h	56	260	1436	156	154	30	1781	212	1405	447	510	755
Grp Volume(v), veh/h	1177	0	0	402	0	0	107	0	61	161	0	0
Grp Sat Flow(s),veh/h/ln	1752	0	0	340	0	0	1781	0	1617	1712	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	3.3	11.1	0.0	0.0
Cycle Q Clear(g_c), s	52.0	0.0	0.0	52.0	0.0	0.0	5.3	0.0	3.3	11.1	0.0	0.0
Prop In Lane	0.04		0.82	0.51		0.09	1.00		0.87	0.26		0.44
Lane Grp Cap(c), veh/h	790	0	0	193	0	0	543	0	493	191	0	0
V/C Ratio(X)	1.49	0.00	0.00	2.09	0.00	0.00	0.20	0.00	0.12	0.84	0.00	0.00
Avail Cap(c_a), veh/h	790	0	0	193	0	0	543	0	493	257	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.66	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	35.5	0.0	0.0	38.5	0.0	0.0	30.8	0.0	30.1	52.3	0.0	0.0
Incr Delay (d2), s/veh	224.6	0.0	0.0	506.2	0.0	0.0	0.8	0.0	0.5	16.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	72.4	0.0	0.0	33.0	0.0	0.0	2.4	0.0	1.4	5.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	260.1	0.0	0.0	544.7	0.0	0.0	31.6	0.0	30.6	69.2	0.0	0.0
LnGrp LOS	F	A	A	F	A	A	C	A	C	E	A	A
Approach Vol, veh/h	1177			402			168			161		
Approach Delay, s/veh	260.1			544.7			31.3			69.2		
Approach LOS	F			F			C			E		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	42.6			58.0			19.4			58.0		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	32.0			52.0			18.0			52.0		
Max Q Clear Time (g_c+I1), s	7.3			54.0			13.1			54.0		
Green Ext Time (p_c), s	0.6			0.0			0.3			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	283.8											
HCM 6th LOS	F											

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.3	1.2	0.6	0.1	0.0	0.0	2.2	0.7	0.8	0.7	0.1	0.1
Total Del/Veh (s)	42.4	56.4	38.2	50.4	47.9	33.8	77.6	32.4	27.3	60.0	33.4	31.8

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	37.3

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.7	0.5	3.8	0.0	0.0	0.0	3.0	0.8	0.7
Total Del/Veh (s)	61.1	57.4	11.5	62.7	64.5	41.9	43.7	34.4	7.9	44.0	16.9	12.0

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	27.9

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.2	0.8	2.8	1.3

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.3	0.0	0.1
Total Del/Veh (s)	2.9	0.4	0.8	0.6	12.0	2.1

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.5	2.7	1.5	2.1	1.5

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Total Del/Veh (s)	4.2	1.4	1.8	0.5	0.3	8.8	10.9	2.5	8.5	9.3	5.5	2.1

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	51.1

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	209	339	125	275	185	683	664	124	509	527
Average Queue (ft)	56	166	72	121	150	400	370	55	303	327
95th Queue (ft)	132	282	136	228	229	668	636	118	447	468
Link Distance (ft)		364		425		1104	1104		1015	1015
Upstream Blk Time (%)		0				1	1			
Queuing Penalty (veh)		1				0	0			
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)		3	6	20	13	27		1	40	
Queuing Penalty (veh)		2	10	17	81	45		8	22	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	74	433	100	911	665	152	531
Average Queue (ft)	25	254	47	338	114	21	270
95th Queue (ft)	56	426	112	756	459	89	476
Link Distance (ft)	607	481		1015	1015		772
Upstream Blk Time (%)		1		1	0		
Queuing Penalty (veh)		0		7	0		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		53	1				16
Queuing Penalty (veh)		27	4				3

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	105
Average Queue (ft)	38
95th Queue (ft)	79
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	78	15	84
Average Queue (ft)	33	1	37
95th Queue (ft)	67	10	69
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	23
Average Queue (ft)	1
95th Queue (ft)	16
Link Distance (ft)	96
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	65	3	31	88
Average Queue (ft)	17	0	5	38
95th Queue (ft)	51	2	23	65
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 229

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM No Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	105	171	82	107	66	166	1219	200	55	1105	99
Future Volume (veh/h)	77	105	171	82	107	66	166	1219	200	55	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	114	186	89	116	72	180	1325	217	60	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	112	183	130	187	116	163	1378	223	241	1629	146
Arrive On Green	0.04	0.17	0.17	0.04	0.17	0.17	0.09	0.45	0.45	0.27	0.99	0.99
Sat Flow, veh/h	1781	639	1043	1781	1080	670	1781	3061	497	1781	3298	296
Grp Volume(v), veh/h	84	0	300	89	0	188	180	764	778	60	646	663
Grp Sat Flow(s),veh/h/ln	1781	0	1683	1781	0	1750	1781	1777	1781	1781	1777	1817
Q Serve(g_s), s	5.0	0.0	21.0	1.8	0.0	11.9	11.0	49.8	51.2	3.2	2.0	2.0
Cycle Q Clear(g_c), s	5.0	0.0	21.0	1.8	0.0	11.9	11.0	49.8	51.2	3.2	2.0	2.0
Prop In Lane	1.00		0.62	1.00		0.38	1.00		0.28	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	294	130	0	302	163	800	801	241	877	897
V/C Ratio(X)	0.63	0.00	1.02	0.68	0.00	0.62	1.10	0.96	0.97	0.25	0.74	0.74
Avail Cap(c_a), veh/h	134	0	294	283	0	452	163	800	801	241	877	897
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.54	0.54	0.54
Uniform Delay (d), s/veh	47.2	0.0	49.5	55.6	0.0	46.0	54.5	31.8	32.2	39.0	0.4	0.4
Incr Delay (d2), s/veh	8.8	0.0	57.3	6.1	0.0	2.1	100.5	22.6	25.5	1.3	3.0	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	13.5	2.8	0.0	5.4	9.5	25.7	27.0	1.4	1.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.0	0.0	106.8	61.8	0.0	48.1	155.0	54.5	57.7	40.3	3.4	3.4
LnGrp LOS	E	A	F	E	A	D	F	D	E	D	A	A
Approach Vol, veh/h	384			277			1722			1369		
Approach Delay, s/veh	95.7			52.5			66.4			5.0		
Approach LOS	F			D			E			A		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	65.3	11.0	26.7	22.3	60.0	10.7	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	13.0	4.0	7.0	13.9	5.2	53.2	3.8	23.0				
Green Ext Time (p_c), s	0.0	8.5	0.0	0.7	0.0	0.6	0.2	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	46.0											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM No Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	304	6	50	6	884	470	22	807	17
Future Volume (vph)	11	6	11	304	6	50	6	884	470	22	807	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1776	1583		1862	1583	1770	1857	
Flt Permitted		0.73			0.39	1.00		0.99	1.00	0.06	1.00	
Satd. Flow (perm)		1289			732	1583		1851	1583	110	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	330	7	54	7	961	511	24	877	18
RTOR Reduction (vph)	0	11	0	0	0	43	0	0	137	0	0	0
Lane Group Flow (vph)	0	20	0	0	337	11	0	968	374	24	895	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Effective Green, g (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Actuated g/C Ratio		0.04			0.21	0.21		0.52	0.52	0.60	0.60	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		54			152	329		954	816	121	1112	
v/s Ratio Prot										0.01	c0.48	
v/s Ratio Perm		c0.02			c0.46	0.01		c0.52	0.24	0.11		
v/c Ratio		0.36			2.22	0.03		1.01	0.46	0.20	0.80	
Uniform Delay, d1		55.9			47.5	37.9		29.1	18.4	27.0	18.6	
Progression Factor		1.00			1.00	1.00		0.46	0.25	1.00	1.00	
Incremental Delay, d2		4.1			568.5	0.2		25.9	1.1	0.8	6.2	
Delay (s)		60.0			616.0	38.1		39.1	5.6	27.8	24.8	
Level of Service		E			F	D		D	A	C	C	
Approach Delay (s)		60.0			536.2			27.6			24.9	
Approach LOS		E			F			C			C	
Intersection Summary												
HCM 2000 Control Delay			97.6				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			1.31									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			24.0		
Intersection Capacity Utilization			91.8%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	215	265	221	54	63	0
Future Vol, veh/h	215	265	221	54	63	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	234	288	240	59	68	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	299	0	0 1026
Stage 1	-	-	- 270
Stage 2	-	-	- 756
Critical Hdwy	4.12	-	- 6.42
Critical Hdwy Stg 1	-	-	- 5.42
Critical Hdwy Stg 2	-	-	- 5.42
Follow-up Hdwy	2.218	-	- 3.518
Pot Cap-1 Maneuver	1262	-	- 260
Stage 1	-	-	- 775
Stage 2	-	-	- 464
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1262	-	- 212
Mov Cap-2 Maneuver	-	-	- 212
Stage 1	-	-	- 632
Stage 2	-	-	- 464

Approach	EB	WB	SB
HCM Control Delay, s	3.8	0	29.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1262	-	-	-	212
HCM Lane V/C Ratio	0.185	-	-	-	0.323
HCM Control Delay (s)	8.5	-	-	-	29.9
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0.7	-	-	-	1.3

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	54	193	2	0	210	28	2	1	1	44	1	41
Future Vol, veh/h	54	193	2	0	210	28	2	1	1	44	1	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	59	210	2	0	228	30	2	1	1	48	1	45

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	212	0	0	595	587	211	573	573	243
Stage 1	-	-	-	-	-	-	329	329	-	243	243	-
Stage 2	-	-	-	-	-	-	266	258	-	330	330	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1307	-	-	1358	-	-	416	422	829	430	430	796
Stage 1	-	-	-	-	-	-	684	646	-	761	705	-
Stage 2	-	-	-	-	-	-	739	694	-	683	646	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1307	-	-	1358	-	-	376	400	829	412	408	796
Mov Cap-2 Maneuver	-	-	-	-	-	-	376	400	-	412	408	-
Stage 1	-	-	-	-	-	-	649	613	-	722	705	-
Stage 2	-	-	-	-	-	-	697	694	-	646	613	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0	13.2	13.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	443	1307	-	-	1358	-	-	535
HCM Lane V/C Ratio	0.01	0.045	-	-	-	-	-	0.175
HCM Control Delay (s)	13.2	7.9	0	-	0	-	-	13.1
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.6

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	20.5	24.8	18.9	0.1	0.1	0.0	118.4	112.4	107.7	8.6	5.3	3.0
Total Del/Veh (s)	51.6	87.9	73.1	63.1	56.4	48.0	231.8	150.0	143.3	136.4	59.9	57.8

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	52.1
Total Del/Veh (s)	102.8

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	1.1	0.5	3.9	0.0	0.0	0.0	3.0	0.9	1.0
Total Del/Veh (s)	63.6	54.6	11.8	59.3	55.5	38.5	37.8	23.7	6.7	39.6	17.9	13.4

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	23.8

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	0.9	2.5	1.2

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.2	0.1	0.3	0.2	0.0	0.2
Total Del/Veh (s)	4.0	0.6	1.2	0.9	14.0	3.5

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	2.2	3.5	1.5	2.4	2.5

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.2	0.3	150.4	206.7	155.6	0.1	0.1	0.1
Total Del/Veh (s)	5.2	2.4	2.0	5.4	2.8	1.4	184.4	181.9	179.0	13.6	19.0	12.8

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	58.5
Total Del/Veh (s)	67.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	59.1
Total Del/Veh (s)	116.9

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	275	378	125	446	185	1155	1151	125	799	801
Average Queue (ft)	124	277	113	306	159	1102	1095	99	443	460
95th Queue (ft)	298	427	147	479	232	1246	1259	152	790	804
Link Distance (ft)		364		425		1104	1104		1015	1015
Upstream Blk Time (%)		7		5		62	58		0	0
Queuing Penalty (veh)		21		28		0	0		1	1
Storage Bay Dist (ft)	250		100		160			100		
Storage Blk Time (%)	0	30	26	46	29	45		29	45	
Queuing Penalty (veh)	0	23	99	97	177	75		159	44	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	72	445	100	724	405	172	554
Average Queue (ft)	24	240	39	237	78	16	282
95th Queue (ft)	56	402	105	599	369	73	501
Link Distance (ft)	607	481		1015	1015		772
Upstream Blk Time (%)		2		0	0		
Queuing Penalty (veh)		0		3	1		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		52	0				17
Queuing Penalty (veh)		26	1				4

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	95
Average Queue (ft)	36
95th Queue (ft)	75
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	121	63	111
Average Queue (ft)	45	3	59
95th Queue (ft)	90	27	95
Link Distance (ft)	181	600	96
Upstream Blk Time (%)			2
Queuing Penalty (veh)			2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB	SW
Directions Served	R	LR
Maximum Queue (ft)	105	53
Average Queue (ft)	18	3
95th Queue (ft)	74	33
Link Distance (ft)	96	364
Upstream Blk Time (%)	2	
Queuing Penalty (veh)	6	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	105	126	750	104
Average Queue (ft)	20	25	666	43
95th Queue (ft)	67	77	885	79
Link Distance (ft)	425	614	696	640
Upstream Blk Time (%)			72	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 768

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	161	186	230	229	179	180	1325	312	104	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	156	139	160	273	246	192	163	1290	298	99	1365	123
Arrive On Green	0.04	0.18	0.18	0.12	0.25	0.25	0.09	0.45	0.45	0.02	0.14	0.14
Sat Flow, veh/h	1781	791	914	1781	973	761	1781	2866	662	1781	3298	296
Grp Volume(v), veh/h	84	0	347	230	0	408	180	812	825	104	646	663
Grp Sat Flow(s),veh/h/ln	1781	0	1706	1781	0	1733	1781	1777	1751	1781	1777	1817
Q Serve(g_s), s	4.7	0.0	21.0	12.3	0.0	27.6	11.0	54.0	54.0	6.7	42.8	43.0
Cycle Q Clear(g_c), s	4.7	0.0	21.0	12.3	0.0	27.6	11.0	54.0	54.0	6.7	42.8	43.0
Prop In Lane	1.00		0.54	1.00		0.44	1.00		0.38	1.00		0.16
Lane Grp Cap(c), veh/h	156	0	299	273	0	438	163	800	788	99	736	752
V/C Ratio(X)	0.54	0.00	1.16	0.84	0.00	0.93	1.10	1.02	1.05	1.05	0.88	0.88
Avail Cap(c_a), veh/h	156	0	299	283	0	448	163	800	788	99	736	752
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.47	0.47	0.47
Uniform Delay (d), s/veh	40.2	0.0	49.5	34.9	0.0	43.8	54.5	33.0	33.0	58.9	48.8	48.9
Incr Delay (d2), s/veh	3.6	0.0	103.6	19.7	0.0	26.0	100.5	35.8	45.0	75.6	7.3	7.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	17.5	6.8	0.0	14.9	9.5	30.4	32.0	5.2	21.9	22.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.8	0.0	153.1	54.6	0.0	69.9	155.0	68.8	78.0	134.5	56.2	56.3
LnGrp LOS	D	A	F	D	A	E	F	F	F	F	E	E
Approach Vol, veh/h	431			638			1817			1413		
Approach Delay, s/veh	131.8			64.4			81.5			62.0		
Approach LOS	F			E			F			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	55.7	11.0	36.3	12.7	60.0	20.3	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	13.0	45.0	6.7	29.6	8.7	56.0	14.3	23.0				
Green Ext Time (p_c), s	0.0	2.4	0.0	0.3	0.0	0.0	0.1	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	77.6											
HCM 6th LOS	E											

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term)

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	304	6	50	6	983	470	22	848	17
Future Volume (vph)	11	6	11	304	6	50	6	983	470	22	848	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1776	1583		1862	1583	1770	1857	
Flt Permitted		0.73			0.39	1.00		0.99	1.00	0.06	1.00	
Satd. Flow (perm)		1289			732	1583		1851	1583	110	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	330	7	54	7	1068	511	24	922	18
RTOR Reduction (vph)	0	11	0	0	0	43	0	0	123	0	0	0
Lane Group Flow (vph)	0	20	0	0	337	11	0	1075	388	24	940	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Effective Green, g (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Actuated g/C Ratio		0.04			0.21	0.21		0.52	0.52	0.60	0.60	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		54			152	329		954	816	121	1112	
v/s Ratio Prot										0.01	c0.51	
v/s Ratio Perm		c0.02			c0.46	0.01		c0.58	0.25	0.11		
v/c Ratio		0.36			2.22	0.03		1.13	0.48	0.20	0.84	
Uniform Delay, d1		55.9			47.5	37.9		29.1	18.6	27.0	19.5	
Progression Factor		1.00			1.00	1.00		0.26	0.05	1.00	1.00	
Incremental Delay, d2		4.1			568.5	0.2		60.9	0.5	0.8	7.9	
Delay (s)		60.0			616.0	38.1		68.4	1.4	27.8	27.4	
Level of Service		E			F	D		E	A	C	C	
Approach Delay (s)		60.0			536.2			46.8			27.5	
Approach LOS		E			F			D			C	
Intersection Summary												
HCM 2000 Control Delay		105.0			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.39										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			24.0				
Intersection Capacity Utilization		93.9%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	12.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	265	221	87	141	0
Future Vol, veh/h	226	265	221	87	141	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	246	288	240	95	153	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	335	0	-	0	1068	-
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	780	-
Critical Hdwy	4.12	-	-	-	6.42	-
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	-
Pot Cap-1 Maneuver	1224	-	-	-	245	0
Stage 1	-	-	-	-	761	0
Stage 2	-	-	-	-	452	0
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1224	-	-	-	196	-
Mov Cap-2 Maneuver	-	-	-	-	196	-
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	452	-
Approach	EB	WB		SB		
HCM Control Delay, s	4	0		68.5		
HCM LOS				F		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1224	-	-	-	196	
HCM Lane V/C Ratio	0.201	-	-	-	0.782	
HCM Control Delay (s)	8.7	-	-	-	68.5	
HCM Lane LOS	A	-	-	-	F	
HCM 95th %tile Q(veh)	0.7	-	-	-	5.4	

Intersection												
Int Delay, s/veh	139.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	193	173	37	210	28	335	21	167	44	9	41
Future Vol, veh/h	54	193	173	37	210	28	335	21	167	44	9	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	59	210	188	40	228	30	364	23	182	48	10	45
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	398	0	0	773	760	304	848	839	243
Stage 1	-	-	-	-	-	-	422	422	-	323	323	-
Stage 2	-	-	-	-	-	-	351	338	-	525	516	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1307	-	-	1161	-	-	~ 316	336	736	281	302	796
Stage 1	-	-	-	-	-	-	609	588	-	689	650	-
Stage 2	-	-	-	-	-	-	666	641	-	536	534	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1307	-	-	1161	-	-	~ 269	303	736	185	272	796
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 269	303	-	185	272	-
Stage 1	-	-	-	-	-	-	572	553	-	648	624	-
Stage 2	-	-	-	-	-	-	594	615	-	364	502	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			1.1			\$ 344.6			23.8		
HCM LOS							F			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	339	1307	-	-	1161	-	-	292				
HCM Lane V/C Ratio	1.677	0.045	-	-	0.035	-	-	0.35				
HCM Control Delay (s)	\$ 344.6	7.9	0	-	8.2	0	-	23.8				
HCM Lane LOS	F	A	A	-	A	A	-	C				
HCM 95th %tile Q(veh)	34.8	0.1	-	-	0.1	-	-	1.5				
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s				+: Computation Not Defined				*: All major volume in platoon		

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	5.0	6.0	4.8	0.0	0.2	0.2	2.6	1.2	2.5	0.5	0.1	0.1
Total Del/Veh (s)	41.6	78.7	16.2	67.8	62.1	53.8	87.8	49.2	28.6	57.4	33.3	30.6

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	1.2
Total Del/Veh (s)	45.8

2: WASHINGTON AVE & PRESUMPCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.6	0.1	0.3	0.0	0.0	2.9	0.2	0.2	0.2
Total Del/Veh (s)	61.0	57.6	11.0	72.5	56.8	25.4	44.1	8.6	39.6	11.4	7.2	30.7

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.5	3.1	2.0	1.8

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	2.2	1.4	1.6	1.3	0.0	1.4
Total Del/Veh (s)	10.1	6.7	16.3	19.6	5.4	10.7

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.7	2.3	3.0	1.6	2.4	2.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.9	0.5	1.0	5.9	15.1	8.5	0.1	0.1	0.2
Total Del/Veh (s)	58.5	38.2	43.5	65.9	60.5	47.1	74.4	49.5	32.5	51.3	63.9	29.0

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	2.8
Total Del/Veh (s)	52.1

Total Network Performance

Denied Del/Veh (s)	2.2
Total Del/Veh (s)	72.9

Queuing and Blocking Report

Mitigation

09/26/2022

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	186	271	197	124	437	260	809	805	320	225	532	530
Average Queue (ft)	54	123	66	113	334	199	475	438	154	104	310	327
95th Queue (ft)	128	269	146	154	519	324	896	872	365	220	460	474
Link Distance (ft)		364	364		405		1096	1096			1010	1010
Upstream Blk Time (%)		5	1		13		3	2				
Queuing Penalty (veh)		8	2		77		0	0				
Storage Bay Dist (ft)	250			100		160			160	200		
Storage Blk Time (%)	0	8		20	45	12	41	29	5	0	20	
Queuing Penalty (veh)	0	6		74	95	71	67	83	29	0	19	

Intersection: 2: WASHINGTON AVE & PRESUMPSCOT

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	T	R	L	T	TR
Maximum Queue (ft)	70	444	271	959	836	126	237	197
Average Queue (ft)	21	262	41	488	257	18	150	103
95th Queue (ft)	56	459	138	1096	882	64	228	194
Link Distance (ft)	608	483	483	1010	1010		748	748
Upstream Blk Time (%)		2	0	1	0			
Queuing Penalty (veh)		0	0	9	3			
Storage Bay Dist (ft)						150		
Storage Blk Time (%)							6	
Queuing Penalty (veh)							1	

Intersection: 6: BAXTER BLVD

Movement	EB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	38	6	83
Average Queue (ft)	1	0	30
95th Queue (ft)	19	4	65
Link Distance (ft)	552	181	219
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report Mitigation

09/26/2022

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	133	113	240	83
Average Queue (ft)	60	60	80	44
95th Queue (ft)	111	97	231	72
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)	1		2	1
Queuing Penalty (veh)	1		0	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	NB
Directions Served	R
Maximum Queue (ft)	26
Average Queue (ft)	4
95th Queue (ft)	31
Link Distance (ft)	66
Upstream Blk Time (%)	4
Queuing Penalty (veh)	13
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	421	534	675	225	165
Average Queue (ft)	280	194	315	134	64
95th Queue (ft)	472	424	647	276	125
Link Distance (ft)	405	608	696		640
Upstream Blk Time (%)	8	2	8		
Queuing Penalty (veh)	41	0	0		
Storage Bay Dist (ft)				200	
Storage Blk Time (%)			30	0	
Queuing Penalty (veh)			57	1	

Network Summary

Network wide Queuing Penalty: 660

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Build (Long Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Future Volume (veh/h)	77	148	171	212	211	165	166	1219	287	96	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	161	186	230	229	179	180	1325	312	104	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	153	321	272	370	243	190	223	1599	713	197	1375	123
Arrive On Green	0.04	0.17	0.17	0.12	0.25	0.25	0.09	0.45	0.45	0.06	0.42	0.42
Sat Flow, veh/h	1781	1870	1585	1781	973	761	1781	3554	1585	1781	3298	296
Grp Volume(v), veh/h	84	161	186	230	0	408	180	1325	312	104	646	663
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1733	1781	1777	1585	1781	1777	1817
Q Serve(g_s), s	4.7	9.4	13.2	12.3	0.0	27.7	7.9	39.2	9.7	0.4	40.0	40.2
Cycle Q Clear(g_c), s	4.7	9.4	13.2	12.3	0.0	27.7	7.9	39.2	9.7	0.4	40.0	40.2
Prop In Lane	1.00		1.00	1.00		0.44	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	153	321	272	370	0	433	223	1599	713	197	741	757
V/C Ratio(X)	0.55	0.50	0.68	0.62	0.00	0.94	0.81	0.83	0.44	0.53	0.87	0.88
Avail Cap(c_a), veh/h	153	327	277	380	0	448	223	1599	713	197	741	757
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.45	0.00	0.45	1.00	1.00	1.00	0.47	0.47	0.47
Uniform Delay (d), s/veh	40.5	45.0	46.6	33.7	0.0	44.2	29.0	28.9	8.1	51.2	32.1	32.1
Incr Delay (d2), s/veh	4.1	1.2	6.6	1.4	0.0	16.1	25.9	5.1	1.9	4.7	7.0	7.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	4.5	5.7	5.5	0.0	13.8	4.9	17.4	3.5	3.2	18.2	18.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.6	46.2	53.2	35.0	0.0	60.3	54.9	34.0	10.1	55.9	39.0	39.1
LnGrp LOS	D	D	D	D	A	E	D	C	B	E	D	D
Approach Vol, veh/h		431			638			1817			1413	
Approach Delay, s/veh		48.9			51.2			32.0			40.3	
Approach LOS		D			D			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	56.0	11.0	36.0	13.0	60.0	20.4	26.6				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	9.9	42.2	6.7	29.7	2.4	41.2	14.3	15.2				
Green Ext Time (p_c), s	0.1	3.7	0.0	0.3	0.1	7.4	0.1	0.8				
Intersection Summary												
HCM 6th Ctrl Delay				39.3								
HCM 6th LOS				D								

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Build (Long Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	304	6	50	6	983	470	22	848	17
Future Volume (vph)	11	6	11	304	6	50	6	983	470	22	848	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1776	1583		1862	1583	1770	1857	
Flt Permitted		0.73			0.39	1.00		0.99	1.00	0.06	1.00	
Satd. Flow (perm)		1289			732	1583		1851	1583	110	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	330	7	54	7	1068	511	24	922	18
RTOR Reduction (vph)	0	11	0	0	0	43	0	0	123	0	0	0
Lane Group Flow (vph)	0	20	0	0	337	11	0	1075	388	24	940	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Effective Green, g (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Actuated g/C Ratio		0.04			0.21	0.21		0.52	0.52	0.60	0.60	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		54			152	329		954	816	121	1112	
v/s Ratio Prot										0.01	c0.51	
v/s Ratio Perm		c0.02			c0.46	0.01		c0.58	0.25	0.11		
v/c Ratio		0.36			2.22	0.03		1.13	0.48	0.20	0.84	
Uniform Delay, d1		55.9			47.5	37.9		29.1	18.6	27.0	19.5	
Progression Factor		1.00			1.00	1.00		0.64	0.44	1.00	1.00	
Incremental Delay, d2		4.1			568.5	0.2		65.7	1.2	0.8	7.9	
Delay (s)		60.0			616.0	38.1		84.3	9.3	27.8	27.4	
Level of Service		E			F	D		F	A	C	C	
Approach Delay (s)		60.0			536.2			60.1			27.5	
Approach LOS		E			F			E			C	
Intersection Summary												
HCM 2000 Control Delay		112.1			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.39										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			24.0				
Intersection Capacity Utilization		93.9%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Intersection	
Intersection Delay, s/veh	12
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	265	221	87	141	0
Future Vol, veh/h	226	265	221	87	141	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	246	288	240	95	153	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	12.1	12.1	11.2
HCM LOS	B	B	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	72%	0%
Vol Right, %	0%	0%	28%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	226	265	308	141
LT Vol	226	0	0	141
Through Vol	0	265	221	0
RT Vol	0	0	87	0
Lane Flow Rate	246	288	335	153
Geometry Grp	7	7	5	2
Degree of Util (X)	0.395	0.423	0.456	0.255
Departure Headway (Hd)	5.795	5.291	4.902	5.985
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	617	674	730	595
Service Time	3.575	3.07	2.978	4.085
HCM Lane V/C Ratio	0.399	0.427	0.459	0.257
HCM Control Delay	12.4	11.9	12.1	11.2
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.9	2.1	2.4	1

HCM 6th Signalized Intersection Summary
9: VERANDA & SHERWOOD

PM Build (Long Term) - Mitigation

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	193	173	37	210	28	335	21	167	44	9	41
Future Volume (veh/h)	54	193	173	37	210	28	335	21	167	44	9	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	210	188	40	228	30	364	23	182	48	10	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	116	283	231	113	485	59	472	48	379	77	16	72
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.26	0.26	0.26	0.10	0.10	0.10
Sat Flow, veh/h	141	840	686	132	1438	176	1781	181	1432	791	165	742
Grp Volume(v), veh/h	457	0	0	298	0	0	364	0	205	103	0	0
Grp Sat Flow(s),veh/h/ln	1667	0	0	1746	0	0	1781	0	1613	1697	0	0
Q Serve(g_s), s	7.1	0.0	0.0	0.0	0.0	0.0	11.3	0.0	6.4	3.5	0.0	0.0
Cycle Q Clear(g_c), s	14.7	0.0	0.0	7.7	0.0	0.0	11.3	0.0	6.4	3.5	0.0	0.0
Prop In Lane	0.13		0.41	0.13		0.10	1.00		0.89	0.47		0.44
Lane Grp Cap(c), veh/h	630	0	0	657	0	0	472	0	427	166	0	0
V/C Ratio(X)	0.73	0.00	0.00	0.45	0.00	0.00	0.77	0.00	0.48	0.62	0.00	0.00
Avail Cap(c_a), veh/h	1405	0	0	1446	0	0	1308	0	1184	510	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.9	0.0	0.0	15.7	0.0	0.0	20.4	0.0	18.6	26.0	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.5	0.0	0.0	2.7	0.0	0.8	3.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.4	0.0	0.0	3.0	0.0	0.0	4.6	0.0	2.3	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.5	0.0	0.0	16.2	0.0	0.0	23.1	0.0	19.4	29.7	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	C	A	B	C	A	A
Approach Vol, veh/h		457			298			569			103	
Approach Delay, s/veh		19.5			16.2			21.7			29.7	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.9		26.2		11.9		26.2				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		44.0		49.0		18.0		49.0				
Max Q Clear Time (g_c+I1), s		13.3		16.7		5.5		9.7				
Green Ext Time (p_c), s		2.6		3.5		0.4		2.1				
Intersection Summary												
HCM 6th Ctrl Delay				20.5								
HCM 6th LOS				C								

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	55.9	82.4	47.0	0.2	0.3	0.1	197.6	189.0	181.9	1.9	1.2	2.1
Total Del/Veh (s)	58.8	96.8	82.4	83.1	77.7	68.8	234.0	163.5	160.6	155.2	37.7	37.7

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	86.7
Total Del/Veh (s)	104.8

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.6	0.8	3.6	0.0	0.0	0.0	0.3	0.6	0.6
Total Del/Veh (s)	61.5	66.5	13.8	52.9	64.0	37.4	67.3	34.9	6.7	34.0	17.7	11.8

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	27.4

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	1.3	0.9	2.4	1.5

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	5.3	5.0	0.3	0.3	0.0	2.7
Total Del/Veh (s)	10.5	0.6	3.7	3.1	16.3	6.5

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.6	6.7	3.4	1.7	2.5	4.4

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	3.6	4.4	6.2	1032.9	964.4	1045.1	0.2	0.2	0.2
Total Del/Veh (s)	77.4	48.0	56.3	80.6	81.2	68.4	178.5	177.7	170.5	53.1	64.1	36.8

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	578.0
Total Del/Veh (s)	105.7

Total Network Performance

Movement	All
Denied Del/Veh (s)	269.0
Total Del/Veh (s)	132.0

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	275	377	125	449	185	1147	1156	225	596	600
Average Queue (ft)	104	284	112	427	158	1104	1104	145	307	325
95th Queue (ft)	274	427	156	484	226	1206	1209	271	561	580
Link Distance (ft)		364		424		1098	1098		1015	1015
Upstream Blk Time (%)		16		20		67	61		0	0
Queuing Penalty (veh)		48		176		0	0		1	1
Storage Bay Dist (ft)	250		100		160			200		
Storage Blk Time (%)	0	34	27	58	18	52		13	19	
Queuing Penalty (veh)	0	26	149	190	107	86		74	18	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	LT	R	L	TR
Maximum Queue (ft)	74	424	100	918	808	52	532
Average Queue (ft)	28	260	47	333	133	11	251
95th Queue (ft)	61	387	117	822	590	33	443
Link Distance (ft)	607	482		1015	1015	741	741
Upstream Blk Time (%)		0		2	1		0
Queuing Penalty (veh)		0		13	8		0
Storage Bay Dist (ft)			75				
Storage Blk Time (%)		55	0				
Queuing Penalty (veh)		28	1				

Intersection: 6: BAXTER BLVD

Movement	EB	SW
Directions Served	T	R
Maximum Queue (ft)	60	93
Average Queue (ft)	4	31
95th Queue (ft)	55	67
Link Distance (ft)	552	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	131	165	118
Average Queue (ft)	54	19	69
95th Queue (ft)	120	109	114
Link Distance (ft)	181	600	96
Upstream Blk Time (%)	2		5
Queuing Penalty (veh)	2		10
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: BATES

Movement	NB	SW
Directions Served	R	LR
Maximum Queue (ft)	93	104
Average Queue (ft)	31	7
95th Queue (ft)	103	57
Link Distance (ft)	96	364
Upstream Blk Time (%)	9	
Queuing Penalty (veh)	27	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	440	390	747	159
Average Queue (ft)	283	225	716	77
95th Queue (ft)	457	401	734	142
Link Distance (ft)	424	362	696	639
Upstream Blk Time (%)	6	12	90	
Queuing Penalty (veh)	30	0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 998

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Long Term Existing Zoning
09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	158	186	358	330	276	180	1325	305	102	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	134	137	161	283	243	203	163	1296	293	89	1347	121
Arrive On Green	0.04	0.17	0.17	0.13	0.26	0.26	0.09	0.45	0.45	0.05	0.41	0.41
Sat Flow, veh/h	1781	783	922	1781	941	787	1781	2879	651	1781	3298	296
Grp Volume(v), veh/h	84	0	344	358	0	606	180	809	821	102	646	663
Grp Sat Flow(s),veh/h/ln	1781	0	1704	1781	0	1729	1781	1777	1753	1781	1777	1817
Q Serve(g_s), s	4.7	0.0	21.0	15.0	0.0	31.0	11.0	54.0	54.0	6.0	40.6	40.8
Cycle Q Clear(g_c), s	4.7	0.0	21.0	15.0	0.0	31.0	11.0	54.0	54.0	6.0	40.6	40.8
Prop In Lane	1.00		0.54	1.00		0.46	1.00		0.37	1.00		0.16
Lane Grp Cap(c), veh/h	134	0	298	283	0	447	163	800	789	89	726	742
V/C Ratio(X)	0.63	0.00	1.15	1.27	0.00	1.36	1.10	1.01	1.04	1.15	0.89	0.89
Avail Cap(c_a), veh/h	134	0	298	283	0	447	163	800	789	89	726	742
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.79	0.00	0.79	1.00	1.00	1.00	0.48	0.48	0.48
Uniform Delay (d), s/veh	40.5	0.0	49.5	36.0	0.0	44.5	54.5	33.0	33.0	57.0	33.0	33.1
Incr Delay (d2), s/veh	8.8	0.0	100.2	140.4	0.0	172.0	100.5	34.7	43.2	110.6	8.3	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	17.2	17.7	0.0	34.5	9.5	30.1	31.6	5.4	18.8	19.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.3	0.0	149.7	176.3	0.0	216.5	155.0	67.7	76.2	167.6	41.3	41.4
LnGrp LOS	D	A	F	F	A	F	F	F	F	F	D	D
Approach Vol, veh/h		428			964			1810			1411	
Approach Delay, s/veh		130.0			201.6			80.2			50.5	
Approach LOS		F			F			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	55.0	11.0	37.0	12.0	60.0	21.0	27.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+l1), s	13.0	42.8	6.7	33.0	8.0	56.0	17.0	23.0				
Green Ext Time (p_c), s	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			101.1									
HCM 6th LOS			F									

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Long Term Existing Zoning

09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	304	6	50	6	1071	470	22	845	17
Future Volume (vph)	11	6	11	304	6	50	6	1071	470	22	845	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732			1776	1583		1862	1583	1770	1857	
Flt Permitted		0.73			0.39	1.00		0.99	1.00	0.06	1.00	
Satd. Flow (perm)		1289			732	1583		1852	1583	110	1857	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	330	7	54	7	1164	511	24	918	18
RTOR Reduction (vph)	0	11	0	0	0	43	0	0	113	0	0	0
Lane Group Flow (vph)	0	20	0	0	337	11	0	1171	398	24	936	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4			3			6		5	2	
Permitted Phases	4			3		3	6		6	2		
Actuated Green, G (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Effective Green, g (s)		5.1			25.0	25.0		61.9	61.9	71.9	71.9	
Actuated g/C Ratio		0.04			0.21	0.21		0.52	0.52	0.60	0.60	
Clearance Time (s)		6.0			6.0	6.0		6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		54			152	329		955	816	121	1112	
v/s Ratio Prot										0.01	c0.50	
v/s Ratio Perm		c0.02			c0.46	0.01		c0.63	0.25	0.11		
v/c Ratio		0.36			2.22	0.03		1.23	0.49	0.20	0.84	
Uniform Delay, d1		55.9			47.5	37.9		29.1	18.8	27.0	19.4	
Progression Factor		1.00			1.00	1.00		0.30	0.11	1.00	1.00	
Incremental Delay, d2		4.1			568.5	0.2		102.7	0.2	0.8	7.7	
Delay (s)		60.0			616.0	38.1		111.5	2.3	27.8	27.2	
Level of Service		E			F	D		F	A	C	C	
Approach Delay (s)		60.0			536.2			78.3			27.2	
Approach LOS		E			F			E			C	
Intersection Summary												
HCM 2000 Control Delay		120.6										
HCM 2000 Level of Service										F		
HCM 2000 Volume to Capacity ratio		1.45										
Actuated Cycle Length (s)		120.0								24.0		
Intersection Capacity Utilization		95.0%								F		
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												

Intersection						
Int Delay, s/veh	36.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	265	221	84	211	0
Future Vol, veh/h	226	265	221	84	211	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	246	288	240	91	229	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	331	0	0 1066
Stage 1	-	-	- 286
Stage 2	-	-	- 780
Critical Hdwy	4.12	-	- 6.42
Critical Hdwy Stg 1	-	-	- 5.42
Critical Hdwy Stg 2	-	-	- 5.42
Follow-up Hdwy	2.218	-	- 3.518
Pot Cap-1 Maneuver	1228	-	- 246 0
Stage 1	-	-	- 763 0
Stage 2	-	-	- 452 0
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	1228	-	- ~ 197
Mov Cap-2 Maneuver	-	-	- ~ 197
Stage 1	-	-	- 610
Stage 2	-	-	- 452

Approach	EB	WB	SB
HCM Control Delay, s	4	0	164.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1228	-	-	-	197
HCM Lane V/C Ratio	0.2	-	-	-	1.164
HCM Control Delay (s)	8.7	-	-	-	164.8
HCM Lane LOS	A	-	-	-	F
HCM 95th %tile Q(veh)	0.7	-	-	-	11.5

Notes			
~: Volume exceeds capacity	\$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary
9: VERANDA & SHERWOOD

PM Long Term Existing Zoning
09/23/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	210	175	37	228	30	688	43	343	48	10	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	234	183	67	358	44	533	33	266	60	13	56
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.48	0.48	0.48	0.08	0.08	0.08
Sat Flow, veh/h	164	808	633	116	1236	153	1100	69	548	791	165	742
Grp Volume(v), veh/h	444	0	0	295	0	0	1074	0	0	103	0	0
Grp Sat Flow(s),veh/h/ln	1606	0	0	1505	0	0	1717	0	0	1697	0	0
Q Serve(g_s), s	13.6	0.0	0.0	0.0	0.0	0.0	58.1	0.0	0.0	7.2	0.0	0.0
Cycle Q Clear(g_c), s	32.6	0.0	0.0	19.0	0.0	0.0	58.1	0.0	0.0	7.2	0.0	0.0
Prop In Lane	0.13		0.39	0.13		0.10	0.64		0.32	0.47		0.44
Lane Grp Cap(c), veh/h	499	0	0	469	0	0	832	0	0	129	0	0
V/C Ratio(X)	0.89	0.00	0.00	0.63	0.00	0.00	1.29	0.00	0.00	0.80	0.00	0.00
Avail Cap(c_a), veh/h	502	0	0	473	0	0	832	0	0	255	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	41.7	0.0	0.0	36.4	0.0	0.0	30.9	0.0	0.0	54.5	0.0	0.0
Incr Delay (d2), s/veh	2.1	0.0	0.0	2.6	0.0	0.0	140.1	0.0	0.0	10.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.1	0.0	0.0	7.8	0.0	0.0	55.4	0.0	0.0	3.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.8	0.0	0.0	39.0	0.0	0.0	171.0	0.0	0.0	65.1	0.0	0.0
LnGrp LOS	D	A	A	D	A	A	F	A	A	E	A	A
Approach Vol, veh/h		444			295			1074			103	
Approach Delay, s/veh		43.8			39.0			171.0			65.1	
Approach LOS		D			D			F			E	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		64.1		40.7		15.1		40.7				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		49.0		35.0		18.0		35.0				
Max Q Clear Time (g_c+I1), s		60.1		34.6		9.2		21.0				
Green Ext Time (p_c), s		0.0		0.1		0.3		1.5				
Intersection Summary												
HCM 6th Ctrl Delay				115.5								
HCM 6th LOS				F								

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	1.5	2.0	0.9	3.9	8.9	5.5	210.0	196.6	203.0	0.4	0.1	0.0
Total Del/Veh (s)	110.0	52.8	16.1	168.4	224.2	238.3	183.9	169.9	109.2	62.1	35.8	33.5

1: BATES/VERANDA & WASHINGTON AVE Performance by movement

Movement	All
Denied Del/Veh (s)	91.0
Total Del/Veh (s)	103.8

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.2	0.2	0.2
Total Del/Veh (s)	60.4	51.4	11.1	61.1	59.3	21.7	68.2	57.9	377.3	42.0	12.2	9.0

2: WASHINGTON AVE & PRESUMPSCOT Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	88.6

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	1.0	2.8	1.8	1.8

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.7	0.8	0.3	0.3	0.0	0.5
Total Del/Veh (s)	7.7	6.5	10.7	7.6	5.3	7.7

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.5	1.3	2.7	1.5	2.1	1.8

9: VERANDA & SHERWOOD Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	538.4	499.5	428.6	1568.4	1497.5	1592.1	0.2	0.2	0.2
Total Del/Veh (s)	61.8	42.2	49.7	397.2	415.7	352.3	586.4	464.1	380.3	180.9	136.9	165.6

9: VERANDA & SHERWOOD Performance by movement

Movement	All
Denied Del/Veh (s)	951.2
Total Del/Veh (s)	230.8

Total Network Performance

Movement	All
Denied Del/Veh (s)	396.3
Total Del/Veh (s)	187.3

Intersection: 1: BATES/VERANDA & WASHINGTON AVE

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	L	T	TR
Maximum Queue (ft)	235	268	138	125	440	260	1146	1142	320	224	552	554
Average Queue (ft)	82	104	66	92	426	229	950	940	264	114	318	334
95th Queue (ft)	176	213	119	178	452	339	1417	1426	440	239	486	497
Link Distance (ft)		364	364		404		1099	1099			1010	1010
Upstream Blk Time (%)		2			66		49	50				
Queuing Penalty (veh)		3			584		0	0				
Storage Bay Dist (ft)	250			100		160			160	200		
Storage Blk Time (%)	1	3		9	83	9	69	65	3	2	24	
Queuing Penalty (veh)	1	3		51	273	53	115	183	16	10	23	

Intersection: 2: WASHINGTON AVE & PRESUMPCOT

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LTR	L	TR	LT	R	L	T	TR
Maximum Queue (ft)	68	402	90	1058	1034	54	269	228
Average Queue (ft)	25	226	34	987	999	15	154	106
95th Queue (ft)	57	396	72	1192	1096	42	248	210
Link Distance (ft)	608	484	484	1010	1010	749	749	749
Upstream Blk Time (%)		1		16	38			
Queuing Penalty (veh)		0		127	296			
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 6: BAXTER BLVD

Movement	EB	SW
Directions Served	T	R
Maximum Queue (ft)	54	66
Average Queue (ft)	2	22
95th Queue (ft)	38	54
Link Distance (ft)	552	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	140	114	195	80
Average Queue (ft)	59	57	64	44
95th Queue (ft)	105	92	137	70
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)	1			1
Queuing Penalty (veh)	1			3
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	NB	SW
Directions Served	R	LR
Maximum Queue (ft)	13	20
Average Queue (ft)	1	1
95th Queue (ft)	16	12
Link Distance (ft)	66	364
Upstream Blk Time (%)	2	
Queuing Penalty (veh)	5	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: VERANDA & SHERWOOD

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	422	645	747	225	383
Average Queue (ft)	288	513	710	126	145
95th Queue (ft)	441	816	729	308	368
Link Distance (ft)	404	608	696		640
Upstream Blk Time (%)	5	66	97		0
Queuing Penalty (veh)	28	0	0		0
Storage Bay Dist (ft)				200	
Storage Blk Time (%)			95	0	
Queuing Penalty (veh)			338	1	

Network Summary

Network wide Queuing Penalty: 2113

HCM 6th Signalized Intersection Summary
1: BATES/VERANDA & WASHINGTON AVE

PM Long Term Existing Zoning - Mitigation

09/26/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Future Volume (veh/h)	77	145	171	329	304	254	166	1219	281	94	1105	99
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	84	158	186	358	330	276	180	1325	305	102	1201	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	130	323	273	290	243	203	223	1599	713	186	1355	122
Arrive On Green	0.04	0.17	0.17	0.13	0.26	0.26	0.09	0.45	0.45	0.05	0.41	0.41
Sat Flow, veh/h	1781	1870	1585	1781	941	787	1781	3554	1585	1781	3298	296
Grp Volume(v), veh/h	84	158	186	358	0	606	180	1325	305	102	646	663
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1729	1781	1777	1585	1781	1777	1817
Q Serve(g_s), s	1.5	9.2	13.2	15.0	0.0	31.0	7.9	39.2	9.3	0.3	40.4	40.6
Cycle Q Clear(g_c), s	1.5	9.2	13.2	15.0	0.0	31.0	7.9	39.2	9.3	0.3	40.4	40.6
Prop In Lane	1.00		1.00	1.00		0.46	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	130	323	273	290	0	447	223	1599	713	186	730	747
V/C Ratio(X)	0.65	0.49	0.68	1.23	0.00	1.36	0.81	0.83	0.43	0.55	0.88	0.89
Avail Cap(c_a), veh/h	134	327	277	290	0	447	223	1599	713	186	730	747
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.00	0.09	1.00	1.00	1.00	0.81	0.81	0.81
Uniform Delay (d), s/veh	55.6	44.9	46.6	45.0	0.0	44.5	29.0	28.9	7.8	51.8	32.7	32.8
Incr Delay (d2), s/veh	9.9	1.2	6.5	108.6	0.0	162.0	25.9	5.1	1.9	9.1	12.4	12.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	4.4	5.7	10.1	0.0	33.2	4.9	17.4	3.4	3.4	19.5	20.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.5	46.0	53.0	153.6	0.0	206.5	54.9	34.0	9.7	60.9	45.1	45.2
LnGrp LOS	E	D	D	F	A	F	D	C	A	E	D	D
Approach Vol, veh/h		428			964			1810			1411	
Approach Delay, s/veh		52.9			186.9			32.0			46.3	
Approach LOS		D			F			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	55.3	10.7	37.0	12.3	60.0	21.0	26.7				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	11.0	49.0	5.0	31.0	6.0	54.0	15.0	21.0				
Max Q Clear Time (g_c+I1), s	9.9	42.6	3.5	33.0	2.3	41.2	17.0	15.2				
Green Ext Time (p_c), s	0.1	3.5	0.0	0.0	0.1	7.4	0.0	0.8				
Intersection Summary												
HCM 6th Ctrl Delay				70.7								
HCM 6th LOS				E								

HCM Signalized Intersection Capacity Analysis

2: WASHINGTON AVE & PRESUMPCOT

PM Long Term Existing Zoning - Mitigation

09/26/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	6	11	304	6	50	6	1071	470	22	845	17
Future Volume (vph)	11	6	11	304	6	50	6	1071	470	22	845	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00	1.00	0.95	
Frt		0.95		1.00	0.87			1.00	0.85	1.00	1.00	
Flt Protected		0.98		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1732		1770	1615			1862	1583	1770	3529	
Flt Permitted		0.85		0.95	1.00			0.99	1.00	0.06	1.00	
Satd. Flow (perm)		1495		1770	1615			1851	1583	110	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	7	12	330	7	54	7	1164	511	24	918	18
RTOR Reduction (vph)	0	11	0	0	51	0	0	0	144	0	1	0
Lane Group Flow (vph)	0	20	0	330	10	0	0	1171	367	24	935	0
Turn Type	Perm	NA		Prot	NA		Perm	NA	Over	pm+pt	NA	
Protected Phases		4		3	4			6	3	5	2	
Permitted Phases	4						6			2		
Actuated Green, G (s)		6.2		25.0	6.2			61.8	25.0	70.8	70.8	
Effective Green, g (s)		6.2		25.0	6.2			61.8	25.0	70.8	70.8	
Actuated g/C Ratio		0.05		0.21	0.05			0.51	0.21	0.59	0.59	
Clearance Time (s)		6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		77		368	83			953	329	106	2082	
v/s Ratio Prot				0.19	0.01				c0.23	0.01	c0.26	
v/s Ratio Perm		c0.01						c0.63		0.13		
v/c Ratio		0.25		0.90	0.12			1.23	1.12	0.23	0.45	
Uniform Delay, d1		54.7		46.2	54.3			29.1	47.5	52.3	13.7	
Progression Factor		1.00		1.00	1.00			0.41	1.23	1.00	1.00	
Incremental Delay, d2		1.7		23.3	0.6			107.1	68.8	1.1	0.7	
Delay (s)		56.4		69.6	54.9			119.1	127.4	53.4	14.4	
Level of Service		E		E	D			F	F	D	B	
Approach Delay (s)		56.4			67.3			121.6			15.4	
Approach LOS		E			E			F			B	
Intersection Summary												
HCM 2000 Control Delay			80.7			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			24.0			
Intersection Capacity Utilization			94.6%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection	
Intersection Delay, s/veh	13.2
Intersection LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	226	265	221	84	211	0
Future Vol, veh/h	226	265	221	84	211	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	246	288	240	91	229	0
Number of Lanes	1	1	1	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	1	2
HCM Control Delay	13.2	13.3	13.1
HCM LOS	B	B	B

Lane	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	100%	0%	0%	100%
Vol Thru, %	0%	100%	72%	0%
Vol Right, %	0%	0%	28%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	226	265	305	211
LT Vol	226	0	0	211
Through Vol	0	265	221	0
RT Vol	0	0	84	0
Lane Flow Rate	246	288	332	229
Geometry Grp	7	7	5	2
Degree of Util (X)	0.423	0.455	0.488	0.392
Departure Headway (Hd)	6.192	5.686	5.299	6.155
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	582	634	680	585
Service Time	3.92	3.414	3.328	4.189
HCM Lane V/C Ratio	0.423	0.454	0.488	0.391
HCM Control Delay	13.4	13.1	13.3	13.1
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	2.1	2.4	2.7	1.9

HCM 6th Signalized Intersection Summary
9: VERANDA & SHERWOOD

PM Long Term Existing Zoning - Mitigation

09/26/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Future Volume (veh/h)	54	193	161	34	210	28	633	40	316	44	9	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	210	175	37	228	30	688	43	343	48	10	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	234	183	67	358	44	859	87	691	62	13	58
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.48	0.48	0.48	0.08	0.08	0.08
Sat Flow, veh/h	164	808	633	116	1236	153	1781	180	1433	791	165	742
Grp Volume(v), veh/h	444	0	0	295	0	0	688	0	386	103	0	0
Grp Sat Flow(s),veh/h/ln	1606	0	0	1505	0	0	1781	0	1612	1697	0	0
Q Serve(g_s), s	13.6	0.0	0.0	0.0	0.0	0.0	39.1	0.0	19.6	7.1	0.0	0.0
Cycle Q Clear(g_c), s	32.6	0.0	0.0	19.0	0.0	0.0	39.1	0.0	19.6	7.1	0.0	0.0
Prop In Lane	0.13		0.39	0.13		0.10	1.00		0.89	0.47		0.44
Lane Grp Cap(c), veh/h	499	0	0	469	0	0	859	0	777	133	0	0
V/C Ratio(X)	0.89	0.00	0.00	0.63	0.00	0.00	0.80	0.00	0.50	0.77	0.00	0.00
Avail Cap(c_a), veh/h	502	0	0	473	0	0	859	0	777	255	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.89	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	41.7	0.0	0.0	36.4	0.0	0.0	26.2	0.0	21.2	54.2	0.0	0.0
Incr Delay (d2), s/veh	16.1	0.0	0.0	2.6	0.0	0.0	7.8	0.0	2.3	9.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.0	0.0	0.0	7.8	0.0	0.0	18.0	0.0	7.8	3.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.8	0.0	0.0	39.0	0.0	0.0	34.0	0.0	23.4	63.4	0.0	0.0
LnGrp LOS	E	A	A	D	A	A	C	A	C	E	A	A
Approach Vol, veh/h		444			295			1074			103	
Approach Delay, s/veh		57.8			39.0			30.2			63.4	
Approach LOS		E			D			C			E	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		63.8		40.7		15.4		40.7				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		49.0		35.0		18.0		35.0				
Max Q Clear Time (g_c+I1), s		41.1		34.6		9.1		21.0				
Green Ext Time (p_c), s		3.3		0.1		0.3		1.5				
Intersection Summary												
HCM 6th Ctrl Delay				39.7								
HCM 6th LOS				D								

	Long Term with Ramp (AM)			Long Term with Ramp (PM)		
	Delay	LOS	Queue Length	Delay	LOS	Queue Length
Veranda and Washington Ave						
Overall	24.6	C		50.4	D	
EBL	39.9	D	95	39.9	D	105
EBT	50.7	D	171	53.1	D	200
EBR	18.7	B	133	15.2	B	116
WBL	52.6	D	144	84.7	F	146
WBTR	51.4	D	317	81.1	F	505
NBL	46.6	D	133	95.1	F	330
NBT	16.3	B	236	46.9	D	669
NBR	12.0	B	222	42.6	D	655
SBL	23.8	C	130	67.5	E	251
SBT	18.9	B	274	37.8	D	475
SBR	16.6	B	280	36.2	D	488
Driveway at Veranda and Sherwood St						
Overall	34.4	C		59.6	E	
EBLTR	48.1	D	337	70.4	E	424
WBLTR	43.3	D	233	62.0	E	343
NBL	30.2	C	104	76.3	E	622
NBT	32.0	C	75	43.1	D	295
SBLTR	51.0	D	134	87.3	F	181
Bates and Baxter Blvd						
Overall	6.3	A		6.8	A	
EBL	5.3	A	84	5.9	A	88
EBT	6.1	A	88	6.8	A	99
WBTR	8.7	A	98	9.1	A	96
SBL	4.7	A	60	5.5	A	78
Washington and Presumpscot St						
Overall	64.0	E		35.3	D	
EBLTR	59.4	E	64	73.7	E	60
WBL	28.6	C	371	46.5	D	342
WBTR	33.5	C	77	49.8	D	116
NBT	55.5	E	779	54.6	D	1108
NBR	5.3	A	304	10.1	B	765
SBL	132.5	F	107	55.5	E	86
SBTR	120.3	F	776	23.0	C	568
Sherwood St & New I-295 Ramp						
Overall	6.8	A		32.6	D	
EBLR	6.1	A	98	14.8	B	135
NBT	6.6	A	61	45.8	E	592
SBT	9.0	A	98	7.1	A	63

Control Delay: m: Volume for 95th percentile queue is metered by upstream signal

#: 95th %tile volume exceeds capacity, queue may be longer

^ Exceeds methodology limits

* Simulation result

1: I-295 RAMP/WASHINGTON AVE & BATES/VERANDA Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	1.5	0.5	0.7	0.0	0.0	0.0	0.4	0.0	0.1
Total Del/Veh (s)	39.9	50.7	18.7	52.6	51.4	32.9	46.6	16.3	12.0	23.8	18.9	16.6

1: I-295 RAMP/WASHINGTON AVE & BATES/VERANDA Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	24.6

2: WASHINGTON AVE & PRESUMPCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.5	0.8	3.4	0.0	0.0	404.5	425.9	466.5	172.9
Total Del/Veh (s)	59.4	56.7	18.4	28.6	33.5	19.1	55.5	5.3	132.5	113.2	120.3	64.0

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.3	2.8	1.9	1.6

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.2	0.3	0.3	0.0	0.2
Total Del/Veh (s)	5.3	6.1	8.7	5.6	4.7	6.3

8: BATES Performance by movement

Movement	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.7	2.5	1.3	2.0	1.3

9: SHERWOOD & VERANDA Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.9	1.0	1.2	0.3	0.2	0.2	0.0	0.0	0.1	0.2	0.2	0.2
Total Del/Veh (s)	48.1	43.5	33.0	43.3	37.3	27.6	30.2	32.0	7.9	51.0	49.9	26.4

9: SHERWOOD & VERANDA Performance by movement

Movement	All
Denied Del/Veh (s)	0.5
Total Del/Veh (s)	34.4

11: I-295/I-295 RAMP & I-295 NEW RAMP Performance by movement

Movement	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.3	0.3	0.0	0.1
Total Del/Veh (s)	0.6	0.5	2.2	1.5

13: SHERWOOD & I-295 NEW RAMP Performance by movement

Movement	EBL	EBR	NBT	SBT	All
Denied Del/Veh (s)	0.0	0.1	0.2	0.0	0.1
Total Del/Veh (s)	6.1	4.8	6.6	9.0	6.8

Total Network Performance

Denied Del/Veh (s)	96.5
Total Del/Veh (s)	64.0

Intersection: 1: I-295 RAMP/WASHINGTON AVE & BATES/VERANDA

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	117	207	158	125	372	177	274	266	200	308	322
Average Queue (ft)	52	99	77	104	164	69	150	128	56	192	196
95th Queue (ft)	95	171	133	144	317	133	236	222	130	274	280
Link Distance (ft)		364	364		419		607	607		1015	1015
Upstream Blk Time (%)					0						
Queuing Penalty (veh)					0						
Storage Bay Dist (ft)	250			100		160			200		
Storage Blk Time (%)		0		23	20	0	6			6	
Queuing Penalty (veh)		0		43	36	2	7			7	

Intersection: 2: WASHINGTON AVE & PRESUMPSCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	T	R	L	TR
Maximum Queue (ft)	70	446	98	767	454	174	789
Average Queue (ft)	27	230	25	363	73	27	760
95th Queue (ft)	64	371	77	779	304	107	776
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		0		0			67
Queuing Penalty (veh)		0		0			0
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		36	0			0	58
Queuing Penalty (veh)		16	0			0	19

Intersection: 6: BAXTER BLVD

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	10	73
Average Queue (ft)	0	23
95th Queue (ft)	5	56
Link Distance (ft)	181	219
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	104	108	118	73
Average Queue (ft)	51	54	62	35
95th Queue (ft)	84	88	98	60
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 9: SHERWOOD & VERANDA

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	391	309	138	107	163
Average Queue (ft)	208	125	49	32	78
95th Queue (ft)	337	233	104	75	134
Link Distance (ft)	419	608	504		640
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (ft)				200	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: I-295/I-295 RAMP & I-295 NEW RAMP

Movement

Directions Served

Maximum Queue (ft)

Average Queue (ft)

95th Queue (ft)

Link Distance (ft)

Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (ft)

Storage Blk Time (%)

Queuing Penalty (veh)

Intersection: 13: SHERWOOD & I-295 NEW RAMP

Movement	EB	NB	SB
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Directions Served	LR	T	T
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Maximum Queue (ft)	130	75	129
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Average Queue (ft)	54	40	56
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95th Queue (ft)	98	61	98
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Link Distance (ft)	630	641	504
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Upstream Blk Time (%)

Queuing Penalty (veh)

Storage Bay Dist (ft)

Storage Blk Time (%)

Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 131

1: I-295 RAMP/WASHINGTON AVE & BATES/VERANDA Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.2	0.0	0.6	0.3	0.4	0.0	0.0	0.0	0.5	0.0	0.1
Total Del/Veh (s)	39.9	53.1	15.2	84.7	81.1	72.8	95.1	46.9	42.6	67.5	37.8	36.2

1: I-295 RAMP/WASHINGTON AVE & BATES/VERANDA Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	50.4

2: WASHINGTON AVE & PRESUMPCOT Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.5	0.5	3.4	0.0	0.0	2.9	0.9	1.0	0.4
Total Del/Veh (s)	62.5	73.7	15.0	46.5	49.8	33.9	54.6	10.1	55.5	23.0	19.8	35.3

6: BAXTER BLVD Performance by movement

Movement	EBT	WBT	SWR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.1
Total Del/Veh (s)	0.4	3.1	2.3	1.9

7: RAMPS Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	All
Denied Del/Veh (s)	0.1	0.2	0.3	0.3	0.0	0.2
Total Del/Veh (s)	5.9	6.8	9.1	5.9	5.5	6.8

8: BATES Performance by movement

Movement	NBT	NBR	SWL	SWT	SWR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.7	3.1	1.6	2.5	1.9

9: SHERWOOD & VERANDA Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.4	0.3	0.2	0.1
Total Del/Veh (s)	70.4	64.3	54.2	62.0	57.2	42.0	76.3	43.1	31.6	87.3	75.9	67.0

9: SHERWOOD & VERANDA Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	59.6

11: I-295/I-295 RAMP & I-295 NEW RAMP Performance by movement

Movement	NBT	NBR	SBT	All
Denied Del/Veh (s)	3.2	3.4	0.0	1.7
Total Del/Veh (s)	9.1	8.3	2.9	6.2

13: SHERWOOD & I-295 NEW RAMP Performance by movement

Movement	EBL	EBR	NBT	SBT	All
Denied Del/Veh (s)	0.1	0.1	3.6	0.0	2.3
Total Del/Veh (s)	14.8	11.4	45.8	7.1	32.6

Total Network Performance

Movement	EBL	EBR	NBT	SBT	All
Denied Del/Veh (s)			1.9		
Total Del/Veh (s)			85.4		

Intersection: 1: I-295 RAMP/WASHINGTON AVE & BATES/VERANDA

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	156	246	139	125	450	260	620	620	225	515	537
Average Queue (ft)	51	104	63	116	421	218	477	448	118	336	347
95th Queue (ft)	105	200	116	146	505	330	669	655	251	475	488
Link Distance (ft)		364	364		419		607	607		1015	1015
Upstream Blk Time (%)					31		5	4			
Queuing Penalty (veh)					180		37	29			
Storage Bay Dist (ft)	250			100		160			200		
Storage Blk Time (%)		0		29	59	16	45		1	27	
Queuing Penalty (veh)		0		111	125	96	74		4	26	

Intersection: 2: WASHINGTON AVE & PRESUMPSCOT

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LT	R	T	R	L	TR
Maximum Queue (ft)	74	414	100	1017	962	155	586
Average Queue (ft)	23	206	46	591	242	21	344
95th Queue (ft)	60	342	116	1108	765	86	568
Link Distance (ft)	607	482		1015	1015		740
Upstream Blk Time (%)		0		1	0		
Queuing Penalty (veh)		0		4	1		
Storage Bay Dist (ft)			75			150	
Storage Blk Time (%)		44	1			0	22
Queuing Penalty (veh)		22	4			0	5

Intersection: 6: BAXTER BLVD

Movement	SW
Directions Served	R
Maximum Queue (ft)	115
Average Queue (ft)	39
95th Queue (ft)	82
Link Distance (ft)	219
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report Mitigation

09/26/2022

Intersection: 7: RAMPS

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	L
Maximum Queue (ft)	104	117	115	95
Average Queue (ft)	55	61	60	48
95th Queue (ft)	88	99	96	78
Link Distance (ft)	181	181	600	66
Upstream Blk Time (%)				2
Queuing Penalty (veh)				2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: BATES

Movement	SW
Directions Served	LR
Maximum Queue (ft)	22
Average Queue (ft)	1
95th Queue (ft)	14
Link Distance (ft)	364
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9: SHERWOOD & VERANDA

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	408	423	504	225	174
Average Queue (ft)	237	179	344	153	92
95th Queue (ft)	424	343	622	295	181
Link Distance (ft)	419	608	504		640
Upstream Blk Time (%)	4		15		
Queuing Penalty (veh)	12		92		
Storage Bay Dist (ft)				200	
Storage Blk Time (%)			36	0	
Queuing Penalty (veh)			105	1	

Queuing and Blocking Report Mitigation

09/26/2022

Intersection: 11: I-295/I-295 RAMP & I-295 NEW RAMP

Movement	NB	NB
Directions Served	T	TR
Maximum Queue (ft)	332	269
Average Queue (ft)	94	76
95th Queue (ft)	394	360
Link Distance (ft)	558	558
Upstream Blk Time (%)	4	3
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: SHERWOOD & I-295 NEW RAMP

Movement	EB	NB	SB
Directions Served	LR	T	T
Maximum Queue (ft)	164	460	78
Average Queue (ft)	66	236	38
95th Queue (ft)	135	592	63
Link Distance (ft)	630	641	504
Upstream Blk Time (%)		7	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 930

Site Land Uses, Descriptions and Data													AM Peak Hour								Midday Peak Hour								PM Peak Hour							
Code	Land Use Group	Size	Unit	Type	# of Studies	Avg. Rate	Std. Dev.	Total by Avg.	r ²	Total by Eq'n	Method Chosen	Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking
710	General Office Building	10	1000 Sq. Ft.	Office	148	2.39	0.69	24	0.9	56	average	24	48%	8AM	11	90%	10	10%	1	9	100%	11AM	24	90%	22	10%	2	19	85%	4PM	20	90%	18	10%	2	16
820	Shopping Center	0	1000 Sq. Ft.	Retail	46	1.95	0.75	0	1	100	average	0	24%	8AM	0	80%	0	50%	0	0	76%	11AM	0	80%	0	80%	0	0	81%	4PM	0	80%	0	50%	0	0
850	Supermarket	0	1000 Sq. Ft.	Retail	19	2.93	0.73	0	0.9	0	average	0	30%	8AM	0	80%	0	20%	0	0	67%	11AM	0	80%	0	80%	0	0	97%	4PM	0	80%	0	20%	0	0
932	High-Turnover (Sit Down) Restaurant	10	1000 Sq. Ft.	Restaurant	51	9.44	5.38	94	N/A	N/A	average	94	68%	8AM	64	80%	51	50%	26	26	83%	11AM	78	80%	63	80%	50	13	42%	4PM	40	80%	32	50%	16	16
222	Multifamily Housing (Mid Rise)	235	Dwellings	Residential	73	1.31	0.22	308	1	306	average	308	56%	8AM	172	80%	138	50%	69	69	37%	11AM	114	80%	91	50%	46	46	45%	4PM	139	100%	139	50%	69	69
310	Hotel	125	Rooms	Hotel	22	0.74	0.22	93	0.7	100	average	93	90%	8AM	83	100%	83	20%	17	67	89%	11AM	82	100%	82	20%	16	66	74%	4PM	68	100%	68	20%	14	55
	Roux Institute			Other								564		8AM	165	80%	132		0	132		11AM	451	80%	361		0	361		4PM	559	80%	447		0	447
760	Research and Development	50	1000 Sq. Ft.	Lab	13	2.58	0.56	129	0.9	123	average	129	91%	8AM	117	80%	94	20%	19	75	93%	11AM	120	80%	96	20%	19	77	75%	4PM	97	80%	77	20%	15	62
															Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking
															614		509		131	378			869		714		134	581			923		782		116	665
													AM Peak Hour Total Parking Demand								Midday Peak Hour Total Parking Demand								PM Peak Hour Total Parking Demand							

Site Land Uses, Descriptions and Data													AM Peak Hour								Midday Peak Hour								PM Peak Hour										
Code	Land Use Group	Size	Unit	Type	# of Studies	Avg. Rate	Std. Dev.	Total by Avg.	r ²	Total by Eq'n	Method Chosen	Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking			
710	General Office Building	50	1000 Sq. Ft.	Office	148	2.39	0.69	120	0.9	142	average	120	48%	8AM	57	90%	52	10%	5	46	100%	11AM	120	90%	108	10%	11	97	85%	4PM	102	90%	91	10%	9	82			
820	Shopping Center	5	1000 Sq. Ft.	Retail	46	1.95	0.75	10	1	108	average	10	24%	8AM	2	80%	2	50%	1	1	76%	11AM	7	80%	6	80%	5	1	81%	4PM	8	80%	6	50%	3	3			
850	Supermarket	0	1000 Sq. Ft.	Retail	19	2.93	0.73	0	0.9	0	average	0	30%	8AM	0	80%	0	20%	0	0	67%	11AM	0	80%	0	80%	0	0	97%	4PM	0	80%	0	20%	0	0			
932	High-Turnover (Sit Down) Restaurant	10	1000 Sq. Ft.	Restaurant	51	9.44	5.38	94	N/A	N/A	average	94	68%	8AM	64	80%	51	50%	26	26	83%	11AM	78	80%	63	80%	50	13	42%	4PM	40	80%	32	50%	16	16			
222	Multifamily Housing (Mid Rise)	415	Dwellings	Residential	73	1.31	0.22	544	1	547	average	544	56%	8AM	304	80%	244	50%	122	122	37%	11AM	201	80%	161	50%	80	80	45%	4PM	245	100%	245	50%	122	122			
310	Hotel	125	Rooms	Hotel	22	0.74	0.22	93	0.7	100	average	93	90%	8AM	83	100%	83	20%	17	67	89%	11AM	82	100%	82	20%	16	66	74%	4PM	68	100%	68	20%	14	55			
	Roux Institute			Other								1145		8AM	277	80%	222		0	222		11AM	867	80%	694		0	694		4PM	1136	80%	909		0	909			
760	Research and Development	50	1000 Sq. Ft.	Lab	13	2.58	0.56	129	0.9	123	average	129	91%	8AM	117	80%	94	20%	19	75	93%	11AM	120	80%	96	20%	19	77	75%	4PM	97	80%	77	20%	15	62			
															Peak Hour Parking			Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking			Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking			Mode Share Adjust		Internal Capture Adjustment	Total Parking
															906			747		189	558			1476			1209		182	1027			1695			1429		180	1249
													AM Peak Hour Total Parking Demand								Midday Peak Hour Total Parking Demand								PM Peak Hour Total Parking Demand										

Site Land Uses, Descriptions and Data													AM Peak Hour								Midday Peak Hour								PM Peak Hour							
Code	Land Use Group	Size	Unit	Type	# of Studies	Avg. Rate	Std. Dev.	Total by Avg.	r ²	Total by Eq'n	Method Chosen	Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking	Peak Hour %	Peak Hour	Peak Hour Parking	Auto Mode Split %	Mode Share Adjust	Internal Capture %	Internal Capture Adjustment	Total Parking
710	General Office Building	200	1000 Sq. Ft.	Office	148	2.39	0.69	478	0.9	465	average	478	48%	8AM	229	90%	206	10%	21	186	100%	11AM	478	90%	430	10%	43	387	85%	4PM	406	90%	366	10%	37	329
820	Shopping Center	10	1000 Sq. Ft.	Retail	46	1.95	0.75	20	1	115	average	20	24%	8AM	5	80%	4	50%	2	2	76%	11AM	15	80%	12	80%	9	2	81%	4PM	16	80%	13	50%	6	6
850	Supermarket	0	1000 Sq. Ft.	Retail	19	2.93	0.73	0	0.9	0	average	0	30%	8AM	0	80%	0	20%	0	0	67%	11AM	0	80%	0	80%	0	0	97%	4PM	0	80%	0	20%	0	0
932	High-Turnover (Sit Down) Restaurant	15	1000 Sq. Ft.	Restaurant	51	9.44	5.38	142	N/A	N/A	average	142	68%	8AM	96	80%	77	50%	39	39	83%	11AM	118	80%	94	80%	75	19	42%	4PM	59	80%	48	50%	24	24
222	Multifamily Housing (Mid Rise)	650	Dwellings	Residential	73	1.31	0.22	852	1	862	average	852	56%	8AM	477	80%	381	50%	191	191	37%	11AM	315	80%	252	50%	126	126	45%	4PM	383	80%	307	50%	153	153
310	Hotel	125	Rooms	Hotel	22	0.74	0.22	93	0.7	100	average	93	90%	8AM	83	100%	83	20%	17	67	89%	11AM	82	100%	82	20%	16	66	74%	4PM	68	100%	68	20%	14	55
	Roux Institute			Other								1288		8AM	341	80%	273		0	273		11AM	1023	80%	818		0	818		4PM	1252	80%	1002		0	1002
760	Research and Development	50	1000 Sq. Ft.	Lab	13	2.58	0.56	129	0.9	123	average	129	91%	8AM	117	80%	94	20%	19	75	93%	11AM	120	80%	96	20%	19	77	75%	4PM	97	80%	77	20%	15	62
															Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking			Peak Hour Parking		Mode Share Adjust		Internal Capture Adjustment	Total Parking
															1349		1119		287	831			2151		1785		289	1495			2282		1880		249	1631
													AM Peak Hour Total Parking Demand								Midday Peak Hour Total Parking Demand								PM Peak Hour Total Parking Demand							

Roux Institute (School and Partners Only) Parking Generation Detail

Time-of-Day Pattern by Group

	Graduate Learners (Daytime)		Graduate Learners (Night)		Corporate Learners		Daytime Special Events		Lunch Special Events		Evening Special Events	
	in	out	in	out	in	out	in	out	in	out	in	out
6am												
7am					10%		20%					
8am	10%				20%		60%					
9am	20%				40%		20%					
10am	60%				20%							
11am	10%				10%				80%			
noon									20%			
1pm										20%		
2pm			10%							80%		
3pm			60%			10%						
4pm		10%	20%			20%		20%			10%	
5pm		20%	10%			40%		60%			50%	
6pm		60%				20%		20%			40%	20%
7pm		10%				10%						50%
8pm				10%								30%
9pm				20%								
10pm				60%								
11pm				10%								

Roux Institute (School and Partners Only) Parking Generation, Short-Term
Before mode share and internal capture adjustments

	Graduate Learners (Daytime) 40% of 359		Graduate Learners (Night) 60% of 359		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups	Faculty/ Staff	Visiting Faculty	Researchers	Cumulative Parking Demand
	144		215		100		25		25		100		59	55	5	47	
	in	out	in	out	in	out	in	out	in	out	in	out	demand	demand	demand	demand	
6am	0	0	0	0	0	0	0	0	0	0	0	0	6	5	1	23	35
7am	0	0	0	0	10	0	5	0	0	0	0	0	8	7	1	40	71
8am	14	0	0	0	20	0	15	0	0	0	0	0	28	26	3	43	165
9am	29	0	0	0	40	0	5	0	0	0	0	0	52	48	5	47	289
10am	86	0	0	0	20	0	0	0	0	0	0	0	59	55	5	47	411
11am	14	0	0	0	10	0	0	0	20	0	0	0	59	55	5	44	452
noon	0	0	0	0	0	0	0	0	5	0	0	0	50	46	5	40	434
1pm	0	0	0	0	0	0	0	0	0	5	0	0	49	46	5	43	431
2pm	0	0	22	0	0	0	0	0	0	20	0	0	55	51	5	46	447
3pm	0	0	129	0	0	10	0	0	0	0	0	0	55	51	5	44	565
4pm	0	14	43	0	0	20	0	5	0	0	10	0	50	46	5	36	560
5pm	0	29	22	0	0	40	0	15	0	0	50	0	33	31	3	15	492
6pm	0	86	0	0	0	20	0	5	0	0	40	20	12	11	1	5	348
7pm	0	14	0	0	0	10	0	0	0	0	0	50	6	6	1	0	258
8pm	0	0	0	22	0	0	0	0	0	0	0	30	6	5	1	0	206
9pm	0	0	0	43	0	0	0	0	0	0	0	0	6	5	1	0	163
10pm	0	0	0	129	0	0	0	0	0	0	0	0					22
11pm	0	0	0	22	0	0	0	0	0	0	0	0					0

= Daily Peak

Roux Institute (School and Partners Only) Parking Generation, Medium-Term
Before mode share and internal capture adjustments

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups	Faculty /Staff	Visiting Faculty	Researchers	Cumulative Parking Demand
	319		479		250		25		25		100		84	101	10	62	
	in	out	in	out	in	out	in	out	in	out	in	out	demand	demand	demand	demand	
6am	0	0	0	0	0	0	0	0	0	0	0	0	8	10	1	30	49
7am	0	0	0	0	25	0	5	0	0	0	0	0	11	13	1	53	108
8am	32	0	0	0	50	0	15	0	0	0	0	0	40	48	5	56	277
9am	64	0	0	0	100	0	5	0	0	0	0	0	74	89	9	61	528
10am	192	0	0	0	50	0	0	0	0	0	0	0	84	101	10	62	794
11am	32	0	0	0	25	0	0	0	20	0	0	0	84	101	10	58	867
noon	0	0	0	0	0	0	0	0	5	0	0	0	71	86	9	52	837
1pm	0	0	0	0	0	0	0	0	0	5	0	0	71	85	8	56	834
2pm	0	0	48	0	0	0	0	0	0	20	0	0	78	94	9	60	884
3pm	0	0	287	0	0	25	0	0	0	0	0	0	79	95	9	57	1145
4pm	0	32	96	0	0	50	0	5	0	0	10	0	71	86	9	47	1136
5pm	0	64	48	0	0	100	0	15	0	0	50	0	47	57	6	19	971
6pm	0	192	0	0	0	50	0	5	0	0	40	20	17	20	2	6	661
7pm	0	32	0	0	0	25	0	0	0	0	0	50	9	11	1	0	530
8pm	0	0	0	48	0	0	0	0	0	0	0	30	8	10	1	0	450
9pm	0	0	0	96	0	0	0	0	0	0	0	0	8	10	1	0	355
10pm	0	0	0	287	0	0	0	0	0	0	0	0					48
11pm	0	0	0	48	0	0	0	0	0	0	0	0					0

= Daily Peak

Roux Institute (School and Partners Only) Parking Generation, Long-Term
Before mode share and internal capture adjustments

	Graduate Learners (Daytime) 40% of 798		Graduate Learners (Night) 60% of 798		Corporate Learners		Daytime Special Events 1/6 of 150		Lunch Special Events 1/6 of 150		Evening Special Events 2/3 of 150		Embedded Startups	Faculty /Staff	Visiting Faculty	Researchers	Cumulative Parking Demand
	319		479		350		25		25		100		84	139	14	77	
	in	out	in	out	in	out	in	out	in	out	in	out	demand	demand	demand	demand	
6am	0	0	0	0	0	0	0	0	0	0	0	0	8	14	1	37	61
7am	0	0	0	0	35	0	5	0	0	0	0	0	11	18	2	65	136
8am	32	0	0	0	70	0	15	0	0	0	0	0	40	67	7	70	341
9am	64	0	0	0	140	0	5	0	0	0	0	0	74	122	12	75	650
10am	192	0	0	0	70	0	0	0	0	0	0	0	84	139	14	77	941
11am	32	0	0	0	35	0	0	0	20	0	0	0	84	139	14	72	1023
noon	0	0	0	0	0	0	0	0	5	0	0	0	71	118	12	65	985
1pm	0	0	0	0	0	0	0	0	0	5	0	0	71	117	12	69	983
2pm	0	0	48	0	0	0	0	0	0	20	0	0	78	129	13	75	1037
3pm	0	0	287	0	0	35	0	0	0	0	0	0	79	131	13	71	1288
4pm	0	32	96	0	0	70	0	5	0	0	10	0	71	118	12	58	1252
5pm	0	64	48	0	0	140	0	15	0	0	50	0	47	78	8	24	1029
6pm	0	192	0	0	0	70	0	5	0	0	40	20	17	28	3	8	681
7pm	0	32	0	0	0	35	0	0	0	0	0	50	9	15	2	0	535
8pm	0	0	0	48	0	0	0	0	0	0	0	30	8	14	1	0	455
9pm	0	0	0	96	0	0	0	0	0	0	0	0	8	14	1	0	359
10pm	0	0	0	287	0	0	0	0	0	0	0	0					48
11pm	0	0	0	48	0	0	0	0	0	0	0	0					0

= Daily Peak

2021 HCL List
Roux Development

Location	HCL	% Injury	CRF	Total Crashes
US1 at Veranda and I-295 Ramps	2021-60334	64.3%	6.05	14
Washington at Randall	2021-17037	62.5%	1.04	8
Washington I-295 NB Exit 8	2021-3123995	16.7%	2.04	12
Washington from Galvin to Bates	2021-3123985	36.4%	1.59	11

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 60334 HIGH NODE: 0000

REGION: 1

U/R: URBAN

DESCRIPTION: Int of Rt1 NB from Veranda St and Rt1 SB from Veranda

RTE # / RD #: 0001S

DATE DRAWN: 5/10/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

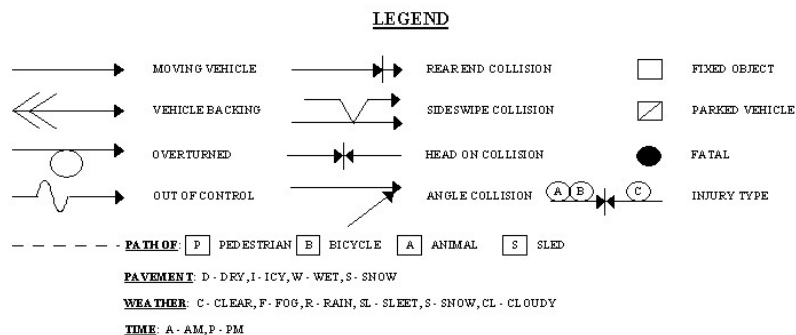
STUDY TO: 12/31/2021

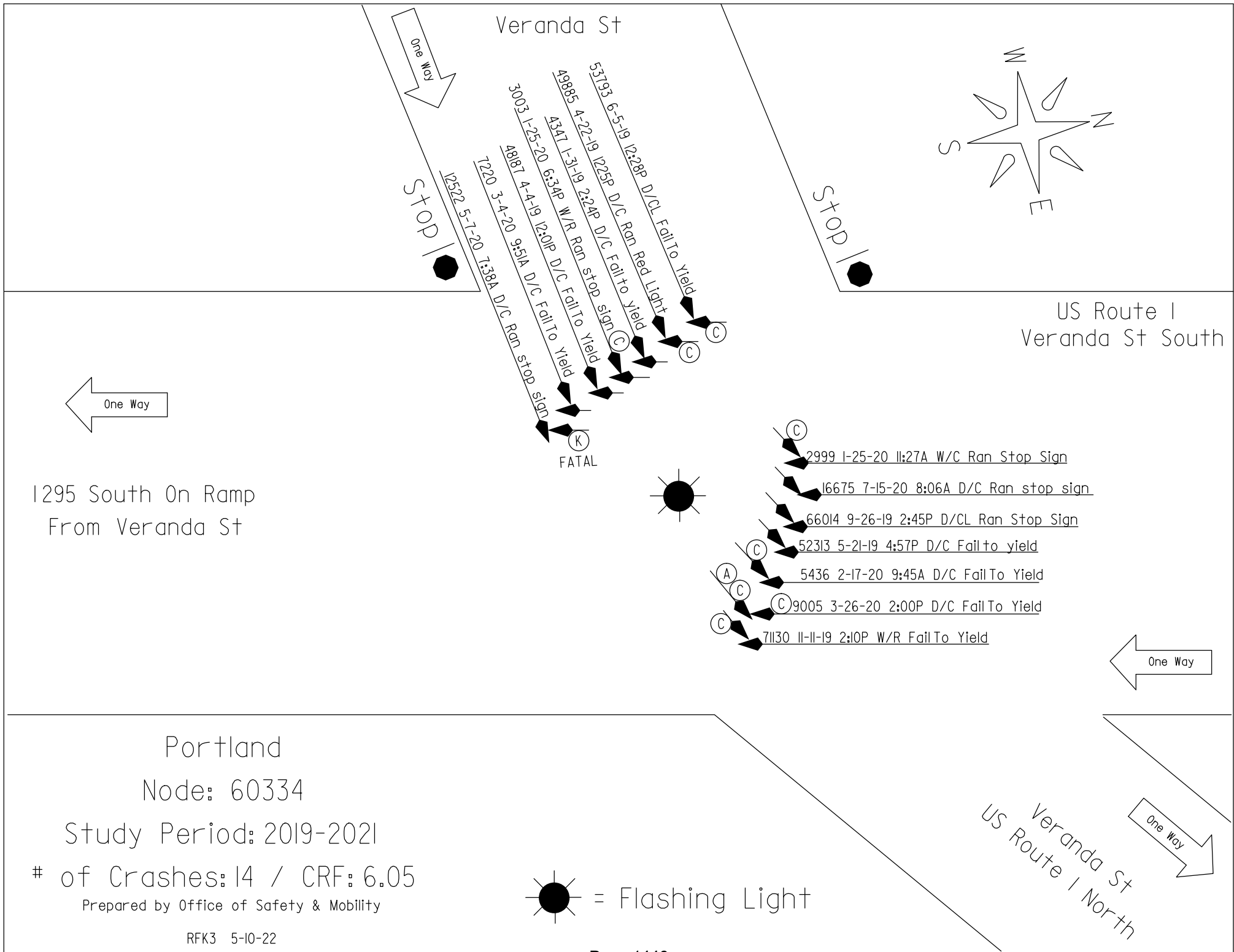
CRASH RATE: 2.05

CRF: 6.05

% INJURY: 64.3

TOTAL CRASHES: 14







Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I - Single Node ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Jct of Rt1 SB from Veranda & Rt1 NB from Veranda

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0001S

Start Node: 60334

Start Offset: 0

☐ Exclude First Node

End Node: 60334

End Offset: 0

☐ Exclude Last Node

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
60334	0001S - 16.49	Int of I 295 RD RAMP ON FROM VERANDA ST RD INV 3200	2	14	1	1	0	7	5	64.3	2.275	2.05	0.34	6.06
				Statewide Crash Rate: 0.10										
Study Years: 3.00				NODE TOTALS:										
				14	1	1	0	7	5	64.3	2.275	2.05	0.34	6.05

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM											Hour of Day											PM												
Day Of Week	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot									
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
MONDAY	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3									
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1									
WEDNESDAY	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3									
THURSDAY	0	0	0	0	0	0	0	1	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	5									
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	2									
Totals	0	0	0	0	0	0	0	1	1	2	0	1	3	0	4	0	1	0	1	0	0	0	0	0	0	14									

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	20	23-Bicyclist	0
2-(Sport) Utility Vehicle	5	24-Witness	4
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	1	26-Construction	0
5-Pickup	2	27-Farm Vehicle	0
6-Motor Home	0	Total	32
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	12	0	0	0	0	13
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	7	1	0	0	0	0	8
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	6	0	0	0	0	0	6
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	1	0	0	0	0	1
Drove Too Fast For Conditions	0	0	0	0	0	0	0
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	0	0	0	0	0	0	0
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	14	14	0	0	0	0	28

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	14	13	0	0	0	0	27
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	1	0	0	0	0	1
Total	14	14	0	0	0	0	28

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	3	0	0	0	0	3
25-29	1	0	0	0	0	1
30-39	2	0	0	0	0	2
40-49	2	0	0	0	0	2
50-59	4	0	0	0	0	4
60-69	7	0	0	0	0	7
70-79	3	0	0	0	0	3
80-Over	5	0	0	0	0	5
Unknown	0	0	0	0	0	0
Total	28	0	0	0	0	28

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	4
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	28
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	24		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	0	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	14	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	0	
14-Other	0	
Total	14	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	1	1
A	1	1
B	0	0
C	7	10
PD	5	0
Total	14	12

Road Character	
Road Grade	Total
1-Level	14
2-On Grade	0
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	14

Light	
Light Condition	Total
1-Daylight	13
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	1
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	14

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	1	2	0	3
FEBRUARY	0	1	0	1
MARCH	0	2	0	2
APRIL	2	0	0	2
MAY	1	1	0	2
JUNE	1	0	0	1
JULY	0	1	0	1
AUGUST	0	0	0	0
SEPTEMBER	1	0	0	1
OCTOBER	0	0	0	0
NOVEMBER	1	0	0	1
DECEMBER	0	0	0	0
Total	7	7	0	14

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	14	0	0	0	0	0	0	0	0	0	0	14

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	9	0	0	0	0	0	0	0	0	0	1	10
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	0	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	11	0	0	0	0	0	0	0	0	0	3	14

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 17037 HIGH NODE: 0000

REGION: 1

U/R: URBAN

DESCRIPTION: Int of Randall St and Washington Ave

RTE # / RD #: 0026X

DATE DRAWN: 4/28/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

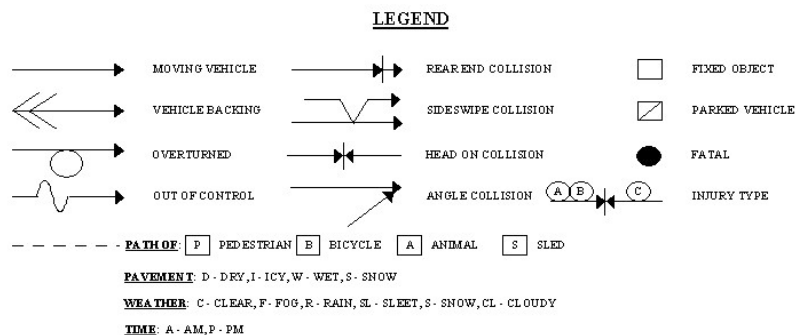
STUDY TO: 12/31/2021

CRASH RATE: 0.3

CRF: 1.04

% INJURY: 62.5

TOTAL CRASHES: 8



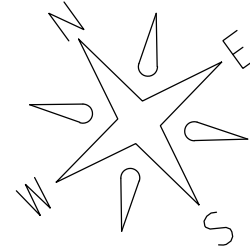
Portland
Node: 17037

Study Period: 2019-2021

of Crashes: 8 / CRF: 1.04

Prepared by Office of Safety & Mobility

RFK3 4-28-22



Washington Ave

14291 6-17-20 5:00P D/C Follow Too Close
61004 8-8-19 11:35A D/C Follow Too Close
15639 7-2-20 8:43A D/C Follow Too Close
2744 2-2-21 6:12P S/S Unsafe speed

21028 8-12-21 8:49A D/C Fail To Yield
13221 5-28-21 10:55A D/CL Fail To Yield
19454 8-17-20 12:45P D/C Fail To Yield

23258 9-30-20 11:21P W/R Fail To Yield

Stop

Randall St



Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I - Single Node ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Jct of Washington Ave & Randall St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X

Start Node: 17037

Start Offset: 0

☐ Exclude First Node

End Node: 17037

End Offset: 0

☐ Exclude Last Node

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	K	Injury A	Crashes B	C	PD	Percent Annual M Injury	Ent-Veh	Crash Rate	Critical Rate	CRF
17037	0026X - 1.32	Int of RANDALL ST WASHINGTON AV	2	8	0	0	0	5	3	62.5	8.776	0.30	0.29	1.04
				Statewide Crash Rate: 0.13										
Study Years: 3.00		NODE TOTALS:		8	0	0	0	5	3	62.5	8.776	0.30	0.29	1.04

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM											Hour of Day											PM											Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11											
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1								
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1								
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2								
THURSDAY	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3								
FRIDAY	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1								
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
Totals	0	0	0	0	0	0	0	0	2	0	1	1	1	0	0	0	0	1	1	0	0	0	0	1	0	8									

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	12	23-Bicyclist	0
2-(Sport) Utility Vehicle	5	24-Witness	2
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	0	27-Farm Vehicle	0
6-Motor Home	0	Total	19
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	7	1	0	0	0	9
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	3	1	0	0	0	0	4
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	1	0	0	0	0	0	1
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	3	0	0	0	0	0	3
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	8	8	1	0	0	0	17

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	7	8	1	0	0	0	16
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	1	0	0	0	0	0	1
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	8	8	1	0	0	0	17

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	3	0	0	0	0	3
20-24	1	0	0	0	0	1
25-29	3	0	0	0	0	3
30-39	5	0	0	0	0	5
40-49	4	0	0	0	0	4
50-59	0	0	0	0	0	0
60-69	1	0	0	0	0	1
70-79	0	0	0	0	0	0
80-Over	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	17	0	0	0	0	17

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	17
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	17		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	0	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	1	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	7	
14-Other	0	
Total	8	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	0	0
C	5	9
PD	3	0
Total	8	9

Road Character	
Road Grade	Total
1-Level	8
2-On Grade	0
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	8

Light	
Light Condition	Total
1-Daylight	6
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	2
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	8

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	0	1	1
MARCH	0	0	0	0
APRIL	0	0	0	0
MAY	0	0	1	1
JUNE	0	1	0	1
JULY	0	1	0	1
AUGUST	1	1	1	3
SEPTEMBER	0	1	0	1
OCTOBER	0	0	0	0
NOVEMBER	0	0	0	0
DECEMBER	0	0	0	0
Total	1	4	3	8

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Head-on - Sideswipe	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Intersection Movement	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	8	0	0	0	0	0	0	0	0	0	0	0	8

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	5	0	0	0	0	0	0	0	0	0	0	5
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	1	0	0	0	0	0	0	0	0	0	0	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	1	0	0	0	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6	0	0	0	0	0	0	1	0	0	1	8

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 18719 HIGH NODE: 18737

REGION: 1

U/R: URBAN

DESCRIPTION: Washington Ave from I-295NB Exit 8 off to Bates St

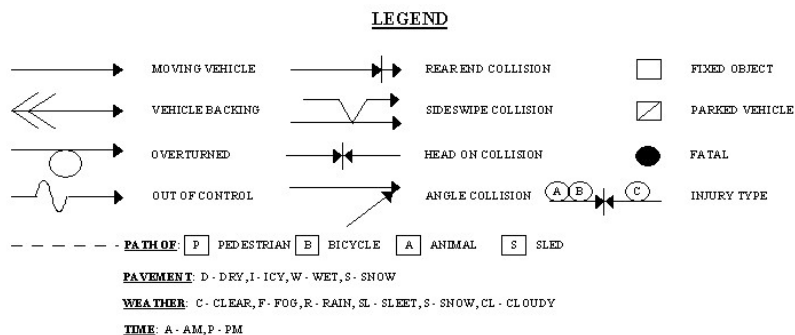
RTE # / RD #: 0026X

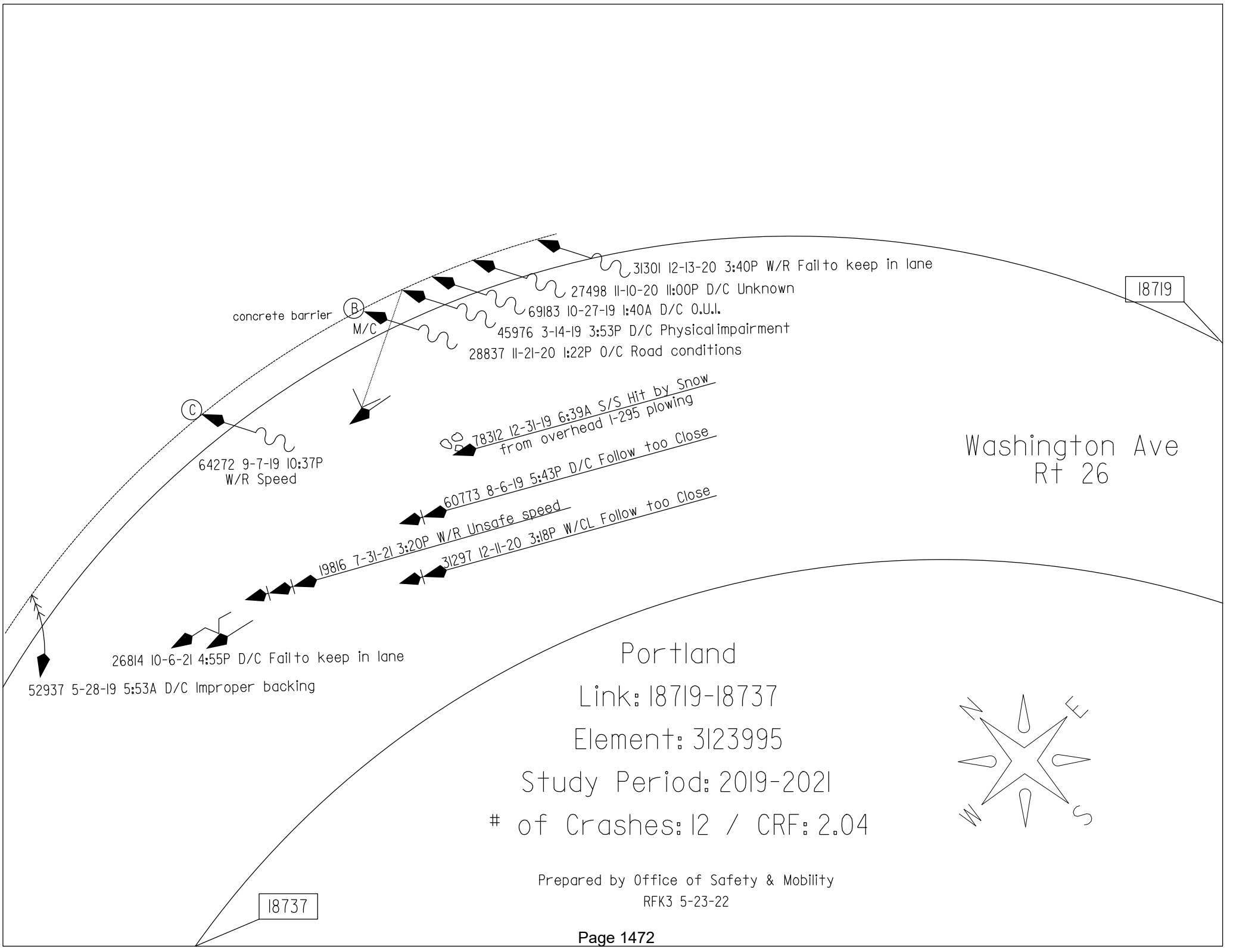
DATE DRAWN: 5/23/2022 DRAWN BY: BOB K

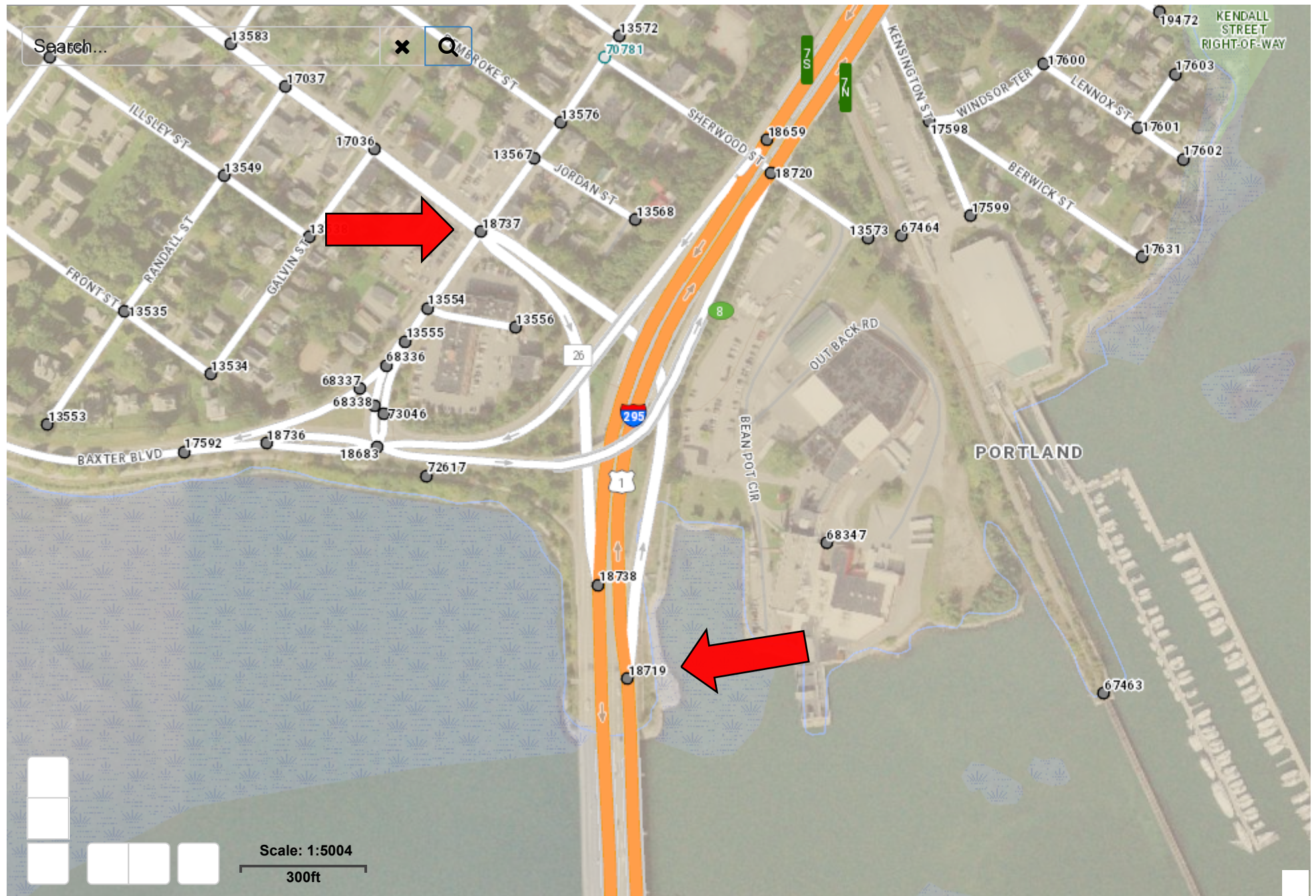
STUDY FROM: 1/1/2019

STUDY TO: 12/31/2021

CRASH RATE: 392.29 CRF: 2.04 % INJURY: 16.7 TOTAL CRASHES: 12







Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I -
Single Element ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Washington Ave from I-295SB Exit 8 Off to Bates/Veranda St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X

Start Node: 18719

Start Offset: 0

☒ Exclude First Node

End Node: 18737

End Offset: 0

☒ Exclude Last Node

Crash Summary I

Sections																				
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	Injury Crashes				Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF			
									A	B	C	PD								
18719	18737	3123995	0 - 0.24	0026X - 0.97	0.24	2	12	0	0	1	1	10	16.7	0.01020	392.29	192.74	2.04			
Int of I 295 NB		WASHINGTON AV		ST RTE 26														Statewide Crash Rate: 78.55		
Study Years:		3.00		Section Totals:		0.24	12	0	0	1	1	10	16.7	0.01020	392.29	192.74	2.04			

Crash Summary

Section Details

Section Details														
Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	Injury Crashes				Crash Report	Crash Date	Crash Mile Point	Injury Degree
							A	B	C	PD				
18719	18737	3123995	0 - 0.24	0026X - 0.97	12	0	0	1	1	10	2020-27498	11/10/2020	1.09	PD
											2019-45976	03/14/2019	1.10	PD
											2020-31301	12/13/2020	1.10	PD
											2020-28837	11/21/2020	1.11	B
											2020-31297	12/11/2020	1.11	PD
											2019-78312	12/31/2019	1.12	PD
											2019-64272	09/07/2019	1.13	C
											2019-60773	08/06/2019	1.13	PD
											2019-69183	10/27/2019	1.13	PD
											2021-19816	07/31/2021	1.16	PD
											2021-26814	10/06/2021	1.18	PD
											2019-52937	05/28/2019	1.20	PD
											Totals:			

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM											Hour of Day											PM											Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11											
SUNDAY	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2								
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
TUESDAY	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	4								
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1								
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1								
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1								
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	3								
Totals	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	4	1	1	0	0	0	0	1	1	0	12									

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	9	23-Bicyclist	0
2-(Sport) Utility Vehicle	6	24-Witness	2
3-Passenger Van	0	25-Other	0
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	2	27-Farm Vehicle	0
6-Motor Home	0	Total	20
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	1		
12-Moped	0		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	2	5	1	0	0	0	8
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	0	0	0	0	0	0	0
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	2	0	0	0	0	0	2
Improper Turn	0	0	0	0	0	0	0
Improper Backing	1	0	0	0	0	0	1
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	2	0	0	0	0	0	2
Failed to Keep in Proper Lane	3	0	0	0	0	0	3
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	1	0	0	0	0	0	1
Total	12	5	1	0	0	0	18

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	8	5	1	0	0	0	14
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	1	0	0	0	0	0	1
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	3	0	0	0	0	0	3
Other	0	0	0	0	0	0	0
Total	12	5	1	0	0	0	18

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	3	0	0	0	0	3
25-29	2	0	0	0	0	2
30-39	3	0	0	0	0	3
40-49	5	0	0	0	0	5
50-59	3	0	0	0	0	3
60-69	1	0	0	0	0	1
70-79	0	0	0	0	0	0
80-Over	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	18	0	0	0	0	18

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	1
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	18
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	1		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	12		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	1		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	3		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	2	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	0	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	10	
14-Other	0	
Total	12	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	1	1
C	1	1
PD	10	0
Total	12	2

Road Character	
Road Grade	Total
1-Level	3
2-On Grade	9
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	12

Light	
Light Condition	Total
1-Daylight	7
2-Dawn	1
3-Dusk	1
4-Dark - Lighted	2
5-Dark - Not Lighted	1
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	12

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	0	0	0
MARCH	1	0	0	1
APRIL	0	0	0	0
MAY	1	0	0	1
JUNE	0	0	0	0
JULY	0	0	1	1
AUGUST	1	0	0	1
SEPTEMBER	1	0	0	1
OCTOBER	1	0	1	2
NOVEMBER	0	2	0	2
DECEMBER	1	2	0	3
Total	6	4	2	12

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	2	0	0	0	0	0	0	2	0	0	0	0	0	0	4
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	1	0	0	0	0	0	9	0	0	0	0	0	0	12

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Not Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	4	0	0	0	1	0	0	0	0	0	0	5
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	1	1
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	1	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	1	0	0	0	1
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6	0	0	0	1	0	0	1	0	0	4	12

H. C. L. CRASH COLLISION DIAGRAM DATA PACKAGE

COUNTY: CUMBERLAND

TOWN: PORTLAND

LOW NODE: 17036 HIGH NODE: 18737

REGION: 1

U/R: URBAN

DESCRIPTION: Washington Ave from Galvin St to Bates St

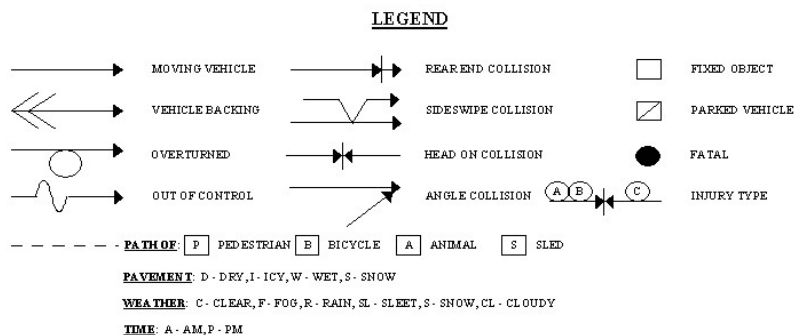
RTE # / RD #: 0026X

DATE DRAWN: 5/23/2022 DRAWN BY: BOB K

STUDY FROM: 1/1/2019

STUDY TO: 12/31/2021

CRASH RATE: 692.71 CRF: 1.59 % INJURY: 36.4 TOTAL CRASHES: 11



Portland
Link: 17036-18737

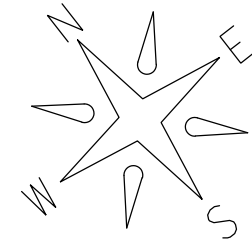
Prepared by Office of Safety & Mobility

RFK3 5-23-22

Element: 3123985

Study Period: 2019-2021

of Crashes: 11 / CRF: 1.59



17036

Driveway
#521

18737

pole (B) 7801 3-28-21 9:00A D/CL Sick

69175 10-25-19 5:40P D/C Follow too close

50601 5-2-19 7:40A W/R Follow too close

(B) 24542 9-15-21 12:21P D/CL Follow too close
laid down moped

19629 8-18-20 4:25P D/C Fail to Yield

30654 11-8-21 5:18P D/C Fail to Yield

49657 4-17-19 4:15P D/C Fail to yield

(C) 52817 5-21-19 4:51P D/C Follow too close

60278 7-28-19 9:17P D/C Fail to keep in lane

16740 6-20-20 10:30P D/C Hit and run

53067 5-29-19 9:37P D/C Fail To Keep In Lane

Washington Ave. (Rte. 26)

Driveway

Driveway



Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☒ Crash Summary I -
Single Element ☐ Section Detail ☒ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Portland
Washington Ave from Galvin St to Bates St

REPORT PARAMETERS

Year 2019, Start Month 1 through Year 2021 End Month: 12

Route: 0026X

Start Node: 18737

Start Offset: 0

☒ Exclude First Node

End Node: 17036

End Offset: 0

☒ Exclude Last Node

Crash Summary I

Sections																	
Start Node	End Node	Element	Offset Begin - End	Route - MP	Section U/R Length	Total Crashes	K	Injury A	Crashes B	Crashes C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF	
17036	18737	3123985	0 - 0.06	0026X - 1.21	0.06	2	11	0	0	2	2	7	36.4	0.00529	692.71	435.32	1.59
Int of GALVIN ST WASHINGTON AV				ST RTE 26	Statewide Crash Rate: 187.15												
Study Years:		3.00		Section Totals:	0.06		11	0	0	2	2	7	36.4	0.00529	692.71	435.32	1.59

Crash Summary

Section Details

Section Details														
Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	Injury Crashes				Crash Report	Crash Date	Crash Mile Point	Injury Degree
							A	B	C	PD				
17036	18737	3123985	0 - 0.06	0026X - 1.21	11	0	0	2	2	7	2019-53067	05/29/2019	1.22	C
											2020-19629	08/18/2020	1.23	PD
											2021-30654	11/08/2021	1.23	PD
											2019-49657	04/17/2019	1.24	PD
											2020-16740	06/20/2020	1.24	PD
											2019-60278	07/28/2019	1.24	PD
											2021-7801	03/28/2021	1.25	B
											2019-69175	10/25/2019	1.25	PD
											2019-50601	05/02/2019	1.25	PD
											2021-24542	09/15/2021	1.26	B
											2019-52817	05/21/2019	1.26	C
Totals:					11	0	0	2	2	7				

Crash Summary II - Characteristics

Crashes by Day and Hour

Day Of Week	AM												PM												Un	Tot
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11		
SUNDAY	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
MONDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	3
THURSDAY	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Totals	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	3	2	0	0	0	2	1	0	0	11

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	14	23-Bicyclist	0
2-(Sport) Utility Vehicle	2	24-Witness	0
3-Passenger Van	0	25-Other	1
4-Cargo Van (10K lbs or Less)	0	26-Construction	0
5-Pickup	3	27-Farm Vehicle	0
6-Motor Home	0	Total	21
7-School Bus	0		
8-Transit Bus	0		
9-Motor Coach	0		
10-Other Bus	0		
11-Motorcycle	0		
12-Moped	1		
13-Low Speed Vehicle	0		
14-Autocycle	0		
15-Experimental	0		
16-Other Light Trucks (10,000 lbs or Less)	0		
17-Medium/Heavy Trucks (More than 10,000 lbs)	0		
18-ATV - (4 wheel)	0		
20-ATV - (2 wheel)	0		
21-Snowmobile	0		
22-Pedestrian	0		

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	1	9	0	0	0	0	10
Ran Off Roadway	1	0	0	0	0	0	1
Failed to Yield Right-of-Way	3	0	0	0	0	0	3
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	0	0	0	0	0	0	0
Improper Turn	0	0	0	0	0	0	0
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	3	0	1	0	0	0	4
Failed to Keep in Proper Lane	2	0	0	0	0	0	2
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	0	0	0	0	0	0
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	10	9	1	0	0	0	20

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	9	9	1	0	0	0	19
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	1	0	0	0	0	0	1
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	10	9	1	0	0	0	20

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	2	0	0	0	0	2
25-29	4	0	0	0	0	4
30-39	5	0	0	0	0	5
40-49	0	0	0	0	0	0
50-59	4	0	0	0	0	4
60-69	3	0	0	0	0	3
70-79	1	0	0	0	0	1
80-Over	0	0	0	0	0	0
Unknown	1	0	0	0	0	1
Total	21	0	0	0	0	21

Crash Summary II - Characteristics

Most Harmful Event			
Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	0	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	21
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	0		
13-Motor Vehicle in Transport	20		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	1		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices		
Traffic Control Device	Total	
1-Traffic Signals (Stop & Go)	3	
2-Traffic Signals (Flashing)	0	
3-Advisory/Warning Sign	0	
4-Stop Signs - All Approaches	0	
5-Stop Signs - Other	0	
6-Yield Sign	0	
7-Curve Warning Sign	0	
8-Officer, Flagman, School Patrol	0	
9-School Bus Stop Arm	0	
10-School Zone Sign	0	
11-R.R. Crossing Device	0	
12-No Passing Zone	0	
13-None	8	
14-Other	0	
Total	11	

Injury Data		
Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	2	2
C	2	2
PD	7	0
Total	11	4

Road Character	
Road Grade	Total
1-Level	8
2-On Grade	2
3-Top of Hill	1
4-Bottom of Hill	0
5-Other	0
Total	11

Light	
Light Condition	Total
1-Daylight	6
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	5
5-Dark - Not Lighted	0
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	11

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2019	2020	2021	Total
JANUARY	0	0	0	0
FEBRUARY	0	0	0	0
MARCH	0	0	1	1
APRIL	1	0	0	1
MAY	3	0	0	3
JUNE	0	1	0	1
JULY	1	0	0	1
AUGUST	0	1	0	1
SEPTEMBER	0	0	1	1
OCTOBER	1	0	0	1
NOVEMBER	0	0	1	1
DECEMBER	0	0	0	0
Total	6	2	3	11

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Head-on - Sideswipe	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Intersection Movement	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	0	0	0	0	2	0	0	0	0	0	0	0	0	11

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	5	0	0	0	0	0	0	0	0	0	0	5
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	3	0	0	0	0	0	0	0	0	0	0	3
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	0	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	10	0	0	0	0	0	0	0	0	0	1	11

Warrant Requirements:

- ☒ Volume entering major approaches at least 300 veh/hr for 8 hours in an average day
- ☒ Volume entering minor approaches at least 200 veh/hr for same 8 hours
- ☒ Minor approach delay at least 30 seconds per vehicle during highest hour of the day

2-Way Volumes on Baxter Blvd (DOT Count)				Short-Term Build Projected Volume at Bates/Baxter Intersection	
Hour	Volume	Multiple of Peak Hour	8 Highest Hours	Major Approaches (peak hour 700)	Minor Approach (peak hour 328)
12:00 AM	27	0.03			
1:00 AM	21	0.02			
2:00 AM	15	0.02			
3:00 AM	7	0.01			
4:00 AM	14	0.02			
5:00 AM	71	0.08			
6:00 AM	181	0.22			
7:00 AM	518	0.62			
8:00 AM	573	0.68	x	477	223
9:00 AM	526	0.63			
10:00 AM	538	0.64			
11:00 AM	573	0.68	x	477	223
12:00 PM	585	0.70	x	487	228
1:00 PM	645	0.77	x	537	252
2:00 PM	703	0.84	x	585	274
3:00 PM	734	0.87	x	611	286
4:00 PM	773	0.92	x	643	301
5:00 PM	841	1.00	x	700	328
6:00 PM	572	0.68			
7:00 PM	412	0.49			
8:00 PM	253	0.30			
9:00 PM	142	0.17			
10:00 PM	102	0.12			
11:00 PM	54	0.06			

Peak Hour Delay, Short-Term Build (two-way stop condition)		
Approach	Type	Delay (s)
EB	Major	8.5
WB	Major	0
SB	Minor	31.8



PLAN REFERENCES:

1. SITE PLAN INFORMATION DEPICTED IS CITY OF PORTLAND GIS DATA.
2. AERIAL IMAGES PROVIDED BY BING MAPPING, MICROSOFT CORPORATION.

EXISTING RETAINING WALL
EXTEND WALL VERTICALLY AS NECESSARY
BETWEEN STA. 0+75 AND 3+90

—EXISTING RETAINING WALL



BAR SCALE
1" = 30'
CHECK GRAPHIC SCALE BEFORE USING

NOT FOR CONSTRUCTION

IDEALS - ROUX INSTITUTE
PORTLAND, MAINE

TUKEY'S BRIDGE BIKE & PEDESTRIAN TRAIL

BIKE & PEDESTRIAN TRAIL CONCEPT
SITE PLAN

	REV	DESCRIPTION	DATE
		DESIGNED BY: BCM	CHECKED BY: DJC
		DRAWN BY: RCM	JPM/KC - 967 Tealil B&S.dwg

41 Hutchins Drive
Portland, Maine 04102
800.426.4262 | www.woodardcurran.com



**Woodward
& Curran**

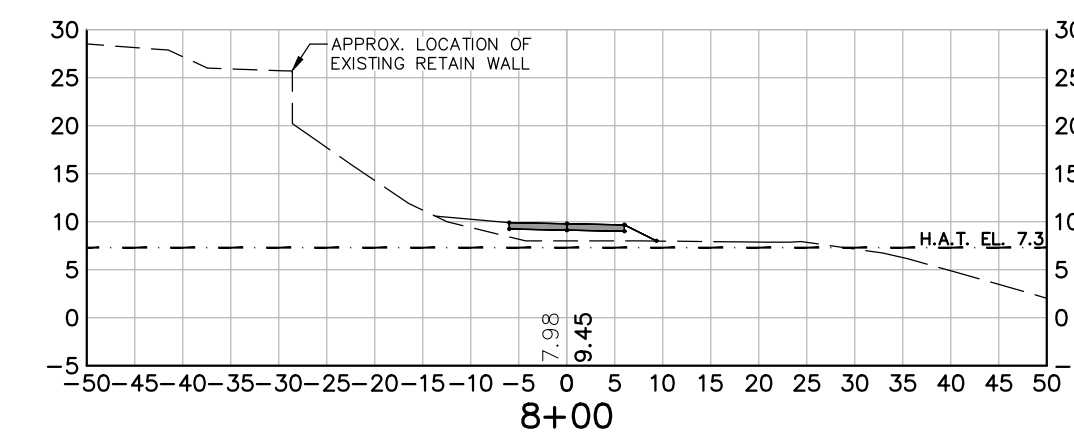
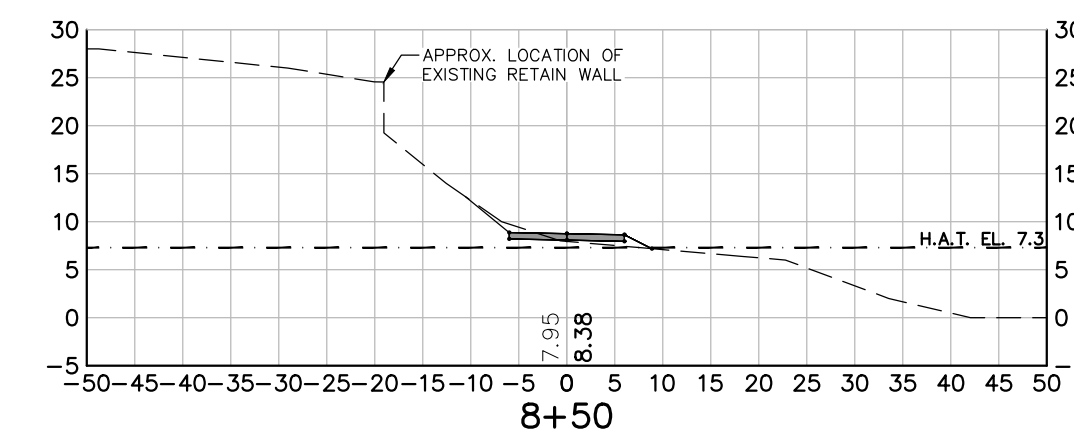
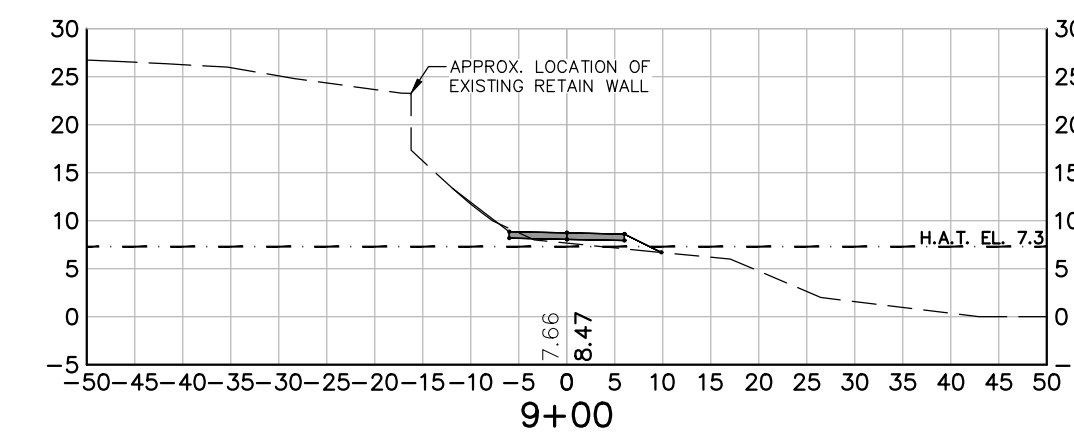
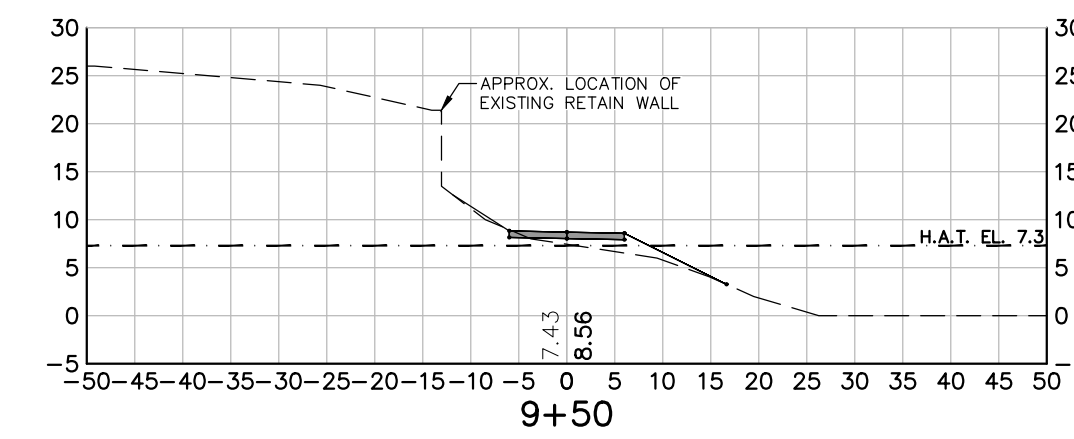
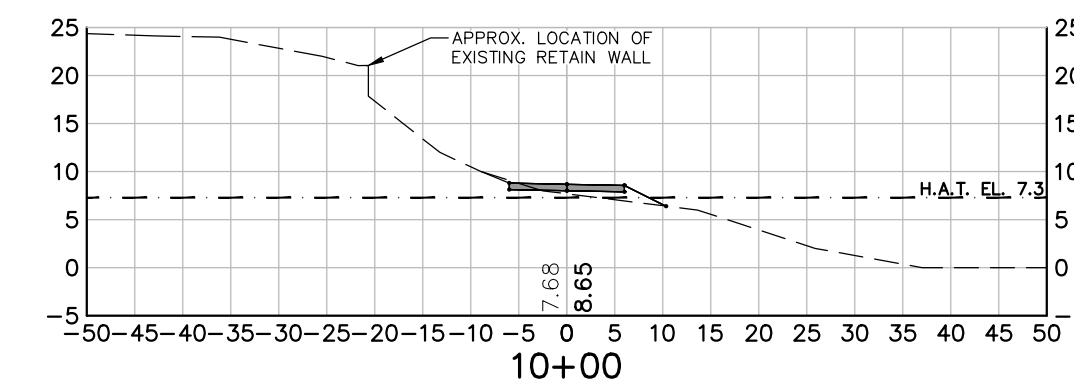
COMMITMENT & INTEGRITY DRIVE RESULTS

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JOB NO.: 233482
DATE: APRIL 2022
SCALE: 1"=30'
SHEET: 1

FIG. 1



Institutional Development Plan
Roux Campus
July 2022September 2022

Introduction

The Roux Institute at Northeastern University in Portland, Maine is a space for cutting-edge educational, research, and collaborative programs in areas including artificial intelligence, computer and data sciences, digital engineering, advanced life sciences, and medicine. The Initiative for Digital Engineering and Life Sciences (IDEALS) is a Maine non-profit corporation tasked with and solely committed to locating and developing a campus for the Roux Institute ~~at Northeastern University in Portland, Maine: a space for cutting-edge educational, research, and collaborative programs in areas including artificial intelligence, computer and data sciences, digital engineering, advanced life sciences, and medicine.~~ IDEALS was formed in 2018 with support from David Roux, a technology entrepreneur and Lewiston native, and his wife Barbara. They sought to create a graduate institute providing opportunities for Maine people to fill talent gaps for growing digital and life sciences companies while ensuring the 21st century success of greater Portland and Maine's economies. IDEALS recruited Northeastern University to establish and run the program, and the Roux Institute at Northeastern University launched in 2020. The Roux Institute now offers post-graduate degrees and certifications, conducts research, assists start-up entities, and partners with private, public, and non-profit entities to ~~spur innovation and~~ develop 21st century workforce talent and spur innovation.

The Roux Institute is temporarily located in leased space in Portland. A permanent campus for the Roux Institute is essential to fulfill its educational and economic potential. The vision for that home - the Roux Campus - is one that allows for continued growth of the education, research, entrepreneurial, and collaborative programs of the Roux Institute while providing space to support those programs and serve the community. After completing an exhaustive four-year search both on and off the Portland peninsula and its surrounding area, IDEALS acquired land formerly occupied by the B&M Baked Beans facility along the Portland waterfront.

Recognizing the prominent role that major educational and healthcare institutions play in the health and well-being of the community, the City of Portland's Land Use Code allows for the creation of Institutional Overlay Zones (IOZ) to "provide a regulatory mechanism where an improved regulatory structure is needed to facilitate a consistent, predictable, and clear growth management process." Consistent with that purpose, we seek designation of an IOZ for the Roux Campus. We will simultaneously seek to change the underlying zone to B-5 Mixed-Use Business. The IOZ designation process requires two components: an Institutional Development Plan (IDP, this document) and a regulatory framework. The purpose of this IDP is to establish baseline institutional data for existing land uses and services while also communicating planned growth; it is the basis of the proposed regulatory framework, submitted under separate cover. The regulatory framework translates the IDP into a set of clear and specific zoning requirements, which will constitute the text and map amendment to the City's Land Use Code. Unlike other institutions for which the IDP process was established, the Roux Institute is in its early years and has not established a stand-alone campus. The IDP allows IDEALS-Northeastern University and IDEALS to memorialize the long-term strategic plan for the Roux Campus in consultation with the Portland community at the very outset of development.

Creation of a new campus provides the opportunity to establish a people-oriented space right from the start. It will prioritize people over cars by creating a pedestrian-friendly landscape supported by multi-modal programs that provide incentives for alternative transportation options. The campus will improve site resilience and sustainability by replacing much of the existing pavement and rooftops with green space while improving coastal and upland ecology and incorporating sustainable building practices.

We intend to create a dynamic, mixed-use campus that contributes to the East Deering neighborhood without encroaching on it or burdening City resources. By providing ancillary uses on site (office and lab space for institutional partners, housing for students, faculty, and employees, a hotel for visitors to the Institute and its partners,

retail, and personal services), the Roux Campus will meet demand created by the Roux Institute at Northeastern University and its collaborating partners.

1. Establishing the Context

Our Roots

The Roux Campus will be the first of its kind in the Northeast. It will integrate graduate education in technology and science with groundbreaking research and a wide range of collaborations to spark innovation and economic development. The campus is being designed at a scale that will facilitate learning, collaboration, and research breakthroughs and innovations, encourage start-up businesses, and strengthen existing Maine businesses and institutions. Every component of the campus is directly linked to the mission of the Roux Institute, from the housing – keep students and faculty on campus to foster collaboration and reduce traffic, to the hotel – provide a convening space and accommodation for Institute guests from around the globe so that, together, they can spark new ideas. The iconic waterfront location, minutes from downtown Portland (by bike, bus, boat, car, or on foot) with striking architecture and a vibrant community, will attract talent from around the globe and spread economic advancement throughout Portland and beyond.

At the direction of Northeastern University, IDEALS will oversee the design and construction of a primary academic building housing the Roux Institute and will also seek partnerships from the private sector to construct and operate ancillary uses, such as housing, parking, a hotel, and commercial office and laboratory buildings that support the primary academic uses—all of which would be on a ground lease basis.

The Roux Institute at Northeastern University was established to develop talent, conduct research, and encourage innovation to support and attract businesses that will thrive in the 21st century economy.

Vision: The State of Maine will be home to a thriving, high-tech economy fueled by people and businesses leading in experiential artificial intelligence, machine learning, big data, life sciences and medicine, engineering, and data visualization. This new economy will attract people and businesses from around the world to the region and provide unprecedented opportunities for all Mainers in a manner that honors and enriches the Maine lifestyle and culture.

Mission: With a vision to enable the creation of a synergistic technology and life science-driven economy and workforce, the Roux Institute designs, curates, and integrates learning, research, and entrepreneurial solutions in collaboration with industry, academic institutions, and community organizations to catalyze talent development and economic impact throughout Maine.

Institutional Context

The Roux Institute at Northeastern University currently has 72 full-time, Maine-based employees, 50 of whom are faculty and post-doctoral staff. The Institute taught a total of 817 learners during fiscal year 2021. Of these 817 learners, 317 are matriculating graduate students and the remainder are pursuing courses and certificates while working full time. Of Maine's 16 counties, 15 are represented in the student body. The Institute offers 16 graduate programs in computer and data science, analytics, cloud software, cybersecurity, life sciences, and project management.

These educational programs are bolstered by collaboration; the Institute has 54 industry partners, 14 academic partners, and 12 community partners. Approximately 450 of these partners' employees have taken courses designed by the Roux Institute in concert with their employers, and over 70% of partners provided paid, cooperative work opportunities for Institute students. Additionally, the Institute has hosted 10 accelerator companies and has 6 established companies in residence. The Roux Institute at Northeastern University currently occupies 44,000 square feet of space leased at 100 Fore Street. This space enabled the Roux Institute to begin providing graduate education services in Portland, but significantly more physical space is needed to meet its Mission & Vision. In the near term (0-5 years), the Roux Institute anticipates enrollment expanding to 1,750 learners; in the medium term (10-20 years),

enrollment is anticipated to grow to 2,500 ~~students~~; and in the long term (20+ years), enrollment is projected to grow to 5,100, including on-campus, virtual and hybrid learning settings. ~~4,500 students~~. The Roux Institute intends to transfer all operations from 100 Fore Street to the new Roux Campus.

Neighborhood Context

The proposed Roux Campus is located within Portland's East Deering neighborhood, near a residential area of single and multi-family homes (three-story apartments) and a commercial node featuring restaurants, bars, mechanics, offices, and three-story apartments. While proximate to these areas, the site is remarkably buffered. I-295 to the west, state-owned vacant parcels to the north, a disused rail corridor and marine business to the east, and Casco Bay to the south collectively surround the property. Access to the site is via Sherwood Street at the intersection with Veranda Street, through a 40-foot-wide highway underpass.

This setting makes for a campus full of potential. Due to its relatively large 13+ acre size and existing buffers, the site lends itself to dense development. Taller buildings with smaller footprints will allow for additional public open space, a mix of landscaped and natural green space, and public waterfront access while helping to reduce impact on Portland's challenged housing stock. The Roux Campus will connect to and enhance the surrounding East Deering neighborhood while simultaneously fostering its own identity.

Future development will acknowledge these advantages and constraints. The site must be planned responsibly to maximize community access while minimizing off-property impacts. The creation of compelling pedestrian, bicycle, water taxi, and public transit connections to the Roux Campus and the waterfront will be particularly crucial.

Site Context

Zoning

The majority of the site is currently zoned I-M Moderate-Impact Industrial, with the area immediately adjacent to and across Sherwood Street zoned R-3 Residential. Parcels adjacent to the site include I-L Low-Impact Industrial at the Maine Yacht Center to the east and R-3 Residential across the railroad tracks to the north. Parcels west of I-295 are generally zoned R-5 Residential and B-2 Mixed-Use Business.

Relationship to Water

The parcel includes approximately 13+ acres above mean high water line (the site) as well as an adjacent 11 acres of submerged lands. The site has 1,000 linear feet of waterfront, within associated Flood Hazard and Shoreland Zones.

The City of Portland designates a shoreland zone within 250 feet of tidal water bodies. Within the shoreland zone, a minimum setback of 25 feet from the normal high-water level is required for structures, roads, and driveways.

Portions of the site are delineated as Special Flood Hazard Areas according to FEMA's Flood Insurance Rate Map (FIRM). The current and effective FIRMs for Cumberland County, based upon FEMA's 1986 publication, indicate portions of the site are within the AE Zone, representing 1% annual chance of flooding. Base flood elevations range from 9 to 11 feet.

Impervious Areas

The majority of the site is developed land, with limited areas of natural vegetation. Approximately 10 acres of land above the mean high-water line are impervious (paved areas, building roofs, etc.). The remaining 2.5 acres of permeable area include lawn and approximately half an acre of vegetated, early successional non-lawn area adjacent to the rail corridor abutting the site to the east.

Not only is the site largely covered in pavement and building structures, it is also inaccessible to the public. Fencing prevents access to the waterfront and the interior of the site. This security was necessary for industrial use. However, new development can "soften" site edges and provide improved access to the waterfront.

Coastal & Natural Resources

Immediately adjacent to this highly developed site are natural resource areas including: an estuarine intertidal emergent marsh located east of the site near the rail corridor; coastal wetlands for all areas below highest annual tide; tidal waterfowl and wading bird habitat, and blue mussel habitat. Portions of the site are delineated as Special Flood Hazard Areas according to FEMA's Flood Insurance Rate Map (FIRM).

Topography of the site slopes downward from the north to the south, toward the water. The highest elevations are near Sherwood Street, at elevation 28 +/- . The lowest grades are near the loading dock at the B&M Bean Building, at elevation 8.5 +/- . These low areas are only 1-foot above Highest Astronomical Tide.

In recognition of existing vulnerabilities and future sea level rise, resiliency will be key to the Roux Campus. The redevelopment will raise site grades and incorporate infrastructure improvements to create a flood resilient landscape. It will also rehabilitate this brownfield site, enhance natural resource areas, and reduce the impacts of current impervious, industrial conditions by creating habitats that foster ecological diversity and productivity at the water's edge.

Historic Resources

The campus was occupied by residences and a lobster cannery prior to 1913, when Burnham & Morrill (B&M) relocated its operations to the site from Franklin Street. The address of the B&M facility at that time was Water Street, which granted access from the west (and is visible on the map below) prior to construction of I-295. By 1913, the five-story B&M Bean Building stood on site, as well as the cod-fish building located on the pier. In the 1920s, B&M began experimenting with brick-oven baked beans in an attempt to offset declines in other product lines (canned fish, meat, and vegetables), and in the 1920s and 1930s began selling brick-oven baked beans in cans. In 1965, B&M's address was designated as 1 Bean Pot Circle. With an appreciation for the B&M history at the site, IDEALS, as the landowner, is seeking City Historic Landmark status for the B&M Bean Building. A more extensive description of site history and the preservation of the Bean Building may be found in the Landmark Designation Report for the Burnham & Morrill Company Cannery by Heritage Consulting and Essex Preservation Consulting, dated June 2022.

Bean Building

The Bean Building was the cornerstone and flagship of the B&M food manufacturing facility. Constructed circa 1912 by Aberthaw Construction Co., Boston, MA, the building housed the baked bean manufacturing processes and the plant management offices. It is a robust five-story, reinforced-concrete building with a high live-load floor capacity. The concrete frame is exposed on the exterior of the building with brick and masonry infill walls and glass windows. The building is structurally sound with only minor structural modifications required. The main entry is on the 2nd floor level, which is at elevation 21.5', well above the 100-year flood zone elevation of 10'. This, along with the rugged structure and historic community value, make the building an ideal candidate for reuse. A permanent exhibit of artifacts and photographs is planned for the site.

A Changing Shoreline

Buildings are not the only changes that occurred onsite over the last 100-plus years. As indicated in the diagram at right, the shoreline has significantly shifted in reach and shape across decades. Some of the shifts were caused by intentional human manipulation; others appear to have been natural changes where mud flats (with limited salt marshes) extended onto the site.

A New Perspective

The historic relationship of the East Deering neighborhood and B&M site was one of stark contrast between residential and industrial uses. Sudden transitions between residential and manufacturing zones, and from manufacturing to the sea, heightened the disparity. Construction of the Grand Trunk railroad line in the 1860s, and then of Interstate 295 in the 1960s, further isolated the campus's industrial identity. The Roux Campus presents an

opportunity for new connections, public access, and thoughtful transitions from the surrounding neighborhoods into a dynamic environment built around the B&M Bean Building.

Municipal Plan Context

The former B&M site is ripe for renewed use and redevelopment. The proposed campus includes adaptive re-use of the B&M Bean Building, facilitates public interaction with the waterfront, creates a new walkable core of diverse uses, and bolsters economic opportunity in East Deering, the City of Portland, and beyond.

Portland's Plan 2030 focuses primarily on eight aspects of Portland's identity and performance: environment, waterfront, transportation, housing, recreation and open spaces, facilities, historic resources, and economy. While the facilities section generally focuses on municipal operations and the waterfront section is focused on the working western, central, and eastern waterfront areas of the peninsula, the other six sections are directly relevant to the proposed plan. Excerpts relevant to the Roux Campus are provided here.

Environment

"Adopt sustainable land use and transportation policies that support connectivity, walkable neighborhoods, and multi-modal transportation."

"Plan for the mitigation and redevelopment of brownfields to support productive uses and a healthier environment for residents."

Transportation

"Promote multi-modal accessibility, enabling residents and visitors of all ages and abilities to participate fully in the social and economic life of the community."

Housing

"Encourage additional contextually appropriate housing density in and proximate to neighborhood centers."

"Identify priority growth areas."

"Allow for a range of housing models in City codes, whether small units, co-housing, or others that may suit changing needs and demographics."

Recreation & Open Space

"Encourage physical and visual access to Portland's waterfront – Casco Bay, Back Cove, and the Stroudwater, Presumpscot, and Fore Rivers – as a "blueway" network and an extension of public space for local and regional recreation and transportation needs."

Historic Resources

"Stabilize and enhance historic areas of the city by ensuring quality investment in existing structures and compatible infill development."

"Ensure an appropriate balance of continuity and change as Portland grows and evolves."

Economy

"Support job creation and business growth through public initiatives and private, institutional, and regional partnerships."

"Develop programs that support industries with high-growth / high-value potential such as life sciences, food production, information technology, and marine-related industries."

“Modify ordinances and make strategic investments to better promote business development and job creation in priority areas.”

“Ensure that the growth of Portland’s educational, medical, and cultural institutions is integrated into Portland’s urban fabric through the use of high-quality design, management of impacts, community partnerships, and innovative planning.”

Nodes & Priority Corridors

Portland’s Plan 2030 emphasizes potential evolutions in land use. Washington Avenue is identified as a priority corridor, which can provide “additional mixed-use, higher density growth to take advantage of the transit benefits and services that well-designed, diverse corridors can offer.” The Washington Avenue / Veranda Street / Tukey’s Bridge area is called out for evaluation: such areas “should be assessed for their ability to address neighborhood needs and serve as centers for complete neighborhoods.”

One Climate Future

The Roux Campus is an opportunity to showcase sustainable and resilient buildings, fostering a resilient community across East Deering and the region of Portland. Its waterfront location demands proactive planning for extreme weather and storm surge events although it is not located within the FEMA Velocity Zone. Its location on a developed, industrial piece of land with a single point of access/egress, means that campus development must take advantage of existing infrastructure within the East Deering neighborhood, facilitating trips by active alternative, multi-modal and mass-transit options.

In 2020, the Cities of Portland and South Portland both adopted a collaborative sustainability and resilience plan: One Climate Future. The plan addresses many challenges, priorities, and strategies for responsible climate stewardship and mitigation of climate-related public health threats. It includes great specificity and is summarized by six general action items. Following are One Climate Future’s “six big moves” and discussion of their relevance to the Roux Campus.

1. Build better buildings.

A new campus of higher education, research, and development deserves thoughtful design; it represents an opportunity to implement best practices for energy efficiency, healthy communities, human comfort, and interaction with the surrounding environment. Aside from the iconic B&M Bean Building, existing on-site buildings are not suitable for adaptive reuse. Much of the site will be redeveloped with new construction. In order to attract and respect climate-conscious students and corporate partners, these new buildings will be created with sustainability and resilience top-of-mind. As described in the design guidelines within this plan, [Northeastern University IDEALS](#) is committed to high-performance buildings while setting a standard for design through signature architecture.

2. Connect people to places, to opportunity.

Graduate education, research, and collaboration exist in order to provide opportunity. At their best, they do this in a collaborative and social setting. The Roux Institute at Northeastern University will achieve both. The campus presents this opportunity to the nearby community, where on-site resources become local community resources, as shown on the 15 minute walkshed map. Finally, by establishing itself within and supporting existing public transportation networks, the Roux Campus will be accessible to all Portlanders as well as those in the broader greater Portland region, and beyond.

3. Power everything with clean renewable electricity.*

Electrification allows for appliances, buildings, and systems to support the shift to renewable energy in our power grid, without cementing a need for fossil fuels moving forward. This entails moving away from carbon intensive heating and energy sources, as more energy is produced by clean energy renewable sources like solar and wind. [IDEALS and Northeastern University](#) will evaluate power purchase agreements for renewable energy sourcing,

incorporate passive solar and photovoltaics, consider the use of geothermal and sea water exchange heating and cooling for buildings, and encourage EV usage through on-site charging capacity.

4. Grow a circular economy.

Fostering technology knowledge and life-science research in Portland will diversify its economy and help prepare for the future. Yet workers in these fields will still rely on other, existing aspects of the regional economy. Food producers and preparers, makers and artists, essential workers, and support staff, all make the City of Portland a compelling and delightful place to live. On a small scale, the Roux Campus will facilitate a circular economy through mixed-use, neighborhood-scaled urbanism that creates a place to live, learn, work and play. On a broader scale, it will strengthen the region and support other initiatives and opportunities through education and research, an investment in people and collaboration with corporate and community partners that are (and will be) fueling progress through innovation.

5. Nourish ecosystems, which nourish us.

The Roux Campus' tidal waterfront location will allow it to meaningfully contribute to ecological health by designing with nature in mind. While B&M has been a steward of their property, the campus development will result in a significant reduction in impervious surfaces and yield a healthier site that protects and enhances the local ecosystem, which has been diminished through the historically industrial development of the property.

6. Build collaborative capacity to create this future.

The Roux Institute at Northeastern University will develop technology and life science talent, and position Mainers, new Mainers, and international students for financially stable and personally rewarding careers. The campus will connect budding talent with existing corporate and community partners, and thus create opportunity for fresh thinking and an innovative future. The Roux Campus will catalyze tech talent and innovation in Portland.

2. Imagining the Future

Campus Programming

The Roux Campus will encompass mixed uses regularly associated with graduate education and research: classrooms and laboratories, faculty offices, an incubator, dining areas, convening spaces, fitness centers, neighborhood retail facilities, and housing. As an essential part of the Roux Institute's graduate education programming, the campus will support collaboration with private industry, other institutions, and community organizations. This collaboration is essential to the Roux Institute at Northeastern University's approach to learning through integrated research, student-work opportunities, and entrepreneurial endeavors. Light manufacturing, research and design facilities, and other industry-oriented spaces will allow start-up businesses and established companies to contribute employment opportunities, foot traffic, and dynamism to the area. Hotel rooms will cater to prospective students, start-ups, visiting lecturers, specialists, business partner guests, and parents of students. Most importantly, the hotel will provide the opportunity for unplanned and informal interactions that are so essential to new ideas and innovation.

A range of rental housing options will foster community and provide on-site opportunities for students, faculty, staff, and their families. These units will ease some of the housing and traffic pressure that might otherwise result from new residents attracted to Portland by the Institute. Housing units not occupied by residents affiliated with the Roux Institute may be made available to the public.

Public open space, including waterfront access and recreational uses, will foster a sense of community. Restaurant, neighborhood grocery, and/or other limited retail options will provide another means for welcoming the neighborhood while reducing dependence on automobiles. The Roux Institute will incentivize transportation options including buses, bikes, pedestrian access, and water shuttle or taxi connections.

The long-term vision for the site is to maximize green space and public shoreline access. That vision includes a potential bike and pedestrian path under Tukey's Bridge and bicycle and pedestrian connections at Sherwood Street, Veranda Street, and beyond. These would link to the Back Cove, Eastern Promenade, Bayside, Martin's Point Bridge, and future trail systems.

Phasing

Before shifts in transportation and distribution networks, the site offered a competitive location for food processing and manufacturing in the 20th century. Now, the site's many compelling attributes enable the pursuit of science, education, and entrepreneurship for the 21st century and beyond. The Roux Campus is envisioned as a hotbed of collaboration, innovation, and inspiration that contributes to the education of Roux Institute students, stimulates Maine's economy, and enriches the lives of Portlanders through the resources it offers.

While the proposed vision represents an ambitious undertaking, the entire endeavor is based on simple tenets of placemaking: provide a mix of uses, allow for creativity and entrepreneurship, and encourage recreation. This vision takes time to grow and develop. Understanding that institutional uses have phased planning horizons, this IDP considers near, medium, and long-term growth plans. The resulting phasing of the development is represented in the figure to the right.

Fortunately, the nature of the Roux Institute at Northeastern University lends itself well to phasing strategies. Corporate partnerships are a core part of the Institute's educational strategy, meaning that office and laboratory partners will sit comfortably within the primary academic building during its first years, before extending outward in the longer term. As the site develops and builds its reputation, more and more students, faculty, and employees will be drawn to live and work on site. Like any new campus, as the population of students, residents, and employees grow, so will demand for limited retail and restaurants.

The proposed vision offers a realistic framework for flexible growth. As the Roux Campus evolves, and the world changes, new opportunities and needs may present themselves. Neighborhood feedback will also inform future growth. A core presence of educational, research, incubator, and partner space will provide the Roux Campus with a strong start, around which additional community needs and services can thrive over time.

At the completion of each phase, the Roux Campus will be a model of comprehensive design. At least three acres of permanent, significant public space will be established early in the development of the campus to ensure public benefit. Interim features such as surface parking lots or construction staging areas will be designed to not detract from the pedestrian experience through planting, lighting, wayfinding, graphics, artwork, or fencing. Other interim areas of the site will be appropriately landscaped or accommodate gathering on lawns and hardscape spaces. Interim features such as parking lots may also be programmed with markets, festivals, or cultural events. Lighting and layout of these spaces will be considered to facilitate flexibility so that they can accommodate a variety of campus events.

Design Principles

The Roux Campus will be a paradigm for 21st-century education with urban, sustainable, and resilient design. All elements of the campus will be conceived holistically to support the educational program of the Roux Institute. Near and long-term planning supports a vibrant campus environment with views and connections to the waterfront, a variety of public spaces, and site access via bike paths, walkways, and the public pier. Key principles of the design approach include:

Connected to the Waterfront, Portland, & the World

Engage the waterfront

Promote visual and physical connectivity

Encourage connections to the waterfront through diverse spaces

Create a holistically built environment

Restore, repurpose, and revitalize the Bean Building
Create an iconic architectural expression

Places to Gather

Welcome the surrounding neighborhood
Foster community with shared spaces and interaction
Build a strong association with the City of Portland
Develop purpose-driven spaces that yield regular connections
Provide public open space
Provide spaces where neighbors can work and read while enjoying the campus's environment

A Sustainable & Resilient Campus

Employ sustainability benchmarking for environmental stewardship
Incorporate state-of-the-art features, systems, and techniques
Minimize energy consumption campus-wide
Build for resilience; prepare for extreme weather and climate change
Maximize green space through appropriate building height

Integrated Landscape

Enhance access through TDM and multi-modal support
Contribute to Portland's open space network

Design Guidelines

1. Buildings shall:

be characterized by excellence in architectural design, sustainability, & craftsmanship

incorporate materials, landscape, signage, & lighting that reflect the industrial heritage of the site as well as
Portland's character yet ~~look also embrace~~ to a high-tech ~~future~~design aesthetic

create a strong identity & sense of place

vary in height, with the tallest buildings located toward the center of campus

be organized to take advantage of views, site circulation, & public space along the waterfront as well as provide
views of the water from multiple vantagepoints around the campus

be planned in a manner that preserves the historic view of the Bean Building from Tukey's Bridge

share visual connections with other campus buildings to achieve a holistic campus appearance

support & augment activation of public spaces and public access to the site

be programmed for activation where they meet the pedestrian realm or feature details & activities related to the building

respect the adjacent neighborhood & facilitate a sense of permeability & welcome

celebrate the primary learning and research building through signature architecture

utilize durable materials resistant to the marine climate & which contribute to an attractive public realm

screen rooftop appurtenances & set back mechanical enclosures from roof edges to reduce shadow & visual impact

limit sound transmission ~~and-~~

minimize bird strike potential

employ sustainability benchmarking to foster environmental stewardship & resilience

utilize building articulation & material selections to provide character and scale

ensure permeability through & within the site for light, air, views, & access

be appropriately scaled to support pedestrian activity, utilizing step-backs where appropriate

be oriented toward open space at the site's center & include prominent facades with windows & entrances oriented toward travel paths

be oriented to allow for easy pick-up & drop-off

respect & provide a buffer from the historic B&M Bean Building

2. Campus circulation shall:

be bike & pedestrian-centered, with motor vehicle circulation generally at the perimeter where practicable

serve pedestrians, bicyclists, autos, public transportation, service, & emergency vehicles at each development phase

provide wayfinding & amenities to create a safe & welcoming environment for the community

provide bike & pedestrian connectivity to existing ways where feasible

3. Open space & public realm shall:

create a strong identity & sense of place

be designed for safety, comfort, & year-round enjoyment

enable access to building entrances

utilize a combination of planting & hardscape

be available to all members of the public, through inclusive, safe and barrier free design as well as support purposeful connections and transitions

provide access & amenities to connect the public to the shoreline & ocean

include meaningful public open space between the buildings & the water

support site resilience in consideration of flooding from storm events & sea level rise

support ecological functions & values

provide an appropriate buffer adjacent to & complementing the historic B&M Bean building

include lighting that is full-cutoff and dark sky-friendly

4. Parking shall:

be located to the maximum extent practicable in below-grade garages & daylight basement garages

when above grade, be architecturally screened to blend in with surrounding buildings & minimize vehicular disturbances of light & sound

when on surface lots, be located at the rear or side of buildings, & not along the primary facade

not be located along the water's edge

ensure EV charging capability meets EV demand & is scalable as demand increases

be shared to the extent practicable

support street activation & pedestrian scale when adjacent to public rights-of-way

Connected to the Waterfront, Portland, & the World

Development of a new landmark campus, with focus toward the community and the waterfront, will enhance the East Deering neighborhood. New, forward-looking campus buildings adjacent to the restored and repurposed Bean Building will update and respect its legacy. The waterfront will integrate with the entire campus through ecologically focused design. Water views from the ground and buildings will emphasize the site's uniqueness and become an integral part of the campus identity. Pedestrian / bicycle trail connections and water shuttle or taxi service will let the waterfront serve as an entrance to the campus.

Places to Gather

All new buildings will connect through linking landscaped terraces with a central, pedestrian-oriented green space. The campus will maximize publicly accessible open space through building height and density. This plan will foster a mixed-use environment encouraging interaction and innovation. Internal connections are echoed by external circulation and access points (pedestrian, bicycle, public transit, potential water taxi, automobile) that further strengthen the connection with neighboring communities and the City of Portland.

A Sustainable & Resilient Campus

The Roux Campus intends to incorporate state-of-the-art sustainable technologies. Examples of possible technologies (illustrated below) that will be thoroughly studied include geothermal heating and cooling, photovoltaic solar panels, high-performance building envelopes with triple glazing, green roofs, blue roofs, stormwater / greywater management, passive solar gain, sea water cooling, and natural summer ventilation. If necessary, purchase of renewable power produced off-site will supplement on-site sources. Resilience strategies like constructing buildings well above the 100-year flood zone will also be deployed to account for rising sea levels and severe weather events.

Enhance Access

The striking campus is visible from Interstate 295, as well as from its on- and off-ramps which are located nearby. US Route 1 and downtown Portland are both accessible within minutes. Via Sherwood Street, the Roux Campus will connect to the East Deering and Back Cove neighborhoods. Bus routes within easy walking distance, and waterfront pedestrian and bicycle trails (including a potential new connection under Tukey's Bridge and improvements to Sherwood and Veranda Streets) will link the Roux Campus to the neighborhood as well as to the Back Cove Trail, Bayside Trail, Eastern Promenade, and future trail networks. Within the site, ADA pathways and inclusive design principles will ensure the site benefits all users.

Adjacent to the Roux Campus (but not on its property) is the former Grand Trunk Railway line, which could one day provide a new transportation pathway. Connections to Casco Bay ensure water access to the peninsula, islands, and the entire Maine coast.

Contribute to Portland's Open Space Network

The Roux Campus will add significantly to Portland's open space network via a modern waterfront with public amenities such as lawns, a pier, plazas, and extended green space. Enhanced sidewalks and bike lanes, a potential direct connection to the Back Cove, Eastern Promenade, and Bayside trails, along with a pier for a water shuttle and / or taxi, will help the public get to the Campus. Gardens, native meadows, trees, and natural areas will offer new, calming spaces and create a variety of healthy habitats.

The primary academic building of the Roux Institute at Northeastern University will anchor a cohesive campus of learning, research, and collaboration along with residential and retail facilities that support them; natural systems will integrate with everyday life. A network of inland pathways across various landscapes will thread uses together.

The Roux Campus will transform an industrial site into an ecologically diverse, urban waterfront setting. Many existing impervious surfaces will give way to open spaces and green roofs inspired by natural landscapes from the Greater Portland area. Stormwater management strategies will further contribute to the environmental function of the site.

3. Creating the Path Forward

Assessment of Growth

The City's Land Use Code establishes content requirements for Institutional Development Plans, including considerations of transportation, environment, infrastructure, design, and neighborhood engagement. The following pages apply these lenses to the Roux Campus, how they interact, and the opportunities they create.

Transportation

With one vehicle entry point, the development must be properly planned to minimize impacts on the surrounding street network. Reductions in trip generation through complementary on site uses, alternative modes of transportation, and transportation demand management are crucial.

Infrastructure

Any development is limited by the capacity of nearby utilities infrastructure. Fortunately, the site's previous industrial demands dovetail nicely with the needs of a mixed-use development. High-performance buildings can help reduce further infrastructure demands.

Environment

One compelling aspect of the Roux Campus is the waterfront location; yet decades of production and transportation-oriented industrial use diminished its ecological function. Thoughtful redevelopment will restore some of this function over time.

Design

While the Roux Institute at Northeastern University seeks to inspire aesthetically, the Roux Campus will be designed with neighborhood context and nature in mind. It can serve as a proving ground for best practices in ecological and urban design.

Neighborhood Engagement

The Roux Institute at Northeastern University cannot thrive without the support and goodwill of its neighbors. By establishing and maintaining community engagement, the organization will incorporate fresh ideas and build trust.

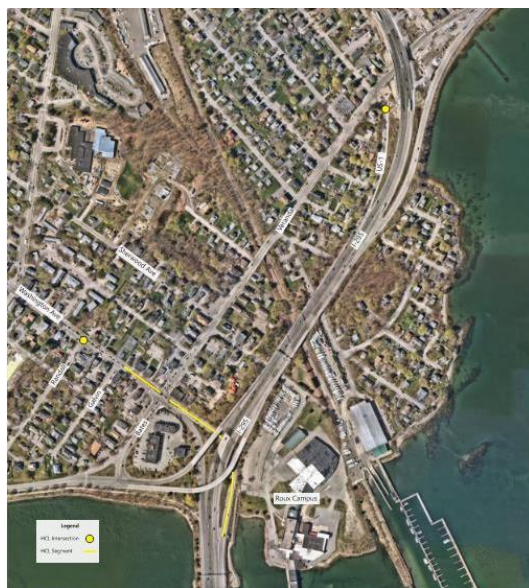
The proposed Roux Campus aligns well with the B-5 Mixed-Use Business zone's purpose statement in the City of Portland's Land Use Code:

"To provide areas of the peninsula* near the downtown where a mixture of uses, including marine, industrial, commercial, and residential, is encouraged. The B-5 and B-5b zones are characterized by larger underdeveloped lots with great potential for denser, clustered, urban mixed-use development and more efficient reuse of existing land and buildings. It is anticipated that the dense, mixed-uses of the B-5 and B-5b zones will rely on a shared infrastructure system, including service alleys, parking lots, public transportation facilities, stormwater management, and driveways."

Transportation

The Roux Campus is well-situated to several major thoroughfares, including I-295, US Route 1, Washington Avenue, and Baxter Boulevard. The site has a single access point, located on Sherwood Street; that access will continue to provide vehicular access in and out of the site in the future. Access to Sherwood Street is provided via Veranda Street which connects to Washington Avenue, I-295, Baxter Boulevard, and US Route 1.

Replacement Figure included below



Washington Avenue accommodates all users, with traffic using two lanes in each direction south of Presumpscot Street, one lane in each direction north of that point, and buffered bike lanes north of Presumpscot. Bus routes run along Washington Avenue and pedestrian accommodations are present. In addition, the traffic signal system along Washington Avenue is a traffic responsive system operating with high efficiency. Intersections of Washington Avenue at Veranda Street, at Presumpscot Street, and at Ocean Avenue are each signalized intersections with pedestrians processed concurrently to traffic.

Veranda Street accommodates vehicular traffic with a single lane in each direction. Sharrows (faded) indicate that bicycles share the travel lane. Sidewalks are provided on both sides of Veranda Street and transit stops are present. Sherwood Street is a two-way roadway that is not striped and allows parking. Sherwood Street intersects Veranda Street to form a slightly offset four-way intersection. Both Sherwood Street approaches are stop-controlled at Veranda Street as well as Presumpscot Street.

Bates Street extends from the intersection of Washington Avenue and Veranda Street toward Baxter Boulevard, and consists of a vehicular traffic lane in each direction and a bike lane from Washington Avenue to Baxter Boulevard. A sidewalk runs along the west side of the street, but narrows and is periodically blocked by utility poles. A single lane in each direction at the intersection of Bates Street and Baxter Boulevard provides access north on I-295. Access south on I-295 is via a two-lane connection in each direction at the intersection of Washington Avenue at Veranda Street and Bates Street. This widens at Washington Avenue for turn lanes.

Several high crash locations (segments or intersections with eight or more traffic crashes and a critical rate factor exceeding 1.00 over the most recent three-year period) are located near the campus:

Intersections (with Crash Totals):

Washington Ave. at Randall St. (8)

~~Washington Ave. at Presumpscot St. (32)~~

~~Washington Ave. at Bates St. (34)~~

~~US1 at Veranda and I-295 Ramps (14)~~

Segments (with Crash Totals):

Washington Ave. ~~from I-295 NB Exit 8 to Veranda St. (121)~~

Washington Ave. from Veranda St. to Galvin St. (112)

~~Washington Ave. from Galvin St. to Randall St. (8)~~

~~Washington Ave. from Presumpscot St. to Cummings St. (10)~~

~~Baxter Blvd. from Bates St. to Catafalque Dr. (9)~~

~~From 2018 to 2020, no fatal crashes occurred at any of these locations. Most were rear end or sideswipe crashes, with some intersection movement crashes. One pedestrian crash occurred, at Washington Avenue and Presumpscot Street. Four bicycle crashes occurred: one each at Washington Avenue and Presumpscot Street, Washington Avenue between Presumpscot Street and Cummings Street, Washington Avenue and Veranda Street, and at Bates Street and Veranda Street.~~

~~From 2019 to 2021, one fatal crash occurred within the study area at the HCL location of Veranda Street/US-1 with the I-295 SB On-Ramps. The crash was determined to be caused from a driver running a stop sign. Safety improvements are being made as a part of the Veranda Street Bridge Replacement project.~~

~~With adequate sight distance, the crashes along Washington Avenue, including at Randall Street, may be attributed to vehicles changing lanes or attempting to turn in or out of side streets where adequate gaps are not available due to congestion. There were no reported pedestrian crashes at the HCL locations. Three bicycle crashes occurred in the~~

study area: one each at the intersections of Washington Avenue/Bates Street/Veranda Street, Bates Street/Baxter Boulevard, and Washington Avenue/Churchill Street.

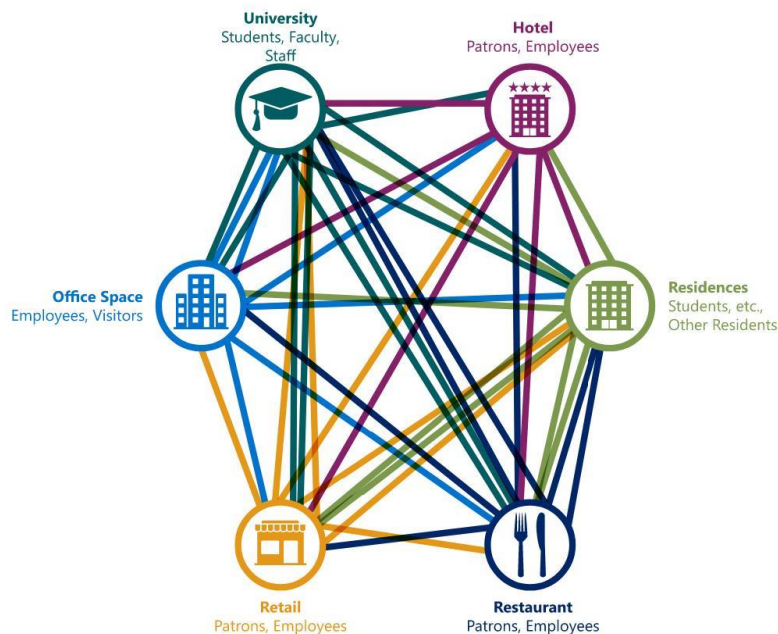
Trip Generation

Trip generation was evaluated using standard rates and Maine DOT guidance for the long-term development of the site. Trip generation rates were obtained from the Institute of Transportation Engineers Trip Generation Manual, 11th Edition, where available. Input was received from the City of Portland regarding appropriate land use codes, specifically for the restaurant component. In addition, because the land use code for university/college does not reflect the type of institution proposed here, VHB developed a trip generation methodology based on the anticipated populations at the site.

Relevant uses for the Roux Campus include ~~university / college (LUC 550)~~, general office building (LUC 710), multi-family housing mid-rise (LUC 221), high-turnover sit-down restaurant (LUC 932), strip retail plaza (LUC 822), and hotel (LUC 310). As a mixed-use development, many trips will occur between destinations on the campus. Students, faculty, and staff will eat in on-site restaurants and shop at on-site retail stores. Some students and staff will live in the residential units or work in the office space. Partner employees may travel between offices, university buildings, restaurants, and stores.

Inclusion of ancillary uses on the campus, such as housing, hotel, office space and retail, will reduce the number of external trips to the site; internal trips will not generate external traffic or impact the adjacent road network. For traffic generation purposes, internal trips are separated from total trips estimated using engineering standards.

Replacement Figure included below



Mode Share

The East Deering Neighborhood is served by multiple bus routes and features a pedestrian and bicycle network. With improvements to these resources, the campus will be well suited for trips by modes other than single-occupant vehicles. We are committed to working with Portland METRO to support increased transit opportunities to and from the campus area. These factors, in addition to a Transportation Demand Management (TDM) plan, will reduce auto mode share.

A transportation engineer developed target mode shares for each envisioned Roux Campus land use, in consultation with City of Portland and Maine Department of Transportation officials. These shares were applied to external trips to determine the likely number of trips by each mode, yielding the estimates in the table at right.

Vehicle Trip Assignment

Vehicle trips were assigned to area roadways by estimating the proportion of trips arriving or leaving on each approach to the area. Estimates were based on data from several sources, including population density maps and US Census Journey to Work data. The process was repeated using catchment areas of various sizes, with minimal change in results. Trip distribution for people within a commuting distance of the site is shown in the adjacent top graphic.

Approximately 50 percent of trips are anticipated to travel from the south to reach the site and 15 percent are anticipated to approach from the north. (The thicknesses of arrows are scaled to indicate the share of trips that will use that route.)

Anticipated distribution of vehicular trips on neighborhood streets is shown in the adjacent bottom graphic. Almost 90 percent of trips are expected to travel through the intersection of Washington Avenue and Veranda Street. However, to access I-295 southbound, some drivers may choose instead to exit by taking a right and traveling up to the southbound on-ramp.

Additionally, ~~almost 30~~ approximately 20 percent of the site traffic is oriented to points west /southwest along local roadways or to and from the north on I-295; this will impact the intersection of Bates Street and Baxter Boulevard.

Replacement Figure included below



Transportation Improvement Opportunities

Bicycle and Pedestrian Connection Opportunities

Infrastructure improvements can alleviate some neighborhood traffic impacts. These improvements include roadway reconfigurations, pedestrian and cyclist connections, and additional transit provisions. Two opportunities stand out when considering bicycle and pedestrian improvements (illustrated below and in the map at right).

The first is an improved connection between the Back Cove Trail and Washington Avenue. At present, users of the Back Cove Trail face a 90-foot mid-block crossing to reach the northwest side of Bates Street. Converting the intersection of Bates Street and sweeping right-turn maneuver would create a shorter, safer crossing. The second improvement is a direct connection from the Roux Campus to the Back Cove Trail, extending the shared-use path below and alongside Tukey's Bridge and through the site.

Parking Demand and Capacity

Parking will be built over time as part of the development program. All vehicular trips are intended to park on site. As demand increases during the phased development, parking will be introduced incrementally to avoid excess supply and inadvertent encouragement of driving to the site.

Base parking demand (calculated for each hour of the day using ITE Parking Generation Manual rates, 5th Edition, and the same land use codes as for trip generation) indicate that total parking demand across all uses on the site will peak at 11 AM. At completion of the first phase of development, parking demand is expected to be approximately 700 vehicles. Demand at full build-out could be as high as 1900 vehicles, inclusive of day users and residents. All site parking is intended to be communal; availability in the closest lot to a destination will not be guaranteed. Additionally, uses with opposing peak parking demands will be able to share parking resources.

All parking will be paid parking, and a parking office will be created to handle permitting and enforcement for the campus. Parking costs and regulations may vary between classes of users (students, staff, residents, office tenants, visitors, etc.). The Roux Campus may include on-site car share, enabling travel to and from the site using other modes, with the comfort that vehicles are available if necessary.

Public Transit

Two bus lines currently stop near the site: METRO Route 7 and METRO Routes 9A / 9B. These routes provide direct connections to the peninsula, western Portland, and Falmouth. With a transfer at the Downtown Transportation Center, riders can reach the rest of Portland and several outlying towns.

Buses run continuously throughout the day, readily accommodating the varied schedules of students and other campus users. METRO BREEZ express bus service to Yarmouth, Freeport, and Brunswick and the Husky Line to Westbrook and Gorham establish a regional footprint for transit service. Ten local and express routes connect the campus to most of the Portland area with no more than one transfer.

The Roux Institute at Northeastern University will promote and incentivize transit use. It plans to subsidize transit passes for students and will work with METRO to improve the quality and frequency of transit connections to the Roux Campus.

Other Roadway Improvement Opportunities

The Roux Campus is constrained on three sides by the Bay, I-295, and a rail line, leaving Sherwood Street as the only viable access road. The campus's vehicle traffic will be highly concentrated on certain streets and intersections immediately surrounding the site. Targeted roadway improvements at these locations can increase capacity and prevent excessive congestion.

These improvements are not tied to specific years or development phases. They are held out as possible mitigation measures to be considered as future traffic warrants. As development continues, the Roux Institute will apply for

traffic movement permits (TMP). Potential improvements will be evaluated during the TMP process in collaboration with the Maine Department of Transportation and City of Portland.

Traffic from the campus to southbound I-295 will make two lefts, once onto Veranda Street and again at Washington Avenue. The left turn lane from southbound Veranda Street to Washington Avenue currently has a storage length of only 130 feet. At higher traffic volumes, the line of vehicles waiting to turn left may extend beyond this length, delaying through and right turning vehicles from reaching the intersection. If this type of congestion becomes frequent, it may be mitigated by extending the left turn lane further back. This will require widening Veranda Street between Washington Avenue and Sherwood Street within the existing right-of-way. Widening on Veranda Street would also allow bicycle lanes to be added. This impact will also be reduced through use of signs indicating that I-295 South can also be readily reached by turning right and using the Veranda Street on-ramp.

With 100% of campus traffic traveling through the intersection of Sherwood Street and Veranda Street, improvements may become necessary. The intersection is currently controlled with a stop sign on Sherwood Street. To improve traffic flow, Sherwood Street could be widened at the intersection within available city right-of-way to separate outbound traffic into left and right turn lanes. A bicycle lane could also be added within this space. This would substantially increase capacity on the Sherwood Street approach. If traffic volumes eventually exceed this new capacity, a traffic signal could be installed at the intersection.

Traffic approaching the campus from I-295 southbound will exit at Baxter Boulevard and make a right onto Bates Street. There is significant unused right of way on Bates Street between Baxter Boulevard and Veranda Street that could be repurposed to increase capacity. Another northbound turn lane could be added (isolating left, through, and right movements) at the intersection as well as adding a bike lane. A bike lane would also have the benefit of completing the trail connection from the Back Cove Trail. The intersection of Washington Avenue, Veranda Street, and Bates Street may eventually need other mitigating measures to increase capacity, such as reconfiguring lanes on the I-295 exit ramp approach.

Managing Transportation Demand

Active Transportation

In addition to the transit options in the study area, the Roux Campus development will benefit from existing pedestrian and bicycle infrastructure. Sidewalks are in good condition and pedestrians are accommodated at signalized intersections with crosswalks and concurrent pedestrian signal phasing. Future visitors will benefit from upgraded pedestrian accommodation along Sherwood Street. Once on the site, pedestrian connections will link site uses and points along the waterfront.

The Roux Campus can promote human-powered trips to the site through improved connections to this infrastructure. The area is densely populated, bicycle lanes are provided along Washington Avenue and other roadways, and the Back Cove Trail is nearby. In the future, cyclists will be accommodated on Veranda Street and into the site on Sherwood Street via dedicated bicycle lanes.

Transportation Demand Management (TDM)

TDM programs seek reductions in traffic impacts by subsidizing and marketing alternative commute options. ~~IDEALS-~~ Northeastern University plans aggressive targets of non-single occupant auto trips and intends to limit on-site parking - the goal is a 37 percent reduction in automobile trips from ITE Trip Generation predictions, and a minimum of 20 percent reduction in parking demand compared to anticipated ITE Parking Generation. As mixed uses are created during development, internal trip-making will increase, and these targets may be revised.

Transportation Coordinator: Northeastern University IDEALS plans to follow industry best practice by appointing a campus-wide transportation coordinator. This person will collect data on the TDM program to ensure it evolves as the site develops. Once aspects of the site are operational, they will conduct a transportation survey to establish a baseline for future trip reduction goals. They will also collect and disseminate information (including non-automobile travel options) among the employers and facility managers on site to encourage TDM participation.

Public Transit Support: IDEALS-Northeastern University intends to partner with Portland METRO to subsidize shorter headway service to the Roux Campus. Student subsidies will enable frequent and reliable service to and from the site.

To further support trips via public transit, the Roux Institute at Northeastern University intends to subsidize bus trips for students and employees (for employees, their purchase can also be included as a pre-tax benefit). Lease agreements will encourage transit pass subsidies by other on-site employers.

Carpools: IDEALS-Northeastern University will prioritize parking for carpools near building entrances. The transportation coordinator can facilitate carpools by maintaining a database of interested parties; commuters may be matched with others who live near them or can access a park-and-ride location along their route. The coordinator can also participate in the Maine DOT commuter resource program, which facilitates carpools across nearby sites and provides participants with rewards for carpooling.

Parking Fees: Parking is intended to be shared across uses on the Roux Campus, not guaranteed in individual lots.

Bicycle Travel: IDEALS-Northeastern University will support active transportation by investing in complete streets and trail connections, bike storage, and shower facilities and lockers.

Water Travel: IDEALS Northeastern University plans to build a modern pier over the footprint of the current pier, in order to accommodate water shuttles and taxis.

Transitions

With I-295 to the west, state-owned vacant parcels to the north, the rail corridor and marine business to the east, and Casco Bay to the south, the Roux Campus is surrounded by existing areas of transition from the campus to the surrounding neighborhoods. In addition to the existing buffers, development will further ease the transition to and from the campus through the following design methods.

Between Site Entrance & Campus

Public open space will ease transition from the smaller scale of Sherwood Street. Views to the water and the Bean Building, and clear wayfinding and circulation of pedestrian and bicycle pathways, will welcome site visitors further into the campus. A smooth transition will also be accomplished through thoughtful facade design at the pedestrian level. Potential nuisance features like dumpsters, air handlers, and parking will be appropriately screened. Buildings will avoid blank walls to respect the adjacent neighborhood and facilitate a sense of permeability and welcome.

Between Buildings & Campus

Building entrances will face major public spaces or circulation paths. Lower stories will be programmed for activation where they meet the pedestrian realm or feature visually interesting details and activities related to the building. Building articulation, massing, and materials will contribute to the sense of a well-textured, connected campus.

Between Campus & Water

The shoreline area between the buildings and the water will serve as meaningful public open space. This open space will contain a combination of pedestrian and bike trails, passive and active gathering spaces, restored and ecologically improved landscape and shoreline to anchor the site's relationship with the water. Building facades facing the water will be considered public-facing, with views designed for interest from the water and Eastern Promenade Trail.

Safety / Crime Prevention Through Environmental Design (CPTED)

Key to these successful transitions is a sense of welcome, comfort, and safety. To ensure this, the campus will incorporate the following CPTED design strategies demonstrated to deter crime:

Mixed Use, multi-tenant 24-hour campus that generates "threshold capacity" for a diversity of places, people, and programs

Ecologically restored, biophilic and publicly accessible campus connected to the wider community

Highly durable, vandal-resistant materials in the public realm to communicate a well-maintained, clean campus

Systematic, clear, and appropriately scaled wayfinding to guide and inform all transportation modes and user groups

Matrix of pedestrian and bike paths connecting well-lit transit stops, bike storage areas, and parking areas to maintain clear sight lines

Street-level building elevations designed for visibility, minimizing hidden corners and spaces

Transparency and openness of buildings at ground levels and entrances to connect with the public realm and create pathways

Controlled campus access points for special events or emergencies

Existing Infrastructure

B&M's facilities required intensive utility and infrastructure development sized appropriately for industrial use. Fortunately, this sizing translates well to re-use in a denser development, as proposed.

Water

Domestic and fire protection services are provided by Portland Water District's (PWD) infrastructure at Sherwood Street. The public water mains nearest to the site are 8-inch and 12-inch, consisting of ductile iron and cast iron. The site is, and will continue to be, serviced by a combined domestic / fire protection loop.

Wastewater

Wastewater will continue to discharge to a gravity public sewer along the I-295 corridor. Downstream of the service connection, public sewer transitions from 15-inch to 48-inch reinforced concrete gravity line conveying combined storm and sanitary sewer from the East Deering neighborhood west of I-295. The 48-inch combined sewer transitions to a 3-barrel (two 18-inch and one 30-inch) siphon along Tukey's bridge and discharges through a pumping station prior to treatment at the East End Wastewater Treatment Facility.

Wastewater is conveyed across a portion of the site near Sherwood Street and I-295 from properties to the northeast (Lennox, Berwick, and Kensington Streets) via an easement benefiting PWD. This easement will remain in place unless otherwise approved by PWD.

Stormwater

Stormwater runoff from the site is managed through a combination of catch basins, buried infrastructure, and overland flow, discharging via outfalls to the bay. The Roux Campus redevelopment allows for reduction of site impervious area and incorporation of low-impact development techniques; these will improve the water quality and reduce the quantity of runoff prior to its discharge into Casco Bay.

In addition to private stormwater outfalls, a public stormwater outfall is located at the site's southwest corner. This outfall will continue to convey drainage from the neighborhood west of I-295 through an easement located near the southwest corner of the site.

Electricity

Central Maine Power provides electric power via an overhead 12.47kV 3-phase distribution system. The facility has two main secondary metered services. New utility corridors will include electrical infrastructure improvements. Energy-saving technologies and renewable energy sources will be incorporated into building and campus design to reduce electricity consumption and advance sustainability goals.

Telephone & Data

Fiber-optic internet is located along Veranda Street and Sherwood Street.

Natural Gas

Unitil provides natural gas service to the site via a 6-inch diameter service. Natural gas infrastructure in the East Deering neighborhood is provided at intermediate pressure and is suitable for campus needs.

Environment

Strengthening Resilience & Ecology

Under current conditions, the site is approximately 75% impervious with approximately 10 acres of building roofs, parking areas, and loading dock space. Minimal shoreline buffer is present at the site, with pavement extending right up to the armored embankment along much of the shoreline. Existing site grades adjacent to the Bean Building are only 1-foot above highest astronomical tide. In recognition of these existing vulnerabilities and with a desire to improve ecological function for the site, the redevelopment will raise interior site grades and soften landscapes to reduce impervious area and increase flood resilience. Living shoreline techniques for landscape will enhance some of the natural resource areas along the water's edge.

Energy Consumption

The development presents an opportunity to mitigate energy consumption through high performance building envelopes, particularly with the likely southern exposure of the Institute building. Similarly, we intend to explore and hopefully incorporate renewable energy sources such as active and passive solar, sea water cooling, and / or geothermal.

Noise Generation

The proposed mixed-use academic campus is compatible in uses with the surrounding East Deering neighborhood. The Roux Campus is buffered by I-295, the abandoned Grand Trunk Railway, and adjacent marine uses.

Development will adhere to City of Portland technical standards regarding noise, vibration, and other potential nuisances. Pre-development noise measurements will serve as the baseline of analysis, in order to assess noise impacts accurately and to allow improvements to baseline conditions where possible. Development will employ noise abatement techniques (screening, acoustical attenuation, landscape buffering, etc.) for the benefit of residents, students, and all users of the site.

Hazardous Materials

Use of hazardous materials, if any, will be in academic and laboratory contexts, and managed in conformance with all local, state, and federal requirements.

Heat, Glare, and Radiation

Development studies will include analysis of heat, glare, and radiation impacts in order to understand and eliminate safety hazards and lessen impacts of new development. Development will comply with all City standards regarding heat, glare, and radiation.

Wind

Wind and occupant comfort analysis will be performed during each phase of development when applicable site plans are reviewed, with design modifications as necessary to maintain acceptable conditions. The analysis will include comfort at and around buildings as well as major public spaces. Existing buffers of plantings at property lines will be maintained or replaced where appropriate. This will be coordinated with the City of Portland arborist.

Lighting

Exterior lighting will be full cut-off and dark-sky friendly. Fixture output will comply with all City of Portland lighting regulations to avoid light spill into neighboring areas from the site. Photometric analysis at each phase of development will be used to inform lighting design in accordance with Illuminating Engineering Society of North America (IESNA) Standards.

Height and Massing

The allowable building heights on the Roux Campus are informed by the historic location and prominence of the Bean Building, the desire to create meaningful public open space while meeting all programmatic goals for the Roux Institute, resilient building design, and potential shadow and other impacts to neighboring properties. Building heights will stagger, with the greatest height at the center of campus and lower heights near the site's boundaries. Building heights around the Bean Building and within 35' of the western and northern edges of the campus will be no greater than 75'. Conceptual massing studies based on allowable building heights are attached as Appendix A.

Shadows

Height and massing will minimize shadow impacts to neighbors and avoid negative impacts to nearby existing public open spaces. The campus height map places the greatest heights to the middle of the site and progressively lower zones to the perimeter. Mechanical enclosures will be set back from roof edges to minimize impact. Conceptual shadow studies based on allowable building heights are attached as Appendix B.

Neighborhood Engagement

Ongoing Engagement

The Roux Campus is intended to become an extension of the East Deering neighborhood, which is separated from the site by Interstate 295 and the rail corridor. The site will be a walkable addition to the neighborhood, with open spaces, waterfront, campus-oriented retail, and restaurant amenities, but it also represents a change. To ensure the campus is designed in a manner benefiting the neighborhood will require robust communication with interested stakeholders.

The City of Portland requires two Neighborhood Meetings related to the Institutional Overlay Zone and Institutional Development Plan processes. We have used those requirements as a starting point for ongoing dialogue. The first Neighborhood Meeting was held virtually on November 18, 2021, with 23 registered attendants. The feedback was ~~very~~ positive, and attendees expressed interest in construction job opportunities, sought additional information regarding traffic and associated transportation improvements, indicated a desire for bike/pedestrian connectivity, requested that lighting plans be considerate of adjacent neighborhoods, and asked about climate resilience and disturbance during construction. A second Neighborhood Meeting was held in person at the Ocean Avenue Elementary School on April 6, 2022. Although the City only requires that abutters within 500 feet of the campus be notified of the meeting, we ~~have~~ expanded the list of invitees to include a much broader radius and mailed over 1700 meeting notices. Forty-seven people attended the meeting at the school. Many attendees expressed concerns about the scale of the proposed development, building height, and traffic and, as a result, we have reduced our planned square footage of construction by 27% and the tallest proposed heights by 19%.

In addition to Neighborhood Meetings required by the regulatory process, we are hosting periodic virtual forums called Roux Campus Roundtables as a way to engage with the East Deering neighborhood on an on-going basis. The first such event occurred December 14, 2021. Additional meetings occurred on February 1, March 23, and June 2, 2022 and an open house was held at the site on September 6, 2022. More Roundtables will be scheduled in 2022 and beyond to continue dialogue and keep the neighborhood informed of progress in development.

To keep all potential stakeholders apprised of the development plans, we maintain a website, www.rouxcampusportland.org, to showcase up-to-date plans, present information about the Roux Institute at Northeastern University, and provide notice of upcoming events with links to recordings of prior forums. The site is an interactive platform with an email link for questions and a feedback section that probes for input on a wide variety of issues. This platform will also be a valuable communication tool during construction, providing a means to share information related to construction schedule, work hours, management plans, public safety, and site access.

Additionally, we have a designated community contact for members of the public. This contact works closely with neighborhood and city stakeholders to solicit feedback and ensure that any concerns are dealt with promptly, whether reported in person or through the website.

Finally, members of the team are conducting regular outreach to interested stakeholders and potential partners to gain broad input into development plans. This will facilitate assessment and calibration regarding how the Roux Campus can fit into the Portland landscape and ways it can best live up to its potential as a model for education, economic development, recreation, and aesthetics.

Future Engagement

Northeastern University and IDEALS will continue to host Roux Campus Roundtable meetings that are open to the public. Such meetings will be held on a quarterly basis to discuss items such as phasing plans, project impacts and construction plans.

For projects requiring Major Site Plan Approvals from the City of Portland, Northeastern University and IDEALS will provide monthly written project updates to interested parties during periods of active construction. Additional written updates regarding development or construction plans may be provided as necessary.

Northeastern University and IDEALS will provide an estimated construction schedule at the beginning of a project and provide regular updates throughout construction.

Stakeholder Advisory Group

Text in Development – Will be provided by end of day 9/30/2022

Construction Management Principles

Text in Development – Will be provided by end of day 9/30/2022

Community Benefits

Text in Development – Will be provided by end of day 9/30/2022

REGULATORY FRAMEWORK

8.5.7 The Roux Institute at Northeastern University Overlay Zone Regulatory Framework

A. Applicability: All development proposed by the Initiative for Digital Engineering and Life Sciences or The Roux Institute at Northeastern University within the boundary of the Roux Institutional Overlay Zone (IOZ) shall be consistent with the approved Institutional Development Plan (IDP), consistent with the Comprehensive Plan, and meet applicable standards of the Land Use Code, unless such standards are superseded by the following regulatory framework. This regulatory framework shall govern future development by IDEALS and Roux within the IOZ unless amended by the Portland City Council upon formal application of IDEALS and/or Roux. The Roux Institutional Overlay Zone shall have the boundaries depicted below and shall include the approximately thirteen-acre property located at 1 Bean Pot Circle and identified as parcels 447-A001 and A002 in the City's assessing records.

Proposed B-5 & IOZ



B. Phasing and monitoring.

1. The Roux Campus will be developed in phases, as set forth in the IDP. The IDP will be updated on a regular basis to ensure that the data is current and that the document remains accurate. Accordingly, monitoring reports will be filed every three years and shall include a summary of progress on IDP implementation and of acquisitions and divestment since the date of IDP approval. At the time of the submission of the monitoring report, any updates to the IDP shall be identified which may result from updated master planning, changes in baseline information, or changes in the adjacent neighborhood which affect the campus, to allow the IDP to remain current. Updates and minor amendments not described below shall be reviewed administratively by the Planning Authority.
2. At completion of each phase, the Roux Campus shall have the appearance of a complete and comprehensive design. Permanent and significant public space shall be established in the first phase, to ensure public benefit. Interim conditions shall be designed for a pleasant pedestrian experience through planting, lighting, wayfinding, graphics, artwork, or ornamental fencing to provide screening, buffers, and enhancement. Interim areas of the site which are not actively used for parking or construction staging will be appropriately landscaped or accommodate gathering on lawns or other aesthetically hardened spaces.
3. Minor amendments that change the approach to parking, transportation, neighborhood engagement or design shall be reviewed by the Planning Board for consistency with the objectives of the IDP. This review may occur simultaneously with the site plan review of a proposed project.
4. Major amendments shall be reviewed by the Planning Board and are required under the following circumstances:
 - a. A change to the regulatory framework is required.
 - b. The IDP is no longer representative of the institutional mission or approach to community as a result of redevelopment in the area or City upgrades to neighborhood planning (such as roadway changes, infrastructure upgrades, community design, lighting).
 - c. Proposed development is inconsistent with the master facility plan, transportation plan intent, design plan intent, or environment and infrastructure plan intent identified in the IDP.
5. Annual monitoring reports will be submitted for the Transportation Demand Management (TDM) Plan. TDM monitoring reports shall include a summary of progress towards targets established in the TDM Plan.

C. Uses. The Roux Campus will encompass a variety of uses to support the mission of the Roux Institute at Northeastern University to spur innovation, build talent, and drive economic growth. Partnerships with industry, academia, and government are essential components of the Institute's success. Campus uses will include classrooms and laboratories, housing, faculty offices, dining areas, convening spaces, fitness centers, retail facilities, entrepreneurial spaces, light manufacturing, incubator space, research and design facilities, hotel, and office space. The uses on the campus will support collaboration with private industry, other institutions, and community organizations, which is essential to the Roux Institute's approach to learning through integrated research, student work opportunities, and entrepreneurial endeavors. Hotel rooms will cater to prospective students, faculty and staff, visiting

lecturers, specialists, and business partner guests, providing multiple opportunities for informal and unplanned interactions and collaboration that would otherwise not be available if staying in a hotel miles away from campus. A range of rental housing options will foster community and provide on-site opportunities for students, faculty, staff, and their families. These units will ease some of the housing pressure and traffic that might otherwise result from new residents attracted to Portland by the Institute. Housing units not occupied by residents affiliated with the Roux Institute may be made available to the public to further assist in easing the housing pressure.

Recognizing the community value of a large waterfront parcel in close proximity to a primary bike and pedestrian trail system, the Roux Campus will be designed to include those uses that will welcome the neighbors to the campus, including publicly available open space, waterfront access, recreational opportunities, restaurant, dining, small neighborhood grocery, and/or other limited retail options. These uses will provide a means for serving the residents and other users of the campus, as well as welcoming the neighborhood to foster connectivity and community engagement, activating the public realm, and reducing dependence on automobiles.

1. In addition to the uses permitted in the underlying zone, the uses in Table 8-E are permitted as a matter of right. In recognition that The Roux Institute is a graduate-level educational and research institution with a number of corporate partners, and in recognition of its location outside of the downtown, the following uses and many that are permitted in the underlying zone, such as multi-family housing, hotels, offices and retail, are ancillary to and support the vision and mission of the Institution. In addition, ground floor retail, restaurant, or comparable community-oriented uses that provide services to local residents, students, faculty and staff shall be provided. Such uses are expressly permitted whether ancillary to or supporting the educational institution, and shall be open and welcoming to the general public in addition to students, faculty, staff, or visitors of The Roux Institute. All of the following uses shall be permitted in all buildings located within the IOZ that are located on land owned or leased by The Roux Institute.

Table 8-E Permitted Uses
All Uses Permitted in the Underlying B-5 Zone
Laboratory and Research Facilities
Structured Parking
Low-impact Industrial (>10,000 SF)
High-tech Manufacturing

2. Hotels shall be limited as follows:

- a. No more than one hotel shall be located in the IOZ.
- b. The hotel shall contain no more than 130 rooms.
- c. The hotel shall be no more than eight stories in height, not including structured parking.

D. Dimensional requirements.

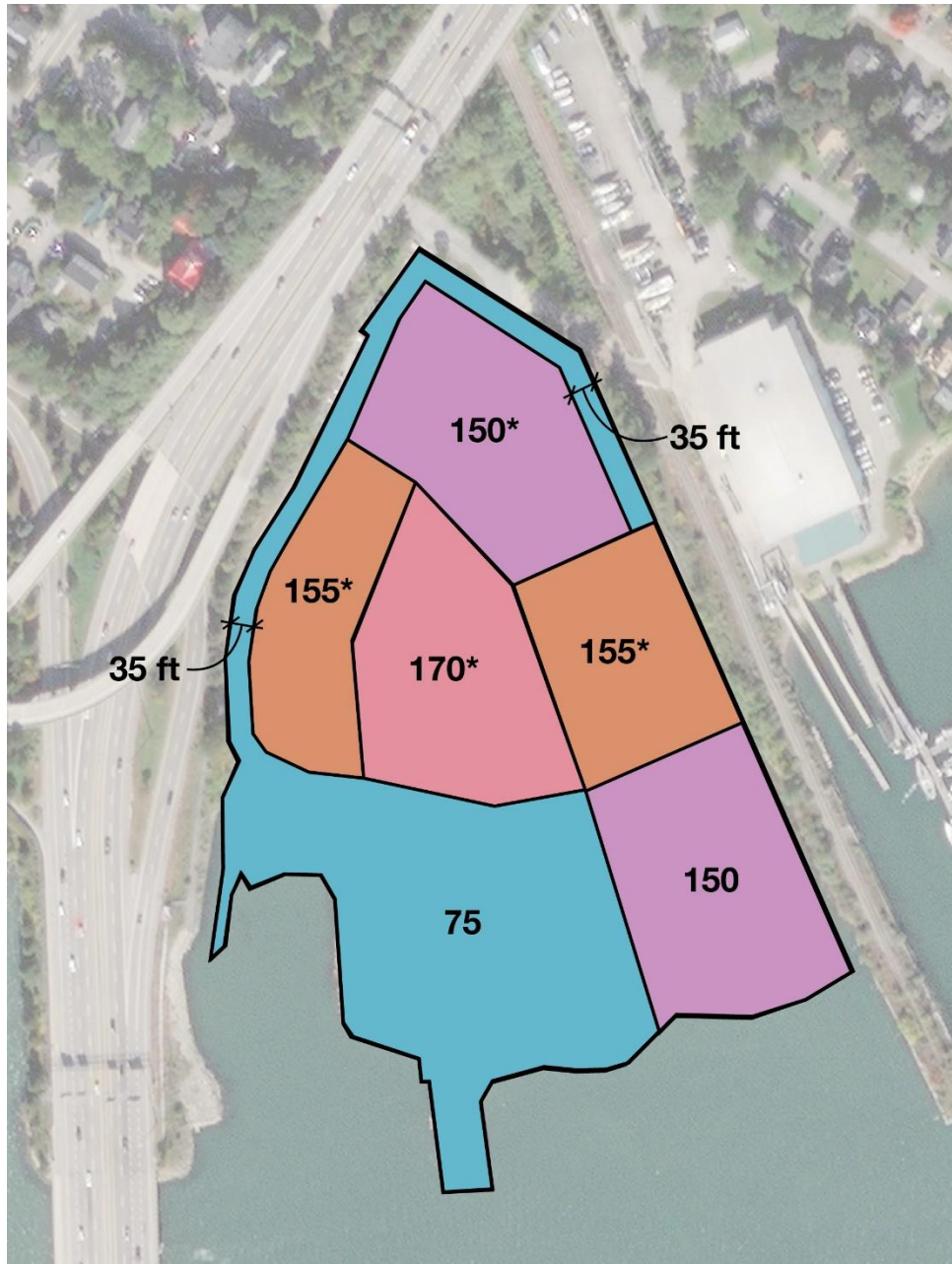
All buildings and structures located within the IOZ and located on land owned or leased by The Roux Institute shall be subject to the dimensional requirements of the underlying zone, except as set forth in Table 8-F.

Table 8-F Dimensional Requirements	
Building Height (max.)	Maximum building heights for new buildings in the IOZ shall be governed by the Roux IOZ Height Map (Figure 8-E)

E. Transportation.**1. Transportation Demand Management (TDM)**

- a. At the time of the first site plan review following IDP approval, the developer shall submit a campus-wide TDM Plan substantially in accordance with those TDM objectives and strategies identified in the approved IDP. The TDM Plan may be phased into short-, mid-, and long term actions to allow for progressive implementation over time.
- b. The TDM Plan shall be designed to provide transportation choice with the goal of reducing parking demand and single-occupancy vehicle trips to and from the Roux Campus by students, faculty, staff, institutional partners, and visitors.
- c. The TDM Plan shall establish parking, mode share, and trip reduction targets associated with each phase of development, as well as a data collection plan.

Figure 8-E: Height Map



NOTES:

1. Applies to zones shown with an asterisk (*): above height of 75 feet, no building floorplate shall exceed 35,000 square feet.
2. Above height of 50 feet, no two buildings shall be closer than 40 feet apart.
3. Building heights for buildings that span two or more height zones shall be measured by calculating the highest point (as defined in the code) of that portion of the building within a particular height zone. If the roof is sloped, height is measured at the midpoint of that portion of the slope located within the particular height zone.

2. Bicycle and Pedestrian Access and Safety.

- a. At the time of the first site plan review following IDP approval, the developer shall submit a bicycle/pedestrian access plan. Where possible, the bicycle and pedestrian access routes shall connect to established accessways. The developer shall look to establish new bicycle and pedestrian accessways where feasible.

3. Parking.

- a. Parking requirements in the IOZ shall be established at the time of site plan review for each phase of development based on a parking study that includes a campus-wide analysis of demand and supply. Parking studies shall integrate parking and trip reduction achievements and data contained in the TDM Plan.

4. Circulation

- a. The campus shall contain a bike and pedestrian circulation network which includes a perimeter access loop, an internal system of pathways and a major campus “promenade” which serves as a walkway linking campus developments, the upland, and the waterfront.
- b. The perimeter access path for bicycles and pedestrians will serve to connect the campus to primary site entry points from the community and provide a continuous recreational loop. Where appropriate, the access loop will be enhanced by wayfinding, lighting, landscaping, and safe crossings at vehicular intersections. Where possible, building facades will respond to the loop for views into the building and periodic activation to building entrances.
- c. Internal campus circulation pathways will connect major open spaces, building entrances, and outdoor plazas to create a network of multiple pathways including the perimeter access path. They will be located along or oriented toward facades that have active programs, architectural articulation, appropriately scaled entrances, and windows. They will avoid traveling along stretches of undifferentiated or blank facades back doors or service areas. They will be generally lower-velocity systems than the access loop. Where appropriate, the internal pathways will be enhanced by wayfinding, lighting, landscaping, and safe crossings at vehicular intersections.
- d. The campus promenade will serve as a major organizing feature connecting the upland and the water and providing access to open spaces, allowing views of principal campus of buildings, and connecting to the internal and perimeter pathway systems. The promenade will be enhanced by lighting, wayfinding, landscape buffers, major and minor open spaces. Viewsheds and topography will emphasize the Roux Institute and Bean buildings, pier and other principal buildings and spaces.

F. Environment.

- 1. The IOZ shall contain a minimum of three acres of public open space designed to enhance waterfront access and provide bicycle/pedestrian network connectivity. This open space requirement shall be met

at the completion of phase one and shall be maintained at all phases of development. The three acres need not be contiguous and may be provided in new and/or different locations following completion of development phases.

2. Development shall utilize critical components of industry standard benchmarking systems such as LEED, SITES, WELL, ILFI, and Passive House which will be combined in a sustainability and resilience charter to identify the specific goals and standards for the campus and its buildings. This charter will be submitted to the Planning Authority prior to submission of the site plan application for phase one.

3. Development shall utilize lighting designs required for safety and comfort and that minimize impact to the night sky in accordance with light pollution reduction standards in ANSI/ASHRAE/IESNA 90.1-2007 or its most current edition.

4. Development shall be carried out in such a way as to minimize the impacts of sea level rise, protecting infrastructure and site features by designing to a minimum of 2-feet above the Base Flood Elevation (BFE) as shown on the most current FEMA Flood Insurance Rate Map.

5. The shoreline edge and immediate adjacent upland shall be protected through shoreline armoring and vegetation to prevent erosion and enhance natural resource protection.

5. Design of ~~the~~ exterior building envelopes will be developed in conjunction with the American Bird Conservancy and Cornell Ornithology Lab standards to mitigate bird strikes to the extent practicable.

G. Mitigation measures.

Site plan impacts to off-premise infrastructure shall be mitigated in a manner proportionate to those impacts. Mitigation may include financial or in-kind contributions to existing or planned City projects focused on mitigating the impacts of the development. Mitigation contribution shall be determined based on the City's standard procedure in effect at the time of site plan review.

H. Design.

1. Introduction and intent.

New development in the IOZ shall adhere to the following design guidelines and the site plan standards of the City of Portland. All new development shall be designed to create a visual connection with the goal of achieving a cohesive campus appearance with a strong identity and sense of place. New development may be contemporary and forward looking in architectural style, but shall be informed by or responsive to the iconic Bean Building as an example of Portland's unique legacy of innovation, adaptation and durability. Reference to the building specifically and in general to the early 20th century industrial factory building type may inform the principles of highly functional yet articulated human-centered facades and details, a combination of local and innovative materials, use of natural daylighting, high degree of flexibility and scalability and capacity for long service life. New development shall be characterized by excellence in architectural design, craftsmanship, materials, streetscape, resilience, sustainability and landscape improvements, signage, and lighting appropriate for a campus development on a coastal site.

These principles and standards are intended to regulate the future build out of the Roux Campus while ensuring that new development is sensitive to adjacent residential neighborhoods and commercial areas and successfully integrates the existing site into the public realm while establishing a global beacon for thought leadership in artificial intelligence, computer and data sciences, digital engineering, and advanced life sciences.

2. Standards

a. Buildings shall:

- i. be characterized by excellence in architectural design, sustainability, and craftsmanship
- ii. incorporate materials, landscape, signage, & lighting that reflect the industrial heritage of the site as well as Portland's character yet also embrace to a high-tech design aesthetic incorporate materials, landscape, signage, & lighting that reflect Portland's character yet look to a high-tech future
- iii. create a strong identity and sense of place
- iv. vary in height, with the tallest buildings located toward the center of campus
- v. be organized to take advantage of views, site circulation, and public space along the waterfront as well as provide views of the water from multiple vantagepoints around the campus
- ~~v.~~vi. be planned in a manner that preserves the historic view of the Bean Building from Tukey's Bridge
- ~~vi.~~vii. share visual connections with other campus buildings to achieve a holistic campus appearance
- ~~vii.~~viii. support and augment activation of public spaces and public access to the site
- ~~viii.~~ix. be programmed for activation where they meet the pedestrian realm or feature visually interesting details and activities related to the building
- x. respect the adjacent neighborhood and facilitate a sense of permeability and welcome
- ~~ix.~~xi. celebrate the primary learning and research building through signature architecture
- ~~x.~~xii. identify the primary academic program area through signature architecture
- ~~xi.~~xiii. utilize durable materials resistant to the marine climate & which contribute to an attractive public realm
- ~~xii.~~xiv. screen rooftop appurtenances and set back mechanical enclosures from roof edges to reduce shadow & visual impact
- ~~xv.~~ limit sound transmission and
- ~~xiii.~~xvi. limit bird strike potential
- ~~xiv.~~xvii. employ sustainability benchmarking to foster environmental stewardship and resilience
- ~~xv.~~xviii. utilize building articulation and material selections to provide character and scale
- ~~xvi.~~xix. ensure permeability through and within the site for light, air, views, & access
- ~~xvii.~~xx. be appropriately scaled to support pedestrian activity, utilizing step-backs where appropriate
- ~~xviii.~~xxi. be oriented toward the open space at the center of the site and shall include prominent facades with windows and entrances oriented toward paths of travel
- ~~ix.~~xxii. be oriented to allow for easy pick-up and drop-off
- ~~xx.~~xxiii. respect and provide a buffer from the historic B&M cannery building

b. Campus circulation shall:

- i. be bike and pedestrian-centered, with motor vehicle circulation generally at the perimeter where practicable
- ii. serve pedestrians/bicyclists, autos, public transportation, service vehicles, and emergency vehicles during each phase of development
- iii. provide wayfinding and amenities to create a safe and welcoming environment for the community
- iv. provide bike and pedestrian connectivity to existing ways where feasible

c. Open space and public realm shall:

- i. create a strong identity and sense of place
- ii. be designed for safety and comfort
- iii. enable access to building entrances
- iv. utilize a combination of planting and hardscape
- iv-v. be available to all members of the public, through inclusive, safe and barrier free design as well as support purposeful connections and transitions
- v-vi. provide access and amenities to connect the public to the shoreline and ocean
- vi-vii. include meaningful public open space between the buildings and the water
- vii-viii. support site resilience in consideration of flooding from storm events and sea level rise
- viii-ix. support ecological functions and values
- ix-x. provide an appropriate buffer adjacent to and complementing the historic B&M cannery building
- x-xi. include lighting that is full-cutoff and dark sky-friendly

d. Parking shall:

- i. be located to the maximum extent practicable in below grade garages and daylight basement garages
- ii. when above grade, be architecturally screened to blend in with the surrounding buildings and minimize vehicular disturbances of lights and sound
- iii. when on surface lots, be located at the rear or side of buildings, & not along the primary façade
- iv. not be located along the water's edge
- v. ensure EV charging capability meets EV demand & is scalable as demand increases
- vi. be shared to the extent practicable
- vii. support street activation & pedestrian scale when adjacent to public open space or rights-of-way

I. Neighborhood integration.

1. Neighborhood Engagement:

a1. For the purpose of keeping surrounding residential areas apprised of its future development plans, and to address any neighborhood issues related to the operations of the Roux Campus, IDEALS and The Roux Institute shall adhere to the ongoing neighborhood engagement principles identified in the IDP.

b2. Ongoing community engagement shall be conducted, including the continuation of Roux Campus Roundtables and maintenance of the Roux Campus website.

c. A Stakeholder Advisory Group shall be created for the purpose of advising on project development, comprised of representatives of interested stakeholder groups, such as recreation, parks and trails, rail, bicycle/pedestrian, the City of Portland, and the East Deering Neighborhood.

d3. A designated community liaison shall be engaged to be the point of contact for providing information to the neighborhood and receiving feedback.

2. Construction Management

At the time of site plan review, Northeastern University shall submit a Construction Management Plan substantially in accordance with the construction management principles identified in the Institutional Development Plan for review and approval by the Planning Authority.

3. Snow Ban Parking:

When the City of Portland declares a Snow Parking Ban, Northeastern University shall make parking available to neighbors in a designated parking area on its campus upon the following condition: The hours of snow ban parking for registered vehicles during an announced City of Portland Snow Parking Bans are 6:00pm until 6:00am. Vehicles that are not moved out of these parking areas by 6:00 each morning are subject to towing at the owner's expense.

J. Historic Preservation

The B&M Cannery Building has been designated as a local historic landmark. The area of designation includes the B&M Cannery Building, as well as the area of the former cod fish building and pier. The Historic Preservation Board's review of activity within the site of the former codfish building and pier is limited to review of any activity that would require a Certificate of Appropriateness that is proposed on a newly constructed pier. A Certificate of Appropriateness will not be required for the demolition of the codfish building or construction of a new pier and related infrastructure, including future alterations to the pier structure.

Northeastern University shall include interpretive element(s) on top of or within the surface of the new pier that convey the history and significance of the codfish building. Prior to construction of said elements, the University shall submit the proposal to the Historic Preservation Board for its review and approval. The interpretive elements shall be designed in a manner that does not interfere with the use and functionality of the pier as a marine passenger facility and for water access by the Roux Institute and the public.

Michael Hale <halem@portlandschools.org>

Aug 23, 2022, 3:52:52 PM (16 hours ago)

to planningboard@portlandmaine.gov, ksnyder@portlandmaine.gov, tchong@portlandmaine.gov, mdion@portlandmaine.gov, atrevorrow@portlandmaine.gov, azarro@portlandmaine.gov, pali@portlandmaine.gov, vpelletier@portlandmaine.gov, afournier@portlandmaine.gov, rrodriguez@portlandmaine.gov

Dear Mayor Snyder, Councilors, and Planning Board Members,

I am writing to express my enthusiastic support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As a Portland resident with two children in our public schools as well as an educator in Portland Public Schools for over 20 years, I think the Roux institute is exactly the type of partner Portland needs to support student “career laddering” as described in the city’s [Strategic Action Plan for Inclusion \(pg.5\)](#). As a partner of the Roux Institute, I have been able to create exciting connections and career-laddering experiences for our Casco Bay High School students including:

- Internship experiences for 3 of our BIPOC students (internships in Artificial Intelligence, User Experience, & Engineering)
- A collaborative program with professor Dr. Michael Wilczek’s Next Gen Sequencing project utilizing [Holoens Augmented Reality technology](#).
- An Entrepreneur Incubator course based on the Roux Institute Maine Start Summit format for aspiring startup curious students (“CBHS Genius Hour X-Block”)

I plan on continuing these current collaborations as well as fostering future collaborations with the Roux Institute. I believe the impact the Roux Institute has already had (and no doubt will continue to have in the future) will expand the access to experiences and connections that our high school students need.

The Roux Institute has articulated in their proposal that their campus will welcome all, with waterfront access, public open space, and offerings to the community. The Roux Institute has already offered conference room spaces to our high school faculty for our culminating events and other endeavors we are currently exploring. During their week-long internships, our students were able to build relationships with several Roux Institute faculty and staff. These connections quickly paid off. One student was invited to the Future Innovators Summer Camp and another student chose their college major based on their internship experience. Our work with Dr. Wilczek is providing our students access to state-of-the-art holographic/augmented reality technology that is at the cutting edge of numerous careers in medicine and engineering.

I am eager to continue our partnership with the Roux Institute and create more exciting opportunities for our students. Please feel free to email or call me if you have any questions.

Sincerely,



--

Michael Hale (He/Him/His)

Director of College, Career, & Citizenship / School Counselor / 504 Coordinator / Innovation Educator

Casco Bay High School An Expeditionary Learning Public High School

Nan Cumming <nan@portlandparksconservancy.org> Aug 23, 2022, 2:39:35 PM (18 hours ago)
to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

I am writing on behalf of the Portland Parks Conservancy regarding the Roux Institute campus at the former B&M factory in Portland.

As a private nonprofit organization with a mission to support the City's public parks and recreational programs, we do not typically advocate for or against development projects in Portland. However, the Parks Conservancy Board of Trustees would like to express our support for the Roux Institute's plan to steward this unique property. Their intention to create at least 3 acres of new public green space, over 1,000 feet of waterfront access, and pedestrian and bicycle connections to the Back Cove and Eastern Promenade will greatly enhance livability in our city.

We look forward to working with the Roux Institute to find innovative ways to connect their campus to Portland's growing network of waterfront parks and public open spaces.

Yours sincerely,

Nan

Nan Cumming
Executive Director



Aug 23, 2022, 11:18:34 AM (21 hours ago)

Chandra Leister <chandrakis@gmail.com>
to planningboard@portlandmaine.gov, council@portlandmaine.gov

Good day,

I am writing today to express my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As a recent Roux graduate, active community member, and locally employed Portland resident, I believe Roux Institute is key to the continued growth of the city of Portland, Cumberland County, and Maine as a whole.

The Roux campus provides a hub for learning, collaboration, entrepreneurship, STEM in Maine, and brings together Maine people who are engaging in the growth of our beloved city and state. I work locally at IDEXX and really wanted to advance in my career, stay in Maine, and connect and collaborate locally to interact globally. Roux provided that opportunity in ways that still let me continue to work at IDEXX, and continue to serve on local non profit boards for the Maine Mechanics Hall, Startup Maine, Maine Marathon, Beach to Beacon, and the Maine Track Club. I was part of the first cohort at Roux, and have seen it thoughtfully grow, fully embrace students of all backgrounds and futures, and support other organizations that support Maine. Roux provided me with a fantastic educational opportunity that let me continue to live and work in Maine by bringing together (and quickly building) a community focused on diversity, talent development, advanced research, and support of the current ecosystem.

The current space is a great starter space, but I believe the new site will become a cornerstone of Portland, solidifying our focus on education, our residents, future opportunities, keeping talent in Maine, and attracting new residents. We already have a beautiful place, filled with delicious things, a working waterfront, growing aquaculture, and foundations and support for entrepreneurs. The proposed Roux Campus at the former B&M factory will solidify Portland's commitment to the future while working wonderfully with existing neighbors, values, tradition, and let's be honest - traffic! The proposed design features a sustainable, well-designed, open campus - with public space, thoughtfully designed spaces that keep education and collaboration in mind, and housing! By including all of these items in a centrally located campus that was designed to work with existing neighbors, minimize traffic impacts, Roux has shown a commitment to working together with the city to create a cohesive community.

I again respectfully request your support for the proposed plans for the Roux Institute at the former B&M factory. I am happy to answer any questions, publically and privately on this important issue.

Thank you,

Chandra Leister
MS, Project Management - Roux Institute, July 2022
Project Manager, IDEXX

Owen McCarthy <owen@medrhythms.com>

Aug 24, 2022, 2:36:22 PM (5 days ago)

to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

I am writing to share my support for the Roux Institute's proposed plan to build a campus in Portland at the former B&M factory.

As the Co-Founder and President of MedRhythms, a medical device startup and one of the Roux Institute's partners, I can attest to the positive impact that the Institute has already had on the Portland community and startup ecosystem. We are a rapidly growing company located at 183 Middle Street that has grown from 5 to 40 employees in just a few years, and we know that the proposed plan for the Roux Institute's expansion will help MedRhythms continue to grow and hire top talent. Moreover, it will enable an even greater impact on the future of the local economy and community.

The partnership with the Roux Institute has been invaluable for MedRhythms. It will enable strategic research collaborations and has already provided MedRhythms with multiple co-op opportunities for Roux Institute students, who have helped develop MedRhythms' technology. The Roux Institute has already improved the life sciences talent pipeline, and it will only continue to do so as the Institute expands. We envision collaborating with the Roux Institute as a strategic partner to further research, access top industry talent, and elevate the entrepreneurship ecosystem across the state. The Roux Institute has also demonstrated its commitment to improving diversity, equity and inclusion, which are top priorities for MedRhythms as well. As evidenced by the \$67M Alfond Scholars Initiative grant to the Institute and the establishment of Northeastern University's Office of Diversity, Equity and Inclusion, it's clear that the Institute is committed to making Maine a better, more inclusive place for everyone to live and work.

Developing this campus will have many positive ripple effects into the community. The campus will be sustainable, it will expand housing as more and more people move into Portland, and it will create inviting and complementary spaces accessible to all in the Portland community. I look forward to continuing to show my support for this initiative, as it will have an important impact on the community where MedRhythms employees live and work.

Best,
Owen McCarthy
President
MedRhythms, Inc.

Emma Christakis <christakis.em@northeastern.edu> Aug 24, 2022, 3:22:34 PM (5 days ago)
to council@portlandmaine.gov, planningboard@portlandmaine.gov, ksnyder@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

I am writing to voice my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland, Maine. As a student of the first cohort at the Roux Institute, I want to let you know that the Roux Institute is one of the most exciting developments in Portland, and the campus will enable its essential growth in the years to come. The Roux Campus will bring together learning, research, collaboration, and entrepreneurship to shape cutting-edge opportunities for Maine people and shape our economy to compete globally. I am a recent graduate of the Roux Institute, and I hope to collaborate with them in research for many years.

Because of the \$67 million Alford Scholars Initiative grant to the Roux Institute and with the commitment of Northeastern University's Office of Diversity, Equity and Inclusion, the Roux Institute celebrates diversity in all its forms and strives to foster an inclusive, accessible culture represented by people from across Maine and around the world.

The non-profit developer of the Roux Campus has been a model of transparency and compromise, reducing the size of the campus by almost 500,000 square feet with attendant traffic reductions, lowering building heights, and changing the design to minimize impacts to neighbors. Rather than develop a closed campus open only to those learning and working there, the campus will welcome all comers, with waterfront access, public open space, and complementary offerings attractive to neighbors and other Portland residents.

The campus will be energy efficient, climate-resilient, sustainable, and environmentally friendly, which is important to many Mainers and me.

If you have any questions or concerns, please let me know! Thank you in advance for taking the time to read.

Best,

Emma Christakis
Roux Institute Alumna
christakis.em@northeastern.edu

Sally Johnstone <Sally.Johnstone@altusgroup.com> Aug 24, 2022, 4:01:27 PM (5 days ago)
to ksnyder@portlandmaine.gov, council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members:

As a Maine resident, full-time telecommuter for a global publicly traded company, and a student at the Roux Institute I want to express my support for the proposed Roux Institute campus at the former B&M factory in Portland.

I know that you will be hearing from many others about this project, but I feel I can bring a unique perspective. Prior to working for the Altus Group, I was a consultant on multiple economic development projects for municipalities and communities in California, Texas, Arizona, Florida, Maryland, Colorado, Kansas, and Washington. Without question, the opportunity that the Roux Institute brings to Portland is the kind of opportunity that cities across the nation **wish** they could have and we are extraordinarily lucky to have the Roux considering a permanent home in Portland. There are commonalities to metropolitan areas that thrive in both good and challenging economic cycles. One of those common factors is the presence of an educated workforce, especially in technical fields like AI, biotechnology, computer science, etc. Another factor driving success is entrepreneurial activity and support. The Roux brings both to Portland in a way that no other institution in Portland can match.

On a personal note, I live in Bath, Maine by choice; as a remote worker, I can live anywhere with an airport and Internet access. The opportunity to further my education at the Roux Institute is part of what is going to keep me in Maine even after my son graduates from high school this year. An educated population and strong entrepreneurial ecosystem attracts businesses and it also attracts the kind of people who are in a position to live and pay taxes where they choose to be, versus where they work.

From what I understand, the developer of the new Roux Campus has been very willing to compromise and modify plans to accommodate the neighboring residents. The campus will have living accommodations, and will be open to the public so that more than just students and visiting academics and researchers will be connected to the campus. A new campus is certainly preferable to an empty decaying industrial building on an industrial site, aesthetically, environmentally, and economically. It sounds as if the plans for the campus will greatly enhance the desirability of the neighborhood around the campus.

I truly hope that Portland embraces this positive change.

Thank you,

Sally

Sally Johnstone, MBA

James Kim <kkgg3781@gmail.com>

Aug 24, 2022, 4:03:14 PM (5 days ago)

to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members

I am writing to voice my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As a student, I want to let you know that the Roux Institute is one of the most exciting developments in Portland and the campus will enable its essential growth in the years to come.

The Roux Campus will bring together learning, research, collaboration, and entrepreneurship to shape cutting edge opportunities for Maine people and shape our economy to compete globally. I am currently engaged at Roux in Align: Master of Science in Computer Science program, and I hope to collaborate with them in research and talent development for many years.

I came here to go Roux from South Korea and currently I am the only Korean student. It will greatly help bring more diversity to Portland, Maine if this request is approved.

Because of the \$67 million Alford Scholars Initiative grant to the Roux Institute and with the commitment of Northeastern University's Office of Diversity, Equity and Inclusion, the Roux Institute celebrates diversity in all its forms and strives to foster an inclusive, accessible culture represented by people from across Maine and around the world.

The non-profit developer of the Roux Campus has been a model of transparency and compromise, reducing the size of the campus by almost 500,000 square feet with attendant traffic reductions, lowering building heights and changing the design to minimize impacts to neighbors.

The campus will be energy efficient, climate resilient, sustainable, and environmentally friendly.

Rather than develop a closed campus open only to those learning and working there, the campus will welcome all comers, with waterfront access, public open space, and complementary offerings attractive to neighbors and other Portland residents.

Housing is an important feature of the Roux Campus. Enabling students, faculty, and employees to live on campus is critical to creating a cohesive community where innovation can thrive.

Sincerely,
James

Breac Baker <breacbaker@gmail.com>

Aug 24, 2022, 5:59:13 PM (5 days ago)

to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors and Planning Board Members,

Hello, my name is Breac Baker, and I am writing in support of the Roux Institute's proposed campus plan. The Roux Institute has consistently impressed me during my time as a student. As a lifelong Mainer, I have rarely seen such great opportunities this close to home.

While enrolled at the Roux Institute, I have pursued a masters' degree in analytics and contributed to research on Maine's nursing workforce. I have also been able to advance my career during this time, thanks to learning about startups at school. A permanent campus will give many more students access to the resources assembled by the Roux Institute. I am confident that the benefits of the planned campus will be significant and that the needs of the larger community have been considered.

Sincerely,

Breac Baker

Caroline Foster <foster.ca@northeastern.edu>
to council@portlandmaine.gov, planning@portlandmaine.gov

Aug 25, 2022, 1:47:50 PM (4 days ago)

Dear Mayor Snyder; Councilors Ali, Chong, Dion, Fournier, Pelletier, Rodriguez, Trevorrow, and Zarro; and Planning Board,

You may know me as the former president of the Portland Education Association, but I'm writing now in a different capacity: as a student at the Roux Institute in support of approving the IOZ for the proposed new campus.

Storytime first: in 2019 (shortly after I was elected to the aforementioned position, actually) I got really sick. COVID hit (unhelpful) and my doc told me it was a good thing I could work remotely because I would never be able to teach again. This is not a pity thing because I completely understand how comparatively lucky I've been, but it did force me to consider my options. The Roux quickly rose to the top of them and during winter "break" (I think we all know none of us had one of those over the course of those couple of years) I applied, was accepted, and jumped immediately into 2021, and into coursework that would culminate in the option to have a career that would allow for my stupid health stuff. Woوو, auto-immune.

Side note: within a month of that my treatment changed so I'm totally okay to be a normal human again. Turns out modern STEM is a wonderful thing, which is merely another argument for the Roux so we'll leave that here. Regardless, the peace of mind that came with having such a robust and convenient option right in Portland is still priceless to me. And my experience - currently serving as World's Oldest Intern at IDEXX, where I'm thrilled to be proposing win/win ways to partner with PPS - has been excellent.

I see Roux's expansion as a huge opportunity for our community. Most of my work has been online in the wee hours of the morning in the depths of pandemic, but the thought of having a campus where people can connect, share ideas, and collaborate across emerging disciplines is exciting. And as a longtime Portland Schools educator, the thought of the partnerships and opportunities for our preK-12 students is inspiring as well. I ran into (*name redacted because I didn't get permission, but she's a former student and rising CBHS senior-do you know her? You should - she's great*) at the Roux this summer, excited to be at STEM camp. Any further opportunities for kids to do that kind of thing is an investment back into Portland. Let's make it happen.

I hope you're all doing well, and I hope to connect with you soon as we figure out how to keep creating opportunities for education, partnerships, and experiential learning right here in the community. Always happy to talk more!

Carrie Foster
[207-252-8547](tel:207-252-8547)

Conor Sullivan <csullivan@theendurancegroup.com> Aug 25, 2022, 9:30:49 AM (5 days ago)
to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

I am writing to voice my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As a business leader, I want to let you know that the Roux Institute is one of the most exciting developments in Portland and the campus will enable its essential growth in the years to come.

The Roux Campus will bring together learning, research, collaboration, and entrepreneurship to shape cutting-edge opportunities for Maine people and shape our economy to compete globally. I am currently engaged at Roux in multiple ways:

- I am a mentor for one of their start-ups in their Founder Residency program, [Dutchpot](#). They are going to completely transform the food entrepreneur industry in Portland.
- My company works with one of its professors, [Philip Bogden](#). Bogden's students analyze the data from a technology we recently created, which will help us mightily as we grow our company.
- Our company also plans to hire one of their co-op students to work at our company in their next cycle. Our hope is that this will create a steady recruiting pipeline for us and keep talent in Portland.

I truly believe the Roux Institute will have a tremendous impact on the growth of Portland's business community. In only a few months, they have transformed our future outlook and plans.

I anticipate that impact will grow if they are permitted to move into their new campus. Their open campus concept will welcome all comers, with waterfront access, public open space, and complementary offerings attractive to neighbors and other Portland residents.

Please consider supporting the proposed plans for the Roux Institute campus.

Best,
Conor Sullivan
Vice President of The Endurance Group

Elizabeth Jerome <ejerome730@gmail.com>

Aug 25, 2022, 8:13:10 PM (4 days ago)

to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

I am writing to voice my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As an alumna, I want to let you know that the Roux Institute is one of the most exciting developments in Portland, and the campus will enable its essential growth in the years to come.

The Roux Campus will bring together learning, research, collaboration, and entrepreneurship to shape cutting edge opportunities for Maine people and shape our economy to compete globally. I recently completed a Master's degree in Project Management at the Roux Institute, and I plan to continue my education with other courses in the years to come. Because of my experience at the Roux, I was able to land a great job with a Maine company and continue living in our wonderful state after college. I know the Roux Institute can do the same for entire generations to come, training and keeping our bright minds in Maine. This will help us all to thrive.

Because of the \$67 million Alford Scholars Initiative grant to the Roux Institute and with the commitment of Northeastern University's Office of Diversity, Equity and Inclusion, the Roux Institute celebrates diversity in all its forms and strives to foster an inclusive, accessible culture represented by people from across Maine and around the world. This is essential not only to bringing our city's authentic identity to life, but also to attracting more people to this wonderful place. Innovation cannot survive without a commitment to diversity, equity, and inclusion, and I know the Roux will make it possible for each of these to thrive, supporting Portland's future as a hub of innovation.

The campus will be a shared resource that strengthens our growing Portland community. Rather than developing a closed campus open only to those learning and working there, the campus will welcome all, with waterfront access, public open space, and complementary offerings attractive to neighbors and other Portland residents.

Housing is another important feature of the Roux Campus. Enabling students, faculty, and employees to live on campus is critical to creating a cohesive community where innovation can thrive. As Portland grows, this commitment to housing will be a model for other institutions as they seek ways to enable their students and employees to live and work in Maine.

I believe this is a unique opportunity to support the city of Portland and the state of Maine.

Sincerely,
Liz Jerome



428 Fore St STE 3, Portland, ME 04101 207.747.9225
Boots2Roots@Boots2Roots.org | www.boots2roots.org

24 August 2022

Dear Mayor, Councilors, and Planning Board Members,

On behalf of Boots2Roots, I am writing to voice my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As a Roux Partner, Boots2Roots is excited for Roux to develop the space and create new educational and economic opportunities for the Greater Portland region.

Boots2Roots and Roux Institute already collaborate to expand higher education and workforce integration experiences for Veterans interested in moving to Maine. Part of Roux's commitment includes providing significant scholarship awards to Veterans seeking advanced degrees in STEM fields. Combined with cutting edge work-study initiatives, these programs are poised to impact a diverse range of Veteran candidates. Completion of the Roux Campus in Portland will increase the visibility of these opportunities and act as a magnet to attract more military talent to Maine communities and Maine businesses.

Importantly, Roux's open campus concept and inclusion of on campus housing help ensure project integration with the surrounding community and contributes to Portland's appeal as a destination city. We look forward to seeing the campus plans develop and to continue promoting Roux opportunities to increasing numbers of interested veterans.

Sincerely,

A handwritten signature in black ink, appearing to read "W. Benson", is written over a horizontal line.

William (Bill) Benson
Executive Director
Director@Boots2Roots.org



Zachary Powell <zpowell@portlandmaine.gov>

Roux Campus Portland

Jordi St. John <jordistjohn@gmail.com>
To: zpowell@portlandmaine.gov

Wed, Sep 7, 2022 at 9:54 PM

Hello Portland Planning Board and City Council,

My name is Jordi St. John, I live on Johansen Street and work for the Maine Island Trail Association, whose office is above the Maine Yacht Center. I am writing in support of Roux's new proposed campus.

It is exciting to me that the Roux Campus will be a dynamic combination of academic and research endeavors applied to real-world settings with start-up companies and small manufacturing applications, all on a campus where housing, lodging, dining and retail essentials create a contained platform for creativity and innovation.

I like that the campus is modeled on similar campuses around the country, this concentration of essential assets amplifies engagement among students, entrepreneurs, visitors and professors, and seems essential to the success of the Roux Institute. From what I can tell the campus is being designed for the Roux Institute community and the community of Portland. Rather than develop a limited campus used only by those learning and working there, the campus will welcome all comers, with waterfront access, public open space, and complementary offerings, which is attractive to us neighbors and other Portland residents.

The old B&M lot is perfect for the campus being on a peninsula in the city, buffered by a highway on two sides and a marina, the site is well-suited to a high-density, architecturally distinctive development.

The non-profit developer of the Roux Campus has been a model of transparency and compromise, reducing the size of the campus by almost 500,000 square feet with attendant traffic reductions, lowering building heights and changing the design to minimize impacts to neighbors.

The Roux Campus will bring together learning, research, collaboration, and entrepreneurialism to shape cutting edge opportunities for Maine people and position the Maine economy as a 21st century global leader. People from all over Maine and around the globe will innovate to strengthen existing Maine businesses and institutions and spawn new ones. I personally am thrilled that the campus will be energy efficient, climate resilient, sustainable, and environmentally friendly. Also, alternative forms of transportation are in use to access the Roux Institute in its current space, and much more is in the works for the new campus.

Thank you for your time.

Sincerely,
Jordi

Sep 11, 2022, 10:23:39 AM (yesterday)

Zachary Nichols <nichols.z@northeastern.edu>
to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

I'm writing to you today in support of the Roux Institute's proposed campus plans in the East Deering neighborhood of Portland. As both a current graduate student at the Roux Institute and a Veranda Street resident, I am thrilled that the Roux Institute has decided to establish a permanent spot close by and believe they will be excellent stewards of the location they have chosen.

The Roux Institute fills a genuine gap in Maine's educational landscape. I enrolled in the Align Master of Science in Computer Science program at the start of last year. The Align program provides students with no prior formal computer science background with a path to acquire the skills necessary to transition into a career in tech.

Although I will have graduated by the time a permanent campus is built, I strongly believe my program, and the others like it that are also offered by the Roux, are the exact thing that both the city of Portland and the state of Maine need more of in the years and decades to come. I believe it is in the best interest of the long-term health of both the neighborhood and the city to embrace the vision behind the project.

I had a chance to attend the open house hosted by IDEALS and the Roux Institute at the B&M factory this past week and it further solidified my belief that this will be an incredibly valuable addition to Portland. I don't think it can come soon enough, and I truly hope the city will work together with the campus developers and the Roux Institute team and do what it can to be a collaborator and partner in the development process.

Please don't hesitate to reach out if you have any questions.

Sincerely,

Zach Nichols

MSCS Align student and local resident

Cell: (207) 624-1912

Email: nichols.z@northeastern.edu OR zpnichols@gmail.com

SOUTHWORTH

Mayor Kate Snyder,
Portland City Council,
Portland Planning Board,
City of Portland,
389 Congress Street,
Portland, ME 04101

September 9, 2022

Dear Mayor Snyder, Councilors, and Planning Board Members:

I am writing to express my strong support for the new Roux Institute campus at the former B&M factory in Portland. As a Portland resident and as the leader of a 130-year-old local company that has strongly partnered with the Roux Institute, I believe the development of Roux is a generational opportunity for the city of Portland and for the state of Maine. Securing a compelling and iconic campus for the Roux Institute is both a great opportunity for Portland and will enable the essential growth of Roux in the years to come.

Southworth International Group, Inc. (SIGI) is a global leader in the design and manufacture of complex material handling systems and solutions. We employ 650 globally, including approximately 100 teammates in the Greater Portland area. These staff are engaged in highly skilled and technical STEM fields including design and sales engineering, research and product development, customer service and support, and accounting and finance.

Southworth is fortunate to have developed an early and deep partnership with the Roux Institute, which will benefit our organization for years to come. Roux has provided us with access to a tremendous pool of Northeastern University interns and co-ops which we have utilized to address critical skills shortages within our company. We are also leveraging Roux to provide training and skills development in advanced STEM areas for our team through degree, certificate and training programs. Finally, we are collaborating with Roux to engage in peer-to-peer networking with other similar companies in the Portland area.

As a Portland resident, I believe the Roux Institute is one of the most exciting developments in recent Portland history. Roux promises to build a world-class research and academic facility right here in Portland, convening leading scholars, researchers and students in pursuit of solutions to some of the most pressing challenges facing our society. And Roux will enable Maine companies and people to compete globally and positively shape our economy far into the future.

Roux promises to have tremendous impact on the greater Portland region. Here are a few specifics that I believe warrant consideration:

- Because of the \$67 million Alfond Scholars Initiative grant to the Roux Institute and with the commitment of Northeastern University's Office of Diversity, Equity and Inclusion, the Roux Institute will foster an inclusive, accessible culture represented by people from across Maine and around the world.

- The non-profit developer of the Roux Campus has been a model of transparency and compromise, working with the neighborhood to find reasonable compromises on development challenges. I have known Sam Reiche, COO & Head of Real Estate at IDEALS, for many years. He is an individual of the highest integrity and vision and he is deeply focused on the betterment of our community.
- The campus will be energy efficient, climate resilient, sustainable, and environmentally friendly.
- Rather than develop a closed campus open only to those learning and working there, the campus will welcome all comers, with waterfront access, public open space, and complementary offerings attractive to neighbors and other Portland residents. It is a terrific and very exciting redevelopment of the iconic B&M baked bean factory. One way or another, this building will be redeveloped. This proposal promises a redevelopment that will be open to the entire community (as opposed to a condo project, for example) and a true shared asset for all.
- Housing is an important feature of the Roux Campus. Enabling students, faculty, and employees to live on campus is critical to creating a cohesive community where innovation can thrive. Roux will create a new and dynamic residential corner of the city of Portland where at present only a fading industrial building stands. This neighborhood is not too far from where I live. It will be exciting to watch the transformation of this corner of Portland in the years to come.

Years from now, our grandchildren will look to this moment filled with admiration for how this generation of city leadership and our city as a whole seized this opportunity to support a transformational initiative facilitating greater growth and promise in the Greater Portland region. Now is the time to support the Roux Institute and to support a brighter, more exciting and more vibrant future for all residents of the Greater Portland region. I trust your administration will do everything it can to ensure the success of the Roux Institute for generations to come.

Yours sincerely,



James Cabot

President and CEO

Southworth International Group, Inc.

Bates

Office of the President

September 12, 2022

Dear Mayor, Councilors, and Planning Board Members,

We write in support of the proposed plans for the Roux Institute campus at the former B&M factory in Portland, ME. Bates College has been working with the Roux Institute as an academic partner since Northeastern University opened the institute in Portland in the fall of 2020. To date, 23 Bates students have, as part of their Bates education, taken a masters level course at the Roux Institute through the [Align Program](#), which provides bridge courses for students from any undergraduate major for graduate-level coursework working toward a Master of Science in Data Science. We are currently working to build on and formalize this pathway for Bates students who are interested in Computer Science (CS). In addition to enhancing Bates' course offerings, our partnership with the Roux Institute presents expanded opportunities for Bates College graduates to remain in Maine to work or study post-graduation, as they already will have obtained credits towards an MS at the Roux.

Bates has also developed a collaborative sabbatical program for faculty with the Roux Institute with one Bates faculty member already having taken part. The type of research opportunities offered by sabbatical programs like the one we are developing can serve as potential recruitment/retention opportunities for both Bates and the Roux Institute as they provide integral support for creative research and teaching opportunities.

The goals of the Roux Institute align with those of [Bates College](#) and its [Digital and Computational Studies Program](#), including bringing "[cutting-edge technology capabilities here to Maine and northern New England](#)" and providing "[inclusive opportunities for underrepresented groups such as women, and first-generation college attendees to lead the future of this industry.](#)"

We are proud of our partnership with the Roux Institute and the opportunities it brings for Bates students and for Maine. We look forward to expanding our engagement with the Institute in the new and exciting campus facilities that are planned.

We urge you to support this next step in the evolution of the Roux Institute and the possibilities it continues to open up for educational and workforce collaborations.

Sincerely,



A. Clayton Spencer
President



Malcolm Hill
Vice President for Academic Affairs
and Dean of Faculty



PORTLAND PUBLIC SCHOOLS

prepared & empowered

Sept. 12, 2022

Dear Mayor Snyder and members of the City Council and Planning Board,

I am writing on behalf of the Portland Public Schools to express the district's strong support for the proposal for The Roux Institute campus at the former B&M factory. The Roux Institute has already proven itself to be a valuable partner of our school district and that partnership will only be enhanced if this exciting development is approved.

Let me give you a few examples of how our partnership with The Roux Institute has already benefited our students and staff.

The Roux Institute has supported our STEM (science, technology, engineering and math) programming through teacher training on coding and computer science. Our computer science vertical team leaders collaborated with The Roux Institute computer science professors to plan and to present to teachers who are early adopters of computer science integration at the elementary level at their campus.

Girls Who Code and Educate Maine organized a middle-school and a high-school camp hosted at The Roux Institute, which brought PPS students who identify as female for coding activities. They also heard from 'women in technology' as guest speakers, took a field trip to nearby Wex and participated in sisterhood activities.

In addition, our high school science teachers would like to build capacity around data science. The Roux Institute could help do that by offering courses for teachers on data science. Experiences that students could attend that would allow them to work with data sets and data communication would also help to expand our students' engagement with data science. Having The Roux Institute in such close proximity would amplify our students' and teachers' access to these rich learning opportunities.

The Roux Institute also has committed to innovative ways to help Portland Adult Education students validate their home country credentials. Many of our new Mainer students have higher education degrees and have been successful professionals in their home countries. Validating their credentials will help them fulfill their potential as part of Maine's workforce.

We also have been able to tap students and graduates of The Roux Institute for key roles.

Roux has given us access to and subsidies for their co-op students in the Project Management and Professional Studies programs. The Roux Institute's co-op program is an experiential learning program that allows students to alternate semesters of academic study with periods of full-time work. We've had two project management co-op students and three analyst co-op students as interns and our current Data Manager was one of those interns. Additionally, The Roux Institute also has invited us to provide projects/problems for their graduate students to tackle through their Experiential Network (XN) courses, which will help us look at thorny problems in new ways. We will take advantage of that offer during the fall semester.

We foresee the Portland Public Schools being able to continue to benefit from those kinds of opportunities and much more if the Roux Campus is approved. Roux has said its campus will bring together learning, research, collaboration, and entrepreneurship to shape cutting-edge opportunities – and our staff, students and families stand to gain from all of that.

I'll also note that The Roux Institute's values dovetail with ours, as Maine's largest and most diverse school district. Because of the \$67 million Alfond Scholars Initiative grant to the Roux Institute, and with the commitment of Northeastern University's Office of Diversity, Equity and Inclusion, The Roux Institute celebrates diversity in all its forms and strives to foster an inclusive, accessible culture represented by people from across Maine and around the world.

In short, The Roux Institute has become a key partner for the Portland Public Schools in helping us achieve our educational goals. We look forward to collaborating even more with them for many years to come and urge you to approve the Roux Campus proposal.

Sincerely,

A handwritten signature in black ink, appearing to read 'X. Botana', with a long horizontal line extending to the right.

Xavier Botana, Portland Public Schools Superintendent

botanx@portlandschools.org

207-874-8111 (office)

207-747-8004 (cell)

Jason Judd <jason@educatemaine.org>

Sep 14, 2022, 8:01:48 AM (yesterday)

to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

As Executive Director of Educate Maine, an education nonprofit located in Portland, I am writing to voice my support for the proposed plans for the Roux Institute campus at the B&M factory in Portland. We have the pleasure of partnering with the Roux Institute on a variety of education and economic development projects. The development of the new Roux Institute campus will allow more Maine people to connect with educational pathways leading to high wage job opportunities to grow our state's economy.

Educate Maine is focused on championing career readiness initiatives to make sure Maine people have the education credentials to thrive in job opportunities in a variety of sectors. As the future of work changes both in Maine and across the globe, the Roux Institute is helping to prepare learners to meet the needs of our economy. As one of the leaders of the MaineSpark coalition focused on increasing education attainment for adults to 60% by 2025, the Roux Institute's new campus will help expand opportunities for students and workers across Maine and help Maine meet its state attainment goal. The expansion of the Roux Campus will allow our organization to better collaborate on meaningful partnerships between K-12 schools, employers, and faculty and staff at the Roux Institute. For example, in the summer of 2022, Educate Maine hosted two weeklong Girls Who Code camps and a Future Innovators camp at the current Roux Institute campus serving dozens of students from across Maine. With the expansion of the campus, more student opportunities like this will be available to connect young people with careers in technology and the life sciences.

The Roux Institute has already greatly impacted Maine students in a short time. Through the \$67 million Alford Scholars Initiative grant to the Roux Institute, the institution has embraced diversity, equity, and inclusion and strives to foster an inclusive, accessible culture represented by people from across Maine and around the world. I have seen first-hand the tremendous impact this investment has had on students, and I encourage you to connect with current students to learn about their experiences.

Our excitement about the Roux Institute's new campus is only increased by their pledge to keep the campus open to all with plenty of open spaces for individuals and groups to gather to focus on education, innovation, and economic development. The waterfront location and inclusion of housing will not only welcome people from across Maine, but it will also attract visitors from across the globe. The campus will help Portland grow as an education and economic development hub. We are thrilled to see the growth of the Roux Institute and believe investment in the new campus will have significant benefits for our state for years to come.

I am more than happy to connect to individual members to talk more about the comments that we have offered in support of the new Roux Institute campus. I can be reached by phone at (207) 458-7824 or by email at Jason@educatemaine.org.

Sincerely,
Jason L. Judd
Executive Director

Andrew Butcher <abutcher@maineconnectivity.org> Sep 21, 2022, 6:34:40 PM (yesterday)
to council@portlandmaine.gov, planningboard@portlandmaine.gov, ksnyder@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members,

This letter is to express our appreciation and support for the Roux Institute's plans to create a Portland-based, world-class, center of excellence for Maine's innovation economy, including education, R&D, and entrepreneurship training and development. We are writing to encourage the City of Portland to move ahead promptly with this essential project given its great potential benefits for Portland and the entire State of Maine. We commend the City of Portland for attracting this new, remarkable asset to Portland.

We are very grateful to the Roux Institute for offering prompt, effective support to the new Maine Connectivity Authority (MCA), established in 2021, as we established our operations and look to leverage world class technical expertise to advance our mission of universal affordable broadband for everyone. With their generous and pragmatic approach, they quickly devised a plan to support MCA to locate its headquarters in the heart of the Roux Institute's Portland facility, working side by side with other innovation economy companies. MCA's new home in this remarkable Roux Institute innovation center has greatly facilitated MCA's work to carry out our essential mission for the State of Maine to assure Maine citizens have universal access to affordable high-speed broadband in Maine.

As part of our work, MCA observes the ferocious competition among the US States and foreign governments to build advanced technology economies. The Roux Institute will provide Portland and the State of Maine an opportunity to remain competitive and excel in that competition. The Roux Institute vision of a dedicated campus, combining education of students (with essential housing) with support for establishing, growing, and financing Maine businesses, is essential to realize this vision. We need to work together to support this innovative growth.

MCA understands that the Roux Institute needs the City of Portland's support for this extraordinary vision to be realized. We strongly encourage the City of Portland Council and the Planning Commission to work with the Roux Institute to establish this vital new center. We understand that the Roux Institute is working closely with neighbors at the former B&M manufacturing site, as well as the City of Portland to assure best design that accommodates public use as well as Roux Institute activities with all appropriate permits.

MCA is an enthusiastic supporter of this vision. We recognize that it does require reconfiguration and change. But our daily work emphasizes the need for careful planning and construction of new technology-based infrastructure to support the New Maine Economy, and the future prosperity of the State.

We hope to be a part of this future Portland center of excellence and please do not hesitate to contact me directly with any questions

Sincerely Yours,
Andrew Butcher

--

Andrew Butcher (he/him/his)
President - Maine Connectivity Authority
(207) 209.3868
maineconnectivity.org
[LinkedIn](#) | [Twitter](#)

To: Planning Board Chair Stanley and Members

From: East Deering Neighborhood for Responsible Development (EDFRD)

Subject: IDEALS Request for Zone Change @ former B&M Site

Date: 9-22-22

1.) MOU, Memorandum of Understand is concerning as to meeting the required standards for titled ownership and unprecedented policy. An MOU is legally defined as a document that describes the broad outlines of an agreement between two or more parties have reached, indicating “intended” line of action. Key word here is “intended” as it is not legally binding nor a substitute for ownership.

- MOU contains language on page 37, General Provision 3.3, regarding Termination which states, “any party shall have the right to terminate this MOU upon written notice to the other party” and “upon termination of the MOU, each party is released from all obligations...”

2.) Traffic issues need more realistic solutions. We would like the Planning Board to inquire about the following:

- What was the methodology used for the Trip Mode Chart and the TDM plan?
- No date-based evidence to provide to more accurately define travel routes and reductions in ITE trips.
- Where is information as to current street capacities, current traffic counts and potential impacts?
- What is correlation of garage parking which appears to be dedicated to hotel and commercial spaces to parking needs of other uses such as housing and Roux students/facilities? Impact of parking needs into the surrounding neighborhood similar to what happened with UNE and USM expansions.
- No analysis of huge potential of cut-through traffic into the neighborhood between Veranda and Ocean Avenue.
- No reference to fire safety issues with only one means of access in and out of the site – and no ladder truck at Engine 8 that services the East Deering neighborhood.

3.) Community Engagement remains elusive with continued paid PR press to gain support for the project by IDEALS.

- We respectfully, once again, ask for the immediate establishment of a Neighborhood Advisory Committee to have an ongoing collaborative community engagement process (not after the fact).
- MMC established such a group early in the process and continues today to meet on a regular basis with the neighborhood. And city council imposed a Community Benefit Agreement to ensure an ongoing process would stay in place.
- Although not an IOZ but rather a master planning process, USM also meets regularly with the neighborhood regarding their expansion.

EastDeering Neighbors <ednfrd@gmail.com>

Sep 23, 2022, 2:02:29 PM (2 days ago)

to planningboard@portlandmaine.gov, Zachary Powell, Planning@portlandmaine.gov, allison brown, Clare Hannan & Steve Von Vogt, Phillip Hoose, Justin Litchfield, James Pratt, Sandra Ste George, Sandy Comstock, Michelle Zichella

To: Planning Board Chair Stanley and Members

From: East Deering Neighborhood for Responsible Development (EDFRD)

Subject: Discussion of Building Heights for IDEALS Development

Date: 9-23-22

The following is the consensus of our group regarding the proposed buildings heights in the IDEALS development:

It has been disappointing as to how little discussion the planning board has had on the proposed building heights of the IDEALS development, as building heights have been identified as an area of major concern for neighborhood residents. Maybe the planning board is unaware of this since the IDEALS IDP barely mentions the neighborhood concerns even though it is a requirement for an IOZ? IDEALS, City of Portland Planning Staff, and the Planning Board have repeatedly said they consider this site similar to Thompson's Point (some East Deering neighbors would disagree in terms of access and proximity to residential neighborhoods). However, the two sites appear to be being held to very different standards in terms of building height.

At the 08.09.22 workshop, there was a discussion about how the height limit at the B5 zone at Thompson's Point is 120'. Thompson's Point is only allowed up to 120' in height as part of an approved master development plan (see footnote 6 from table 7E). Otherwise, the B5 maximum height of 65' applies to the Thompson's Point site. In looking at the current Thompson's Point approved master development plan, almost all of the buildings are currently shown as being well below 120' (refer to table 1 of Thompson's Point Master Development Plan). Compare that to the fact that as proposed, all of the IDEALS development buildings would be well above 120'. Currently the heights shown for the IDEALS development are taller than most buildings located along the "spine" in downtown Portland, where the tallest buildings in Portland are located. The additional height granted to Thompson's Point as part of the approved master development plan allows for some buildings to be up to 55' taller than the B5 allowed height of 65'. Allowing buildings up to 170' in East Deering as requested by IDEALS, would be a staggering 105' taller than allowed in the proposed B5 zone.

These heights proposed at the IDEALS development do not fit into the existing East Deering neighborhood context or follow any of the historical patterns of height that the city has established.

Please see the attached PDF

Steve Von Vogt

On behalf of
East Deering Neighbors for Responsible Development
Windsor Heights
Portland, ME 04103

It has been disappointing as to how little discussion the planning board has had on the proposed building heights of the IDEALS development, as building heights have been identified as an area of major concern for neighborhood residents. Maybe the planning board is unaware of this since the IDEALS IDP barely mentions the neighborhood concerns even though it is a requirement for an IOZ?

IDEALS, City of Portland Planning Staff, and the Planning Board have repeatedly said they consider this site similar to Thompson's Point (some East Deering neighbors would disagree in terms of access and proximity to residential neighborhoods). However, the two sites appear to be being held to very different standards in terms of building height.

At the 08.09.22 workshop, there was a discussion about how the height limit at the B5 zone at Thompson's Point is 120'. Thompson's Point is only allowed up to 120' in height as part of an approved master development plan (see footnote 6 from table 7E). Otherwise, the B5 maximum height of 65' applies to the Thompson's Point site. In looking at the current Thompson's Point approved master development plan, almost all of the buildings are currently shown as being well below 120' (refer to table 1 of Thompson's Point Master Development Plan).

Compare that to the fact that as proposed, all of the IDEALS development buildings would be well above 120'. Currently the heights shown for the IDEALS development are taller than most buildings located along the "spine" in downtown Portland, where the tallest buildings in Portland are located.

The additional height granted to Thompson's Point as part of the approved master development plan allows for some buildings to be up to 55' taller than the B5 allowed height of 65'. Allowing buildings up to 170' in East Deering as requested by IDEALS, would be a staggering 105' taller than allowed in the proposed B5 zone.

These heights proposed at the IDEALS development do not fit into the existing East Deering neighborhood context or follow any of the historical patterns of height that the city has established.

TABLE 7-E (CONT.): MIXED-USE ZONE DIMENSIONAL STANDARDS

	B-1/B-1b	B-2/B-2b/B-2c	B-3/B-3b/B-3c	B-4	B-5/B-5b	B-6	B-7
Structure height (max.)	On-Peninsula: 45 ft., except 50 ft. along Congress Street if commercial first floor and residential above ²	45 ft., except 50 ft. if first floor is in commercial use, 65 ft. in B-2 and B-2c on lots >5 ac. if required side and rear setbacks are increased by 1 foot for each foot of height over 45 ft., or as otherwise governed by the Bayside Height Overlay Map	See Downtown and Bayside Height Overlay Maps	65 ft.	65 ft., except in B-5b along W. Commercial St. south of Danforth St. ⁵ and 120 ft. on Thompson's Point ⁶	65 ft. or as otherwise governed by the B-6 Building Height Overlay Map	See Bayside Height Overlay Map
Lot coverage (max.)			25% of lot area for portions of structures exceeding 125 ft. in height ⁴				
Impervious surface ratio (max.)	90%	Residential: None Other uses in B-2 and B-2c: 80% Other uses in B-2b: 90%		80%			

¹ Uses in structures which existed prior to the date of enactment of the B-1/B-1b zones are exempt.

² The commercial first floor uses shall utilize at least 75 % of the first-floor frontage along Congress Street and shall have an average depth of at least 20 ft.

³ A building will be determined to have an active street frontage upon meeting the following guidelines to the greatest extent practicable: the primary building façade shall be within 10 ft. feet of the front lot line; there shall be no parking on the lot within 35 ft. of the front lot line; no more than 25% of the first floor primary façade shall consist of access to garages, unutilized space, service entrances, storage or mechanicals and the remaining minimum 75% shall have an average depth of a minimum of 20 ft. for residential or commercial uses; and all primary ground floor entries to multi-family buildings must orient to street, not to interior blocks or parking lots.

⁴ Except that no floor area shall be required to be less than 10,500 SF, gross.

⁵ For parcels of land in the B-5b zone located along W. Commercial St. south of Danforth St.: West of the projection of the centerline of the Fletcher St. right-of-way, the maximum building height shall be 45 ft.; and, east of the projection of the centerline of the Fletcher St. right-of-way and west of the projection of the centerline of the Emery St. right-of-way, the maximum building height shall be 55 ft. A projection of the centerline of a street is defined by extending the centerline of the referenced street right-of-way along its most southerly block to the centerline of W. Commercial St. Furthermore, notwithstanding Subsection 7.5.1, no rooftop structure located between the projections of the centerlines of Emery St. and Fletcher St., as described above, shall exceed a height of 62 ft as measured from average grade of the building at its foundation.

⁶ Applies only to parcels subject to an approved master development plan. Thompson's Point is defined as the contiguous parcels of upland occupying the peninsula bounded on the east by Route 295, on the north by the Mountain Division Rail right-of-way, and on the south and west by the Fore River and its associated wetlands. Nearby lands accessed from Hobart and Osgood Streets are not included.

⁷ Does not apply to parking garages and public transportation facilities. Notwithstanding required setbacks, new structures located in the blocks located south of Fore Street and north of Commercial Street and its extension shall build to the key building envelopes shown on the B6 Building Height Overlay & Building Envelopes map. Buildings located in the area east of the Fore Street Connector shall not have a maximum front setback and shall not be required to build to the key building envelope perimeter. Parking structures and the buildings for public transportation facilities may, however, be set back beyond the key building envelopes (toward the interior of blocks), but may not occupy the land between the key building envelope and the street right-of-way.

⁸ For buildings fronting on two or more streets, the minimum building wall on one street may be decreased so long as the frontage is proportionally increased on other streets in so far that the building wall on the secondary street is not reduced to less than 25 ft. Buildings in the area east of the Fore Street Connector shall not be subject to this requirement.

⁹ Does not apply to additions to or relocations of designated historic structures or structures determined to be eligible by the Historic Preservation Board.

square footage and more residential density. The increased emphasis on residential development advances the notion of the site as a transit-oriented development and in many ways allows for a more efficient use of the site overall. The revised development program is as follows:

Table 1: Forefront at Thompson's Point, Proposed Development Program

	Building	Height	Floor area	Footprint	Units	Rooms	Seats	Surface parking	Garage parking	Total parking
1A	Building A: Office, Café, Retail	Existing	34,000	34,000				71		71
1B	Building B1: Multi-Purpose (Live Theater)	Existing	14,000	14,000				436		507
	Boat Launch									
1C	Building C: Educational	1-2 Floors	41,000	33,750				(175)		332
1D	Building B2: Restaurant	1 Floor	3,600	3,600				(19)		313
	Building D: Gym & Medical Office	1 Floor	11,000	11,000						
	Portions of West Side Trail & Outdoor Stage									
1E	Building E1: Hotel & Condominiums	120 ft	70,000	23,350	24	125		144		457
	Building E2: Restaurant	1 Floor	6,000	6,000						
	Remainder of West Side Trail									
1F	Building F1: Parking Garage	5 Floors	161,575	32,315				15	730	1,202
	Building F2: Parking Garage		1,530	1,530						
1G	Building G: Office	9 Floors	180,000	22,350				58		1,260
1H	Building H: Event Center	80 ft	63,000	47,564			4,800	30		1,290
2A	Building I: Cultural Center	1-2 Floors	25,000	18,080						1,290
2B	Building J1: Condominiums	6 Floors	160,000	30,000	160			(78)	78	1,290
	Building J2: Condominiums	TBD	196,500	19,650	160			(48)	48	
2C	Building B3: Ancillary to B1	1 Floor	6,000	6,000						1,290
	TOTAL		973,205	303,189	344	125	4,800	434	856	1,290



September 27, 2022

City of Portland Planning Board
c/o City of Portland Planning Division
389 Congress Street, 4th Floor
Portland, ME 04101

To Members of the City of Portland Planning Board:

I am writing on behalf of MaineHealth, to express our strong support for the proposed plans for the Roux Institute campus at the former B&M factory. The investment the Roux Institute wishes to make in the City of Portland is an exciting development that has the potential to strengthen Portland's economy and positively impact our City in the decades to come. The campus will enable the Roux Institute's growth while revitalizing an important and historic part of the city waterfront.

As a large employer, we are in a challenging time in which we should work collaboratively to promote and develop our state's workforce and attract new residents to Maine. At MaineHealth, we have already benefitted in numerous ways from the Roux Institute's presence in our community. For example, the MaineHealth Innovation Center has developed a strong relationship with the Roux Institute. Through our partnership, MaineHealth and the Roux institute aim to align learning and research initiatives through talent development, healthcare innovation, and use-inspired research in the critical fields of computer and information sciences, artificial intelligence and advanced life sciences. The MaineHealth Innovation Center provides unique services and programs in collaboration with the Roux Institute and other Maine partners to create a diversity of ideas and expertise to get the right people in the right room together at the right time to develop innovative solutions to health care challenges. These relationships foster a culture of creativity, curiosity, and courageousness to help MaineHealth solve unmet care needs to achieve our vision of creating the healthiest communities in America.

The Institutional Overlay Zone, which Maine Medical Center (MMC) pioneered with the City of Portland in 2017, is an approach to the proposed Roux Campus which is a perfect fit. The IOZ establishes a framework which sets expectations for all parties while allowing for flexibility within the regulations. At MMC, this flexibility has been essential. The needs for hospital care at MMC have evolved rapidly since 2017 due to COVID-19 and the rapidly growing need for intensive care services.

IDEALS, the non-profit developer of the Roux Campus, has demonstrated its commitment to transparency and compromise, reducing the size of the campus significantly and working with neighbors to minimize resident impacts. Housing, which is in extremely short-supply in Portland, is an important feature of the Roux Campus. Enabling students, faculty, and employees to live on campus is critical to creating a cohesive community where innovation can thrive.

Thank you for your time and the work you do on behalf of this City.

Sincerely

Jeff Sanders
President

cc: Margaret Angell, COO, Roux Institute

Warren Valdmanis <wvaldmanis@twosigmaimpact.com> Oct 4, 2022, 11:56:55 AM (yesterday)
to council@portlandmaine.gov, planningboard@portlandmaine.gov

Dear Mayor, Councilors, and Planning Board Members

I am writing to voice my support for the proposed plans for the Roux Institute campus at the former B&M factory in Portland. As a neighbor and constituent, I want to let you know that the Roux Institute is one of the most exciting developments in Portland and the campus will enable its essential growth in the years to come.

Through my business relationship with the Roux Institute, I am confident the Roux Campus will bring together learning, research, collaboration, and entrepreneurship to shape cutting edge opportunities for Maine people and shape our economy to compete globally. I am currently engaged at Roux in a partnership with Roux to further data science and technical careers here in Maine. I hope to collaborate with them in talent development and venture creation for many years.

I believe that because of the \$67 million Alford Scholars Initiative grant to the Roux Institute and with the commitment of Northeastern University's Office of Diversity, Equity and Inclusion, the Roux Institute celebrates diversity in all its forms and strives to foster an inclusive, accessible culture represented by people from across Maine and around the world.

The non-profit developer of the Roux Campus has been a model of transparency and compromise, reducing the size of the campus by almost 500,000 square feet with attendant traffic reductions, lowering building heights and changing the design to minimize impacts to neighbors. The campus will be energy efficient, climate resilient, sustainable, and environmentally friendly. Rather than develop a closed campus open only to those learning and working there, the campus will welcome all comers, with waterfront access, public open space, and complementary offerings attractive to neighbors and other Portland residents. As you are aware, housing in Portland can be tough and Roux has addressed this issue by promising that housing will be an important feature of the Roux Campus. Enabling students, faculty, and employees to live on campus is critical to creating a cohesive community where innovation can thrive.

I fully support this endeavor and hope you will too.

Thank you,

Warren Valdmanis

To: Chair Stanley & Members of the Planning Board
From: Charles Tetelman
Date: October 7, 2022
Re: 1772 Westbrook Street Map Amendment
Project ID: ZN-002163-2022
CBL: 239 A003002, 239 A003001
Meeting Date: October 11, 2022

I. INTRODUCTION

Touchstone Enterprises, Inc. have submitted a Zoning Map Amendment application for the properties located at 1772 Westbrook (~52 acres) to rezone from Industrial Low-Impact (I-L) to Industrial Moderate-Impact (I-M). This rezoning application would facilitate the development of a new, five-lot industrial subdivision containing warehouses on Westbrook Street. This application is being referred to the Planning Board for compliance with the City of Portland's Comprehensive Plan *Portland's Plan 2030*.

The Planning and Urban Development Department mailed 46 notices advertising this meeting to property owners within 500 feet of the site. A legal advertisement ran in the October 1, 2022 and October 2, 2022 editions of the *Portland Press Herald*.



Figure 1: 1772 Westbrook Street

Applicant: Touchstone Enterprises, Inc.
Applicant: Woodard & Curran, Inc.
Representatives:

II. PROJECT DATA

Existing Zoning	Industrial Low-Impact (I-L)
Proposed Zoning	Industrial Moderate-Impact (I-M)
Property Size	52 acres
Existing Use	Undeveloped
Proposed Use	Industrial (uses permitted under I-M)

III. EXISTING CONDITIONS AND SURROUNDING AREA

The proposed zoning map amendment is within the parcels located at 1772 Westbrook Street (239-A003002 + 329-A003001). The parcels are currently zoned I-L Industrial Low-Impact and are bounded by

Westbrook Street to the north, Interstate 95 to the east, Stroudwater River to the south, and the City of Westbrook to the west. The site is currently undeveloped and Westbrook Street is classified as an urban major collector. Urban collectors provide both land access and traffic circulation within urban residential neighborhoods and commercial and industrial areas in federally designated urban areas. A portion of the site is zoned Resource Protection (RPZ) along the Stroudwater River and the Shoreland Overlay Zone extends 250 feet from the high-water line, which is subject to Shoreland Zone site development standards. Central Maine Power has transmission lines running along the Portland-Westbrook municipal border that cross into Portland and over Westbrook Street.

The immediate vicinity east of Interstate 95 contains mostly single family residential developments including Stroudwater Preserve along Westbrook Street. On November 28, 2017, the Planning Board voted unanimously 6-0 (Stanley absent) to approve 95 housing lots, two two-family lots, and a planned residential unit development (PRUD) with 25 townhouses – all located within the Stroudwater Preserve subdivision at 1700 Westbrook Street (Project #s 2017-193 and 2017-199). To the west, Westbrook Street connects with Stroudwater Street in the City of Westbrook. This corridor leading into the center of Westbrook includes a variety of businesses, farmland, and Westbrook Middle School and High School. Moreover, Stroudwater Street connects to Westbrook Arterial via Forest Street which provides access to Route I-95. The Portland Jetport is located south of the intersection of Westbrook Street and Congress Street.

The site is not located near any Greater Portland METRO bus routes.

IV. PROPOSED MAP AMENDMENT

The applicant proposes a zoning map amendment to rezone the properties associated with 1772 Westbrook Street from Industrial Low-Impact (I-L) to Industrial Moderate-Impact (I-M). According to the applicant, this zoning map amendment would facilitate the development of warehousing, storage, and distribution facilities that are currently restricted to 10,000 square feet or less in the I-L zone. The applicant's submittal (Plan 1) shows that the existing I-L zone at the 1772 Westbrook Street parcels are proposed to be rezoned into I-M while maintaining the current boundary for the Resource Protection Zone (RPZ – shown in green on Plan 1). The existing Shoreland Overlay Zone would also be retained.

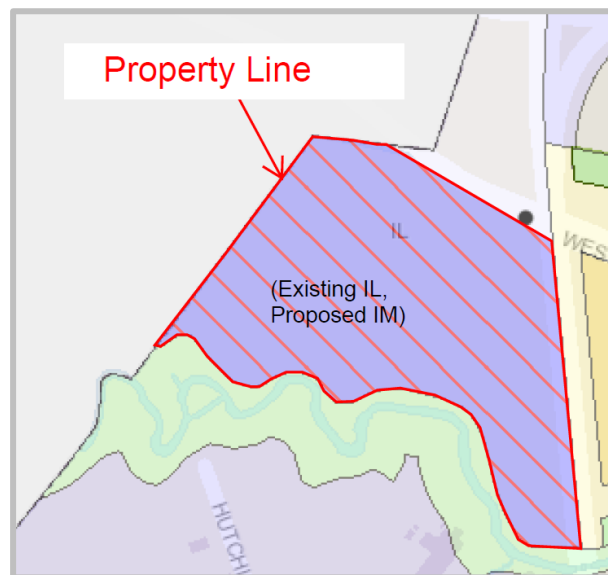


Figure 2: Proposed Zoning Map Amendment (Plan 1)

V. ZONING ANALYSIS

I-L: Industrial Light-Impact

The existing zoning at 1772 Westbrook Street is mostly I-L Industrial Light-Impact. The purpose of the I-L industrial zone is to:

“...provide areas in which low-impact industrial uses, and limited other uses serving employees and residents of the surrounding neighborhood, will be compatible with adjacent residential uses, will provide a

buffer between residential neighborhoods and higher impact industrial zones, or will stand alone as a smaller scale industrial district. The I-L zone is located adjacent to residential neighborhoods, business uses and other industrial uses where the low-intensity nature of the uses, as well as their strict performance standards, will ensure the compatibility of the uses with other adjacent industrial and nonindustrial uses. Performance standards for uses in the I-L zone are designed to maintain compatibility between low impact industrial uses and neighboring nonindustrial and industrial uses.”

The applicants are seeking zoning that permits Warehousing, Storage, and Distribution Facilities uses greater than 10,000 square feet. According to *Table 6-3: Permitted and Conditional Uses In Industrial & Airport Zones*, warehousing, storage, and distribution facilities are allowed in the I-L and I-Lb zones but must be less than 10,000 square feet, cannot have outdoor storage, and self-storage is not permitted.

I-M: Industrial Moderate Impact

The purpose of the I-M Industrial Moderate-Impact zone is to:

“...provide zones in areas of the city in which low- and moderate-impact industries and transportation-related uses will coexist. I-M and I-Ma zones are located on arterials or collectors. The I-Mb zone is similarly located on the peninsula. These locations provide for direct access onto arterials, thereby protecting residential neighborhoods from drive-through traffic. The purpose of the I-M, I-Ma and I-Mb industrial zones is also to provide for larger industrial buildings and for the limited or controlled use of areas outside of structures for storage of materials and machinery. These facilities often require large volumes of imported materials and products which result in large volumes of shipping and receiving. Often uses may be highway-oriented and transportation-related, thus relying on citywide and regional transportation infrastructure. Industrial uses in these moderate-impact industrial zones may require separation from higher-impact uses.”

According to the applicant, the I-M zone would permit the development of approximately five new industrial lots with the ability to construct warehousing, storage, and/or distribution facilities greater than 10,000 square feet at 1772 Westbrook Street.

Staff Analysis:

Table 1 provides a comparison of the permitted uses for zones under consideration. Uses marked with a ‘P’ are permitted uses in the zone. A ‘C’ indicates a conditional use. Uses with an empty cell are **not** permitted in the zone. ** indicates that other restrictions apply.

Table 1 shows the differences between the I-L and I-M zones. Although the uses mostly overlap, key differences include Intermediate Care Facilities (permitted in I-M), Places of Assembly <10,000 sq. ft. (permitted in I-L), General Offices (back-office use only in I-L), Animal-Related Services (permitted in I-L), Marijuana Cultivation Facility 2,000 to 7,000 sq. ft. (permitted in I-M), Telecommunications Towers (permitted in I-M), Tow Lots (permitted in I-M), Warehousing, Storage, and Distribution Facilities (<10,000 sq. ft., no outdoor storage, no self-storage in I-L), major Solar Energy Systems (permitted in I-M), and major Wind Energy Systems (permitted in I-M). As use relates to proposed future use of the site, the applicant emphasizes that Warehousing, Storage, and Distribution Facilities will serve as the primary use of future development.

Table 1 - Permitted Uses	I-L	I-M
Preschool Facilities	P	P
Emergency Shelters	C	C
Intermediate Care Facilities		P**
Places of Assembly (<10, 000 sq. ft.)	P	
General Offices (>5,000 sq. ft.)	P**	P
General Offices (>5,000 sq. ft.)	P**	P
Recreation and Amusement Centers	P	P
Repair Services	P	P
Animal-Related Services	P**	
Construction & Engineering Services	P	P
Dairies	P	P
Food & Seafood Processing, Packing, and Distribution		P
Intermodal Transportation Facilities	P	P
Laboratory And Research Facilities	P	P
Low-Impact Industrial	P	P
Lumber Yards	P	P
Marijuana Cultivation Facility (<2,000 sq. ft. plant canopy)	P	P
Marijuana Cultivation Facility (2,000-7,000 sq. ft. plant canopy)		P
Marijuana Manufacturing Facility	P	P
Marijuana Testing Facility	P	P
Printing and Publishing	P	P
Recycling and Solid Waste Disposal Facilities		P**
Studios for Artists and Craftspeople	P	P
Telecommunications Towers (ground-mounted)		P
Tow Lots		P
Warehousing, Storage, and Distribution Facilities	P** (<10,000 sq. ft.; no outdoor storage permitted; no self-storage)	P
Correctional Pre-Release Facilities		P**
Solar Energy System (minor)	P	P
Solar Energy System (major)		P
Utility Substations	P	P
Wind Energy System (minor)	C	P
Wind Energy System (major)		P

The dimensional standards have minor differences as shown in Table 2. The I-L dimensional standards have static setbacks – 25 ft. or 40ft. when abutting residential zones. The I-M zone setbacks are determined by

building height – 1 ft. for each foot of building height up to 25 ft., except 35 ft. when abutting residential zones. For building height, the maximum structure height in the I-L zones is 45 ft. and 75 ft. in I-M zones. The maximum impervious surface ratio for I-L zones is 65% and for I-M zones 75%. The pavement setbacks do not apply to driveways.

Table 2 – Dimensional Standards	I-L	I-M
Street Frontage (min.)	60 ft.	60 ft.
Front Setback (min.)	25 ft.	1 ft. for each ft. of building height.
Rear setback (min.)	25 ft., except 40 ft. when abutting residential zone.	1 ft. for each ft. of building height up to 25 ft., except 35 ft. when abutting residential zone.
Side Setback (min.)	25 ft., except 40 ft. when abutting residential zone.	1 ft. for each ft. of building height up to 25 ft., except 35 ft. when abutting residential zone.
Structure Height (max.)	45 ft.	75 ft.
Impervious Surface Ratio (max.)	65%	75%
Pavement Setback (min.)	15 ft.	10 ft.
Side Yard (Side Street, min)	15 ft.	20 ft.

Figure 3 below shows the locations of all Industrial Zones in the City of Portland:

Industrial zones are generally located along Interstate 95 on the western side of Portland. Other industrial zones are scattered throughout Portland with a concentration along Presumpscot Street as well as Canco Road and Read Street. Figure 4 below shows the full zoning context for Portland.

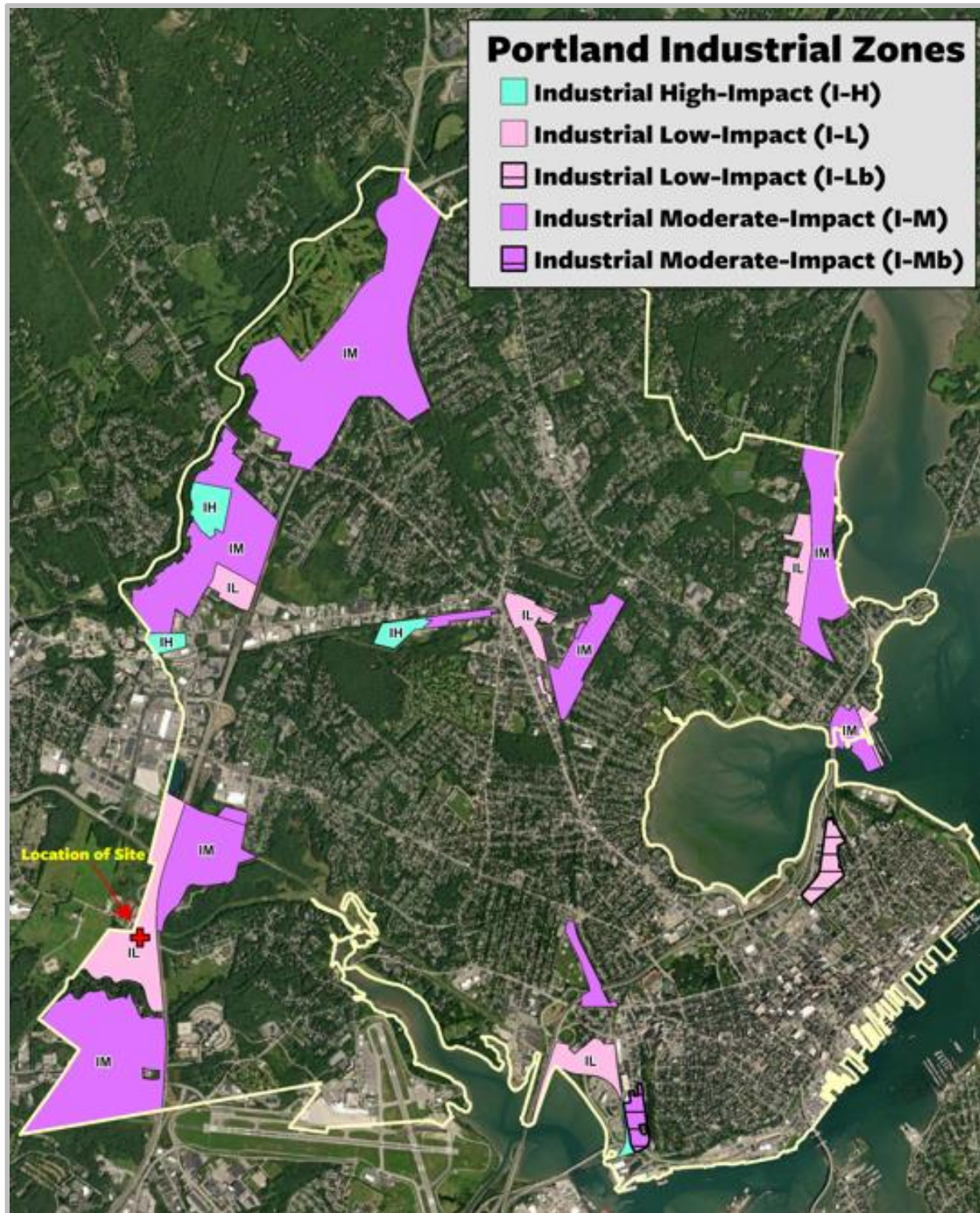


Figure 3: Portland Industrial Zones

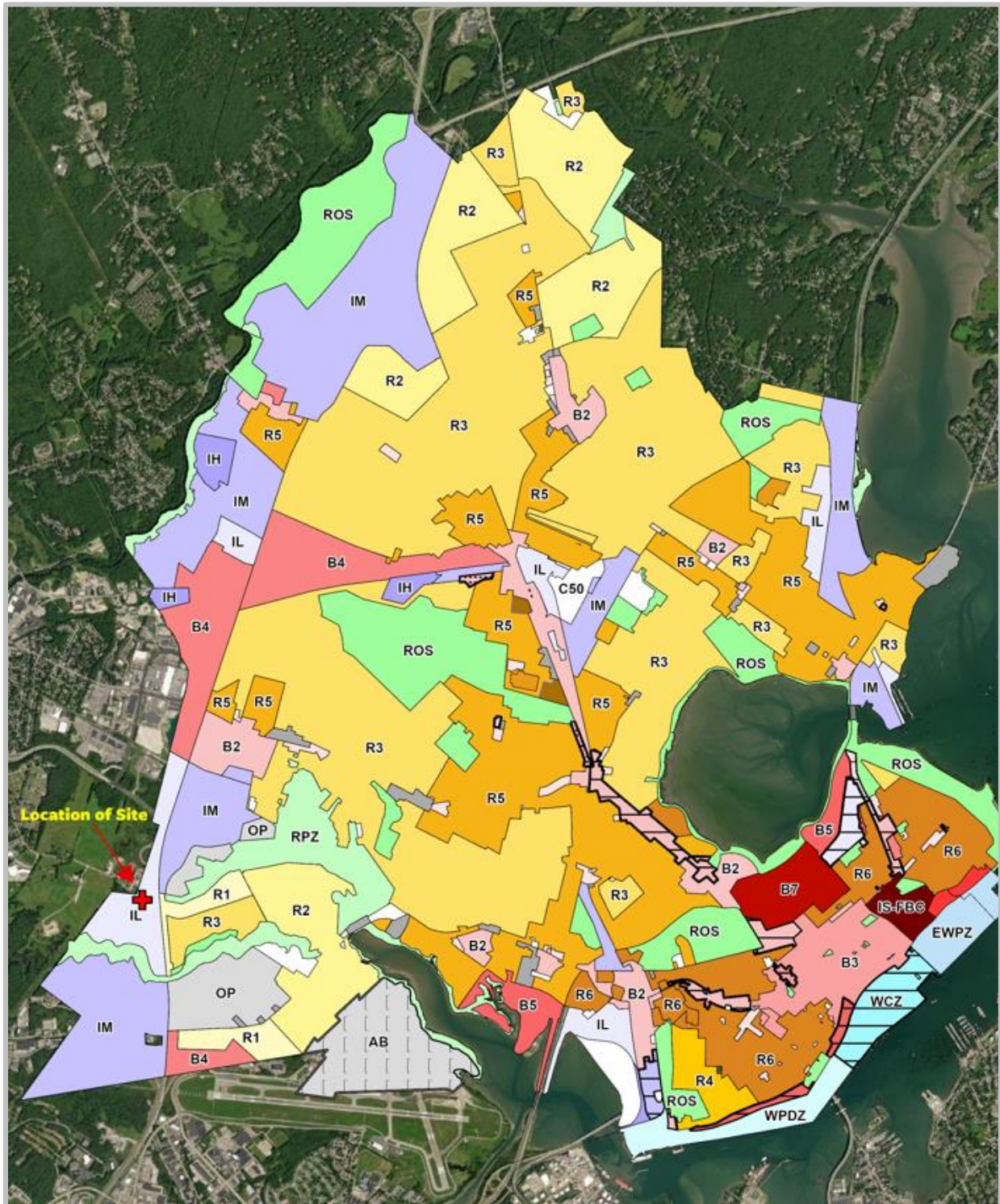


Figure 4: Portland Zoning Map

VI. COMPREHENSIVE PLAN CONSISTENCY

Maine law requires that zoning enactments and amendments, to be valid, must be “pursuant to and consistent with [the municipal] comprehensive plan.” 30-A M.R.S. 4352. Zoning is “consistent” with a comprehensive plan when it is “in basic harmony” with some (though not necessarily all) portion of it. As part of their application, the applicant highlighted a variety of elements from *Portland’s Plan 2030* as it relates to the proposed zoning map amendment (Attachment E). Many elements of this attachment relate more directly to the future use associated with 1772 Westbrook Street.



Figure 5: From *Portland’s Plan 2030*

Vision Statement:

Sustainable:

“Portland has been built and rebuilt to endure; we will balance our historic fabric, sound infrastructure, and the best of new technology and design for future.”

“We will use sound fiscal decision making as an essential element of our city’s future health.”

“Portland will grow in order to sustain our community, infrastructure, and economy.”

Secure:

“We will strive to create a resilient economy through innovation, investment, and commitment to diversity.”

Authentic:

“We will invest in and support our local economy.”

Local Goals:

Environment:

“Identify and protect Portland’s critical natural resources.” Applicant notes the project is near the Resource Protection Zone (RPZ) and the Stroudwater Trail and future development will not infringe upon either resources.

Economy:

“Create economic prosperity by growing Portland’s tax and employment base.” Applicant notes that there is a demand for uses allowed in the I-M zone and not I-L.

“Respect that our unique quality of place is key to our current and future economic success.” According to the applicant, the project will allow growth in an I-M zone acknowledging the proximity to natural resources.

Recreation and Open Spaces:

“Strengthen connections between open spaces.” The applicant mentions the proposed zoning change will strengthen the connection to the Stroudwater River area near the proposed I-M zone.

In conducting its review of the application, Staff identified a number of objectives outlined in Portland’s Plan 2030 that may support the requested re-zoning. Those sections include the Plan’s stated desire to *promote an economic climate that increases job opportunities and overall economic well-being* as well as *create economic prosperity by growing Portland’s tax and employment base* (Portland’s Plan Economy Policy Guide, State and Local Goals), and its emphasis to evaluate identified priority nodes where there is a need to support future growth (Future Land Use Chapter, Priority Nodes and Corridors map). The Plan highlights this portion of Westbrook Street as a node to evaluate. Moreover, the Plans highlights the importance of *supporting the pursuit of policies that create, nurture, and retain local businesses* (Portland’s Plan Economy Policy Guide, Future Strategy #2).

VII. NEIGHBORHOOD MEETING & PUBLIC COMMENT

The applicant will be required to hold a Neighborhood Meeting.

Seven public comments have been submitted to the Planning & Urban Development Department regarding this Zoning Map Amendment (PC 1-8). Comments note that this rezoning would result in an increase in traffic along Westbrook Street. Citing safety concerns, the increase in traffic and larger vehicles could lead to an unsafe pedestrian environment. Public comments also mention the increase in industrial uses would contribute to more noise to the surrounding residential neighborhoods.

VIII. REQUISITE COUNCIL ACTION

Any proposed rezoning, regardless of whether it is recommended by the Planning Board, must be approved by City Council vote in order to take effect.

IX. NEXT STEPS

- Neighborhood Meeting
- Planning Board Workshop Follow Up
- City Staff Review
- Schedule Next Planning Board Meeting

X. ATTACHMENTS

APPLICANT SUBMITTAL

- A. Application Cover & Table of Contents
- B. Application Checklist
- C. Project Description
- D. Right, Title, and Interest
- E. Consistency with Portland’s Plan 2030
- F. Cover Letter

PLANS

- Plan 1. Proposed Map Amendment
- Plan 2. Vicinity Map

PUBLIC COMMENT

- PC 1. Ruth Barton 9/30/22
- PC 2. Roy St. Clair and Elizabeth Germani 9/28/22
- PC 3. Maryann & Eric Leffler 9/30/22
- PC 4. Margaret Dion-Marovitz 9/30/22
- PC 5. Kathleen Gardner 9/30/22
- PC 6. James Alexander 10/1/22
- PC 7. B. Beaulé 10/2/22
- PC 8. Maryann & Eric Leffler 10/7/22



ZONING MAP AMENDMENT

1772 Westbrook
Street, Portland, ME

41 Hutchins Drive
Portland, ME 04102
800.426.4262

woodardcurran.com

0233858.01

**Touchstone
Enterprises, Inc.**
August 2022

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1. APPLICATION CHECKLIST

CITY OF PORTLAND
Planning & Urban Development Department

MAP AMENDMENT SUBMISSION CHECKLIST	
* Please submit each document <u>and</u> drawing as a separate PDF file * Please submit all drawings in a <u>24 x 36</u> sheet size * Please confirm each item by electronically checking the boxes to the left for each document/drawing	
GENERAL APPLICATION DOCUMENTS	
☒	Project Description Cover Letter with detailed project description
☒	Consistency with Comprehensive Plan Analysis of the consistency of the zone change request with the goals, policies and land use plan of Portland's Comprehensive Plan.
☒	Completed Checklist – Map Amendment Application (this document)
☒	Right, Title and Interest Deeds, leases, or purchase and sales agreements
PLANS	
☒	Vicinity Map
☒	Proposed Map Amendment (please use the Portland zoning map as a reference)
☐ N/A	Site Plan (if applicable) Provide a site plan of the property showing existing and proposed improvements, including such features as buildings, parking, driveways, walkways, landscape and property boundaries.

3. PROJECT DESCRIPTION

On behalf of Touchstone Enterprises, Inc. (Applicant), Woodard & Curran (W&C) is submitting this application for a Zoning Map Amendment for the subject property at 1772 Westbrook Street. This application requests that the Zoning Map be amended for this property from Industrial – Low Impact (I-L) to Industrial – Moderate Impact (I-M). A Vicinity Map and Proposed Map Amendment is attached to this Section for your reference. The property is approximately 52 acres.

3.1 Project Justification

The reason for this map change request by the Applicant is to permit Warehousing, Storage, and Distribution Facilities uses greater than 10,000 square feet (SF) – which is the current limitation of the I-L zone. The applicant has identified demand for low- and moderate-impact industries in the greater Portland area that is unmet by the City's existing inventory of commercial real estate larger than 10,000 SF. Approving this map change will permit the development of approximately five new industrial lots with sufficient flexibility to provide a variety of building footprints.

The proposed change would also maintain consistency with the City of Portland's Zoning Map. At present, industrial-zoned land along I-295 south of Brighton Avenue (the City's southwest border) is mostly I-M, except a smaller area of I-L west of the turnpike. Adjacent to the subject parcel, directly across the Stroudwater River, is another area of I-M-zoned land. The subject parcel would continue the trend of I-M industrial zoning in the area and is sufficiently large to mitigate any additional perceived impacts of the I-M zone.

3.2 Industrial Zone Purpose Statements

Chapter 5, Table 5-F of the Land Use Code contains purpose statements for each of the zones, as follows:

I-L Zone: To provide areas in which low-impact industrial uses and limited other uses serving employees and residents of the surrounding neighborhood, will be compatible with adjacent residential uses, will provide a buffer between residential neighborhoods and higher impact industrial zones, or will stand alone as a smaller scale industrial district. The I-L zone is located adjacent to residential neighborhoods, business uses and other industrial uses where the low-intensity nature of the uses, as well as their strict performance standards, will ensure the compatibility of the uses with other adjacent industrial and nonindustrial uses. Performance standards for uses in the I-L zone are designed to maintain compatibility between low impact industrial uses and neighboring nonindustrial and industrial uses.

I-M Zone: To provide zones in areas of the city in which low- and moderate-impact industries and transportation-related uses will coexist. I-M and I-Ma zones are located on arterials or collectors. The I-Mb zone is similarly located on the peninsula. These locations provide for direct access onto arterials, thereby protecting residential neighborhoods from drive-through traffic. The purpose of the I-M, I-Ma and I-Mb industrial zones is also to provide for larger industrial buildings and for the limited or controlled use of areas outside of structures for storage of materials and machinery. These facilities often require large volumes of imported materials and products which result in large volumes of shipping and receiving. Often uses may be highway-oriented and transportation-related, thus relying on citywide and regional transportation infrastructure. Industrial uses in these moderate-impact industrial zones may require separation from higher-impact uses.

The purpose statement for the I-L zone contains several clauses that are not directly applicable to this property. The property is unlikely to, “[serve] employees and residents of the surrounding neighborhood”, due to its adjacency to the Maine Turnpike, which buffers the area from residential zones to the east. It is not, “located adjacent to residential neighborhoods, business uses and other industrial uses where the low-intensity nature of the uses.” While the property is bounded to the south by a Resource Protection Zone, or RPZ, another I-M zone exists to the south of the RPZ that includes established uses greater than 10,000 SF, including the property’s closest neighbor, the EcoMaine Waste-to-Energy Facility. The entire east side of the property is bounded by the Maine Turnpike; and the northern side of the property is fronted by a large CMP transmission line corridor as well as Westbrook Street, which is classified as a “Major Urban Collector” in the City of Portland Technical Manual (Figure I-26). Businesses established on the opposite side of Westbrook Street (currently zoned I-L) include an auto sale business and a larger (20,000 SF plus) industrial use, an arborist/waste management company, and several other professional service offices. The property to the west of 1772 Westbrook Street is zoned “Rural District” within Westbrook and is currently used for agricultural purposes.

The purpose statement for the I-M zone states that it is, “[t]o provide zones in areas of the city in which low- and moderate-impact industries and transportation-related uses will coexist. I-M and I-Ma zones are located on arterials or collectors.” The subject property is located on Westbrook Street, a Major Urban Collector. Although there is no direct access to the Maine Turnpike, it abuts the property to the east. Changing to an I-M zone is compatible with adjacent transportation related uses.

The Applicant feels that the zone change of this property to from I-L to I-M, is appropriate for the responsible development of this property and is compatible within the surrounding context. As noted above, the property is sufficiently large to mitigate any additional perceived impacts of the I-M zone.

A Comparative Trip Generation Assessment for the two zones is attached. Preliminary site development density calculations show that under the existing (I-L) zone, a theoretical maximum of sixteen 10,000 SF buildings could be developed on the “buildable area” of the parcel, for a combined 160,000 SF. The proposed (I-M) zone would theoretically allow for a maximum of five 35,000 SF buildings, with a combined 175,000 SF or a very modest “net” difference of 15,000 SF. The assessment concludes the comparative trip generation analysis prepared property based upon both the existing (I-L) zoning standards and the requested (I-M) zoning regulations, clearly demonstrates the overall peak hour trip generation differential between both development scenarios is negligible.

3.3 Comparison of Permitted Uses and Dimensional Standards

A select comparison of Permitted and Conditional Uses for the I-L and I-M zone is below for comparison:

Table 1. Comparison of Select Uses in the I-L and I-M Zones

Use	I-L Zone (Current)	I-M Zone (Proposed)
General Offices	Back-office use only	Permitted
Repair Services	Permitted	Permitted
Construction and Engineering Services	Permitted	Permitted

Use	I-L Zone (Current)	I-M Zone (Proposed)
Laboratory and Research Facilities	Permitted	Permitted
Low-Impact Industrial	Permitted	Permitted
Printing and Publishing	Permitted	Permitted
Warehousing, Storage and Distribution Facilities	<10,000 SF area No outdoor storage permitted; no self-storage	Permitted

A comparison of the space and bulk dimensions for each zone is included in Table 2 below. In general, the two zones are fairly similar, with the main difference being in the allowable structure height. The I-M zone permits building heights up to 75 feet, while the I-L zone limits building heights to 45 feet. The vision of the Applicant is generally for buildings in the 35-40 ft. range, which is below the maximum allowed in the I-L zone. While building heights and other space and bulk dimensions would be addressed with future site plan approvals, the proposed rezoning is driven entirely by the maximum square footage limit on warehousing, storage, and distribution facilities

Table 2. Space and Bulk Dimensions for I-L and I-M Zones

Standard	I-L Zone (Current)	I-M Zone (Proposed)
Lot Area (min)	Not Applicable	Not Applicable
Street Frontage (min)	60 ft	60 ft
Front Setback (min)	25 ft	1 ft for each ft of building height
Rear Setback (min)	25 ft (except 40 ft when abutting residential zone)	1ft for each ft of building height up to 25ft (except 35ft when abutting residential zones)
Side Setback	25 ft (except 40 ft when abutting residential zone)	1ft for each ft of building height up to 25ft (except 35ft when abutting residential zones)
Structure Height	45 ft	75 ft
Lot coverage (max)	Not Applicable	Not Applicable
Impervious Surface Ratio (max)	65%	75%
Pavement Setback (min)	15 ft (Does not apply to entrance drive)	10 ft (Does not apply to entrance drive)

3.4 Attachments

- Agent Authorization Letter
- Vicinity Map
- Proposed Map Amendment
- Comparative Industrial Zoning Trip Generation Assessment

Chris Paszyc
Touchstone Enterprises Inc.
8 E Grand Ave
Scarborough, ME 04074

July 19, 2022

Re: 1772 Westbrook Street, Portland, ME – Agent Authorization

To Whom it May Concern:

Woodard & Curran, Inc. will be acting as our agent for all local, state, and federal permitting associated with the Touchstone Enterprises project located at 1772 Westbrook Street in Portland, Maine.

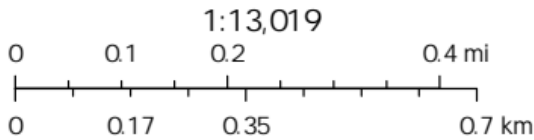
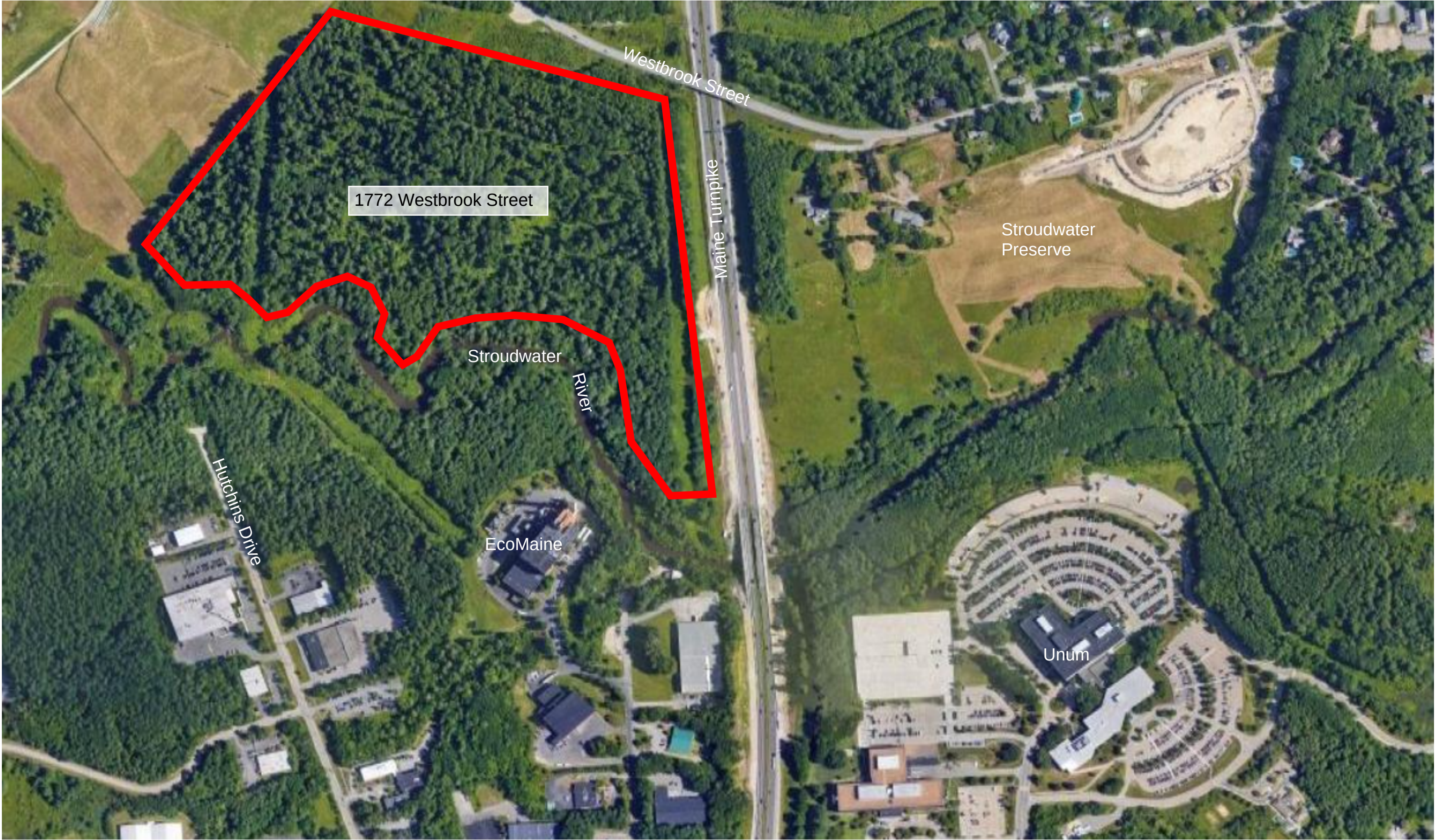
Please feel free to contact me if you have any questions at (207) - 939-4147.

Sincerely,

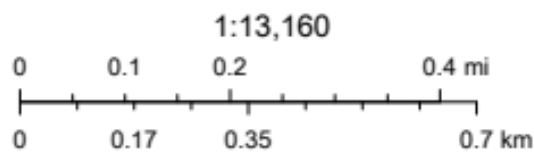
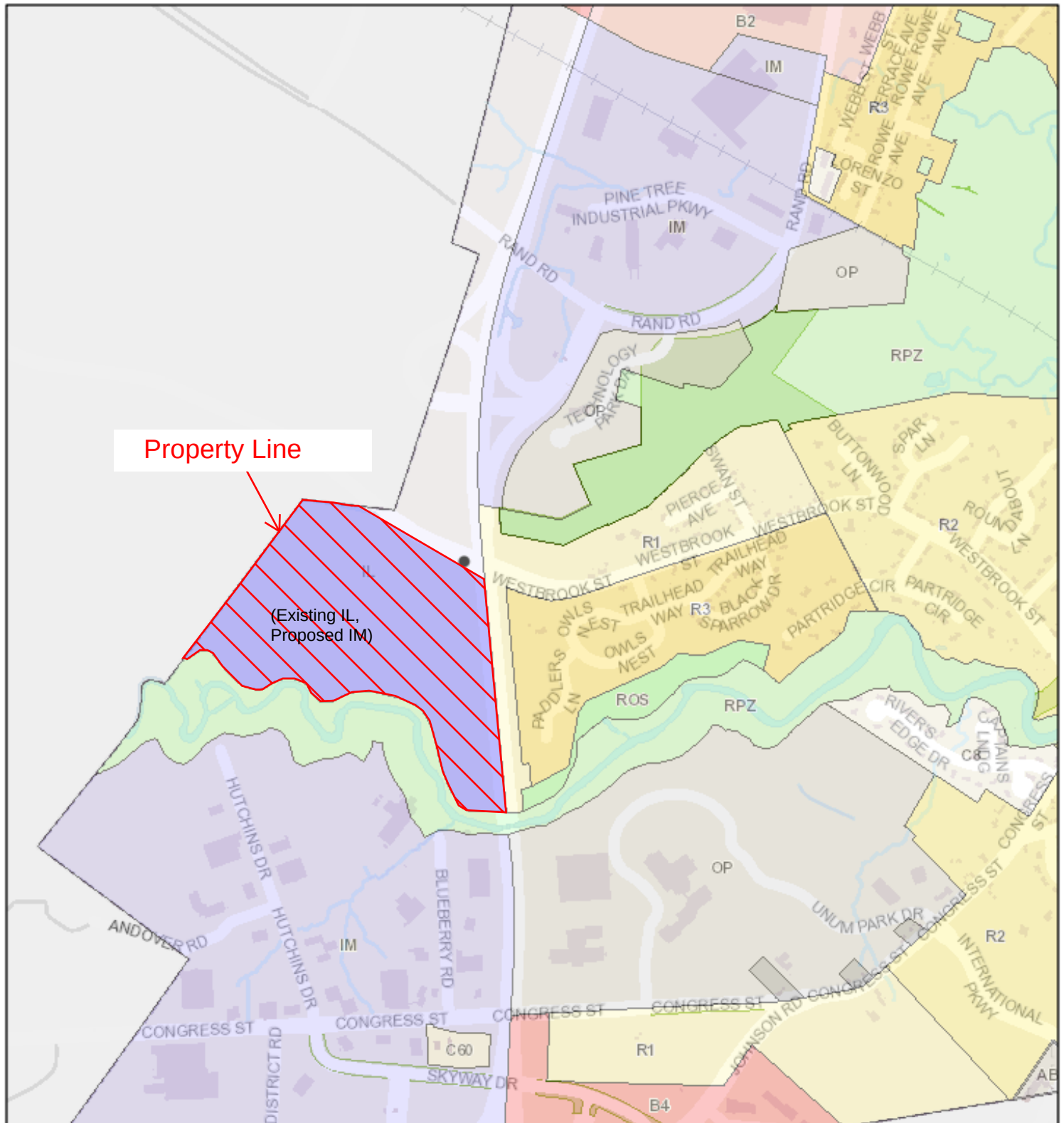
A handwritten signature in black ink, appearing to read 'CAP' followed by a stylized flourish.

Chris Paszyc
President
Touchstone Enterprises, Inc.

Vicinity Map



Proposed Zoning



Comparative Industrial Zoning Trip Generation Assessment

Date: August 17, 2022

To: **Darrin B. Stairs, PE,**
Woodard & Curran

From: Jacob Sirois
Engineer 1
Barton & Loguidice, LLC. William J. Bray, P.E.
Senior Transportation Engineer
Barton & Loguidice, LLC.

Re: **Comparative Industrial Zoning Trip Generation Assessment**
1772 Westbrook Street
Zone Change Application
Portland, Maine

Introduction

Touchstone Enterprises, Inc. is proposing a zoning map amendment for the subject property at 1772 Westbrook Street in the City of Portland to allow for larger warehousing, storage, and/or distribution buildings. The current zoning of the site is Industrial – Low Impact (I-L) which allows for a maximum building size of 10,000 square-feet. The Applicant is requesting a zoning amendment change for the property to the Moderate Impact (I-M) zone, which effectively allows for a larger building footprint than the existing (I-L) zone requirements.

Preliminary site development density calculations show that under the existing (I-L) zone, a theoretical maximum of sixteen 10,000 sf buildings could be developed on the “*buildable area*” of the parcel, for a combined 160,000 sf. The proposed (I-M) zone would theoretically allow for a maximum of five 35,000 sf buildings, with a combined 175,000 sf or a very modest “net” difference of 15,000 sf.

Barton and Loguidice, LLC presents maximum site trip generation comparisons for both the existing (I-L) zone and requested (I-M) zone for both build-out conditions to determine the net difference in traffic generation of both building zones. The trip analyses compare peak hour trip generation for general warehouse, storage and distribution facilities allowed uses in both the (I-L) and (I-M) zones. Additionally, trip generation forecasts are provided for development uses allowed in the (I-M) zone but not the (I-L) zone.

Proposed Site Trip Generation Comparison

Daily and peak hour trip generation was determined for the calculated maximum development for both the (I-L) and (I-M) zones based upon trip tables presented in the eleventh edition of the Institute of Transportation Engineers (ITE) “**TRIP GENERATION MANUAL**”. The ITE publication provides numerous land use categories and the average volume of trips generated by each category.

Trip generation estimates for both preliminary development plans for the 1772 Westbrook Street property are prepared for: LUC #150 – Warehousing, described as: primarily devoted to the storage of materials, but it may also include office and maintenance areas; LUC #140 – Manufacturing, which is

described as: a facility where the primary activity is the conversion of raw material or parts into a finished product; LUC #130 – Industrial Park, described as: containing several individual industrial or related facilities. It's characterized by a mix of manufacturing, service, and warehouse facilities with a wide variation and highly diversified facilities; and LUC #110 – General Light Industrial, described in the ITE manual as a free-standing facility devoted to a single use with an emphasis on activities other than manufacturing, with minimal office space. Each of the identified land-uses are allowed uses in both the (I-L) and (I-M) zones.

Industrial – Low Impact Maximum Trip Generation (I-L) Zone: In this study, we perform trip calculations for each of the proposed land use codes assuming all buildings will be dedicated to that respective land use, given that the final development uses and total square foot areas are still undetermined. The following tables, Table 1.1 thru 1.4 present the trip generation calculations for the proposed site industrial uses allowed in the existing (I-L) zone.

Table 1.1 ITE Trip Generation Calculations						
Land Use	Warehousing - LUC 150					
Time Period	Square Footage (KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	160	1.71	274	50% / 50%	137	137
AM Weekday Peak Hour (Street)	160	0.17	27	77% / 23%	21	6
PM Weekday Peak Hour (Street)	160	0.18	29	28% / 72%	8	21
AM Weekday Peak Hour (Generator)	160	0.21	34	66% / 34%	22	12
PM Weekday Peak Hour (Generator)	160	0.23	37	24% / 76%	9	28

Table 1.2 ITE Trip Generation Calculations						
Land Use	Manufacturing - LUC 140					
Time Period	Square Footage (KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	160	4.75	760	50% / 50%	380	380
AM Weekday Peak Hour (Street)	160	0.68	109	76% / 24%	83	26
PM Weekday Peak Hour (Street)	160	0.74	118	31% / 69%	37	81
AM Weekday Peak Hour (Generator)	160	0.80	128	73% / 27%	93	35
PM Weekday Peak Hour (Generator)	160	0.80	128	42% / 58%	54	74

Table 1.3 ITE Trip Generation Calculations						
Land Use	Industrial Park - LUC 130					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	160	3.37	539	50% / 50%	270	269
AM Weekday Peak Hour (Street)	160	0.34	54	81% / 19%	44	10
PM Weekday Peak Hour (Street)	160	0.34	54	22% / 78%	12	42
AM Weekday Peak Hour (Generator)	160	0.41	66	87% / 13%	57	9
PM Weekday Peak Hour (Generator)	160	0.40	64	21% / 79%	13	51

Table 1.4 ITE Trip Generation Calculations						
Land Use	General Light Industrial - LUC 110					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	160	4.87	779	50% / 50%	390	389
AM Weekday Peak Hour (Street)	160	0.74	118	88% / 12%	104	14
PM Weekday Peak Hour (Street)	160	0.65	104	14% / 86%	15	89
AM Weekday Peak Hour (Generator)	160	0.91	146	87% / 13%	127	19
PM Weekday Peak Hour (Generator)	160	0.80	128	18% / 82%	23	105

The preliminary site density calculations developed for the 1772 Westbrook Street property based upon the existing (I-L) zone yielded a total of sixteen 10,000 sf buildings for a total 160,000 sf of building area.

The above trip generation calculations show a maximum total of 146 vehicle trips are generated in the morning peak hour and a slightly lower volume of 128 trips in the evening peak hour.

Industrial – Moderate Impact Maximum Trip Generation (I-M) Zone: Similar trip forecasts are presented for the requested (I-M) zone for the same industrial land-uses. The requested (I-M) zone allows the same industrial development uses presented for the existing (I-L) zone; albeit, with a larger building footprint. The preliminary density calculations developed for the (I-M) zone suggests a total of five 35,000 square foot buildings could be built for a combined 175,000 sf of development. In addition to allowing for larger warehousing, storage and distribution buildings; the proposed (I-M) zone allows for land uses that aren't allowed under the existing (I-L) zone. These land uses include:

- Intermediate care facilities (Not applicable. Standards allow only in existing structures.)
- Food and seafood, packing and distribution
- Marijuana cultivation facility (2,000-7,000 sf plant canopy)
- Recycling and solid waste disposal facilities (permitted within an enclosed structure)
- Telecommunication towers (ground-mounted)
- Tow lots
- Self-storage facility
- Correctional pre-release facilities

Comparative Industrial Zoning Trip Generation Assessment – 1772 Westbrook Street

- Solar energy system (major)
- Wind energy system (major)

In the preceding list, there are facilities that won't be large trip generators, as well as facilities which trip generation data is not provided for in the ITE manual. The uses that wouldn't be expected to generate a high number of trips include: a Telecommunications Tower, Solar Energy System (major) and Wind Energy System (major). The only trips expected to be produced by these facilities are maintenance type trips which are assumed to be minimal. The land uses that are excluded from the ITE publication include: Food and Seafood, Packing and Distribution; Recycling and Solid Waste Disposal Facility; Tow Lots, and Correctional Pre-Release facilities.

The ITE publication does, however, provide trip rates for a Marijuana Cultivation facility, based off of one study performed at an approximately 40,000 sf facility, and a Self-Storage facility.

The following tables present the ITE trip generation calculations under the proposed zoning conditions which would include five 35,000 sf facilities for a total buildout of 175,000 sf.

The following tables, Table 1.5 thru 1.10 present trip generation estimates for the maximum and allowable development under the proposed (I-M) zoning that can be estimated with the ITE publication.

Table 1.5 ITE Trip Generation Calculations						
Land Use	Warehousing - LUC 150					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	175	1.71	299	50% / 50%	150	149
AM Weekday Peak Hour (Street)	175	0.17	30	77% / 23%	23	7
PM Weekday Peak Hour (Street)	175	0.18	32	28% / 72%	9	23
AM Weekday Peak Hour (Generator)	175	0.21	37	66% / 34%	24	13
PM Weekday Peak Hour (Generator)	175	0.23	40	24% / 76%	10	30

Table 1.6 ITE Trip Generation Calculations						
Land Use	Manufacturing - LUC 140					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	175	4.75	831	50% / 50%	416	415
AM Weekday Peak Hour (Street)	175	0.68	119	76% / 24%	90	29
PM Weekday Peak Hour (Street)	175	0.74	130	31% / 69%	40	90
AM Weekday Peak Hour (Generator)	175	0.80	140	73% / 27%	102	38
PM Weekday Peak Hour (Generator)	175	0.80	140	42% / 58%	59	81

Table 1.7 ITE Trip Generation Calculations						
Land Use	Industrial Park - LUC 130					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	175	3.37	590	50% / 50%	295	295
AM Weekday Peak Hour (Street)	175	0.34	60	81% / 19%	49	11
PM Weekday Peak Hour (Street)	175	0.34	60	22% / 78%	13	47
AM Weekday Peak Hour (Generator)	175	0.41	72	87% / 13%	63	9
PM Weekday Peak Hour (Generator)	175	0.40	70	21% / 79%	15	55

Table 1.8 ITE Trip Generation Calculations						
Land Use	General Light Industrial - LUC 110					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	175	4.87	852	50% / 50%	426	426
AM Weekday Peak Hour (Street)	175	0.74	130	88% / 12%	114	16
PM Weekday Peak Hour (Street)	175	0.65	114	14% / 86%	16	98
AM Weekday Peak Hour (Generator)	175	0.91	159	87% / 13%	138	21
PM Weekday Peak Hour (Generator)	175	0.80	140	18% / 82%	25	115

Table 1.9 ITE Trip Generation Calculations						
Land Use	Marijuana Cultivation and Processing Facility - LUC 190					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday*						
AM Weekday Peak Hour (Street)	175	0.69	121	93% / 7%	113	8
PM Weekday Peak Hour (Street)	175	0.64	112	28% / 72%	31	81
AM Weekday Peak Hour (Generator)*						
PM Weekday Peak Hour (Generator)*						

*Weekday and Generator rates are not provided by ITE

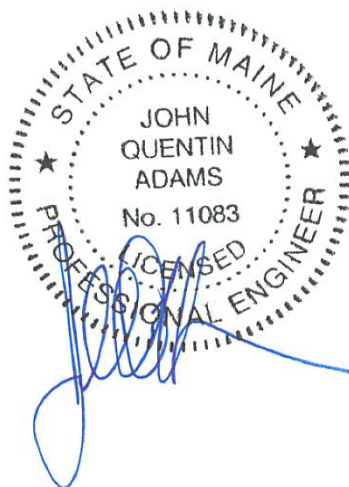
Warning - Small Sample Size (one study was conducted at a ~40ksf facility)

Table 1.1.10 ITE Trip Generation Calculations						
Land Use	Mini-Warehouse - LUC 151					
Time Period	Square Footage (1KSF)	Trip Generation Rate Trips/1 KSF	Trips Generated	Distribution Entering / Exiting	Enter	Exit
Weekday	175	1.45	254	50% / 50%	127	127
AM Weekday Peak Hour (Street)	175	0.09	16	59% / 41%	9	7
PM Weekday Peak Hour (Street)	175	0.15	26	47% / 53%	12	14
AM Weekday Peak Hour (Generator)	175	0.18	32	51% / 49%	16	16
PM Weekday Peak Hour (Generator)	175	0.18	32	51% / 49%	16	16

As presented in the preceding tables, the maximum trip generation occurring within the proposed development at 1772 Westbrook Street, based upon the requested (I-M) zoning regulations for those land-uses measured, assumes full development of the property under the (I-M) zoning requirements for general light industry. The provided trip estimates for LUC #110 General Light Industry in Table 1-8 shows a total of 159 AM trips and 140 PM trips are generated. The peak hour trip generation results highlighted for the other studied potential land-uses in the (I-M) zone are somewhat lower, as follows: 1) marijuana cultivation and processing facility 121 trips AM peak hour and 112 trips in the PM peak hour; 2) self-storage facility, 32 trips in both peak hour time periods.

Summary

Barton and Loguidice, LLC concludes the comparative trip generation analysis prepared for the 1772 Westbrook Street property based upon both the existing (I-L) zoning standards and the requested (I-M) zoning regulations, clearly demonstrates the overall peak hour trip generation differential between both development scenarios is negligible. The only allowed land-use in the requested (I-M) zone that may potentially result in a higher number of peak hour trip generation would be a food and seafood processing and distribution facility which likely would require a higher level of employment.



John Q. Adams, PE, PTOE, Date: 07/14/22

APPENDIX

4. RIGHT, TITLE AND INTEREST

The proposed project is located on property owned by the Applicant and identified on the City of Portland Tax Assessor Maps as 239-A-3, Map 242-A-1, Map 243-A-1, Map 245-A-1, and Map 246-A-1. Attached is a copy of the deed associated with this property.

The Applicant has been assigned an Option to Purchase the subject property. A redacted version of the Option and the Assignment to Chris Paszyc, owner of Touchstone Enterprises, is attached.

4.1 Attachments

- Deed, Book 4962, Page 219, Cumberland County Registry of Deeds
- Option to Purchase Real Estate (redacted)
- Assignment of Option to Purchase Real Estate (redacted)
- Amendment 4 to Option to Purchase Real Estate (redacted)

Know All Men By These Presents.

That I, SIMON A. SNYDER, of Winter Park, County of Orange,
and State of Florida

in consideration of One Dollar (\$1.00) and other valuable considerations
and love and affection

paid by SIMON A. SNYDER and JASON A. SNYDER, both of Winter Park,
County of Orange, State of Florida

the receipt whereof I do hereby acknowledge, do hereby

give, grant, bargain, sell and convey unto the said SIMON A. SNYDER and JASON A.
SNYDER, as joint tenants and not as tenants in common,

their heirs and assigns forever,

a certain lot or parcel of land situated in the City of Portland and the City
of Westbrook, County of Cumberland, State of Maine, bounded and des-
cribed as follows:

Beginning on the southwesterly side line of Westbrook Street
at its intersection with the line between the cities of Westbrook and
Portland; thence southeasterly by the southwest side line of Westbrook
Street to the northeast corner of land conveyed to Maine Turnpike
Authority by Susie E. Mitchell, September 13, 1954, recorded in the
Cumberland County Registry of Deeds, Book 2195, Page 423 and the
westerly side line of land formerly of Maurice S. Tomlinson, et al,
now or formerly of Helen W. Soule; thence southerly by said Soule
land to the Stroudwater River; thence westerly along the Stroudwater
River, land now or formerly of Frank P. Cummings heirs and land
conveyed by Susie E. Mitchell to Portland Water District, March 24,
1958, recorded in Cumberland County Registry of Deeds, Book 2401, Page
139 to land formerly of Elmer W. Randall, now or formerly of Llewellyn
A. Randall; thence northeasterly along said Randall line to the south-
westerly side line of Stroudwater Street in Westbrook; thence south-
easterly by Stroudwater Street to the line between the cities of
Westbrook and Portland and point of beginning.

Excepting a parcel of land conveyed by George B. Leavitt to
Portland Electric Co., July 15, 1907, recorded in Cumberland County
Registry of Deeds, Book 808, Page 500; parcel conveyed by George B.
Leavitt to Cumberland County Power and Light Co., March 22, 1921,
recorded in Cumberland County Registry of Deeds, Book 1071, Page 374;
parcel of land taken by Maine Turnpike Authority September 7, 1954,
recorded Cumberland County Registry of Deeds Book 2192, Page 219;
parcel conveyed by Susie E. Mitchell to Maine Turnpike Authority,
September 13, 1954 recorded in Cumberland County Registry of Deeds,
Book 2195, Page 423 and a parcel conveyed by Susie E. Mitchell to
Central Maine Power Company, March 12, 1955, recorded in Cumberland
County Registry of Deeds Book 2221, Page 122; provided, however, all
rights, easements and interests in land reserved by the Grantor(s)
in said conveyance are included in this deed.

Subject to rights and easements conveyed by Ida M. Leavitt
to Portland Water District, November 28, 1938 recorded in Book 1564,
Page 137; and by Susie M. Mitchell to Socony-Vacuum Oil Company,
Incorporated, August 25, 1947 and January 28, 1948, recorded in said
Registry in Book 1891, Pages 86 and 188, to Central Maine Power
Company, May 7, 1951 and June 24, 1954 recorded in said Registry in
Book 2046, Page 69 and Book 2186, Page 112; to Portland Pipe Line
Corporation, February 2, 1965, recorded in said Registry in Book 2879,
Page 208 and to Northern Utilities, Inc., January 23, 1968 and Febru-
ary 27, 1968, recorded in said Registry in Book 3028, Page 253 and
Book 3032, Page 249.

Title of the grantors is derived as sole lineal descendants of Ina Mitchell Currie who died October 8, 1975, Cumberland County Probate Docket #74970 who was devisee under the Will of Susie Eva Mitchell who died April 5, 1977, Cumberland County Probate Docket #75937; said Ina Mitchell Currie was the natural sister of said Susie Eva Mitchell. Meaning and intending to convey all real estate, rights and interests in land owned by Grantors situated southerly of Westbrook Street in Portland and Stroudwater Street in Westbrook, and northeasterly, northerly and northwesterly of the Stoudwater River; and to the extent all such real estate, rights and interests in land are not included within the above described premises, such real estate rights and interests in land owned by Grantors are hereby included in this deed.

Being the same premises conveyed to the Grantor herein by Frederick W. Currie, Robert L. Currie, Bruce A. Currie, and Jean F. Currie by Quit-Claim Deed deed December 29, 1978 and recorded in the Cumberland County Registry of Deeds in Book 4362 Page 197.

To Have and to Hold the aforegranted and bargained premises with
all the privileges and appurtenances thereof to the said
SIMON A. SNYDER and JASON A. SNYDER

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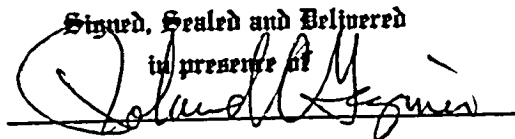
their heirs and assigns, to them and their use and behoof forever.

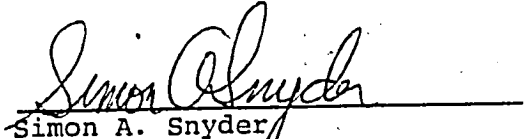
And I do COVENANT with the said Grantee s, their heirs
and assigns, that I am lawfully seized in fee of the premises that they
are free of all encumbrances:

that I have good right to sell and convey the same to the said Grantee s to
hold as aforesaid; and that I and MY heirs shall and will WARRANT
and DEFEND the same to the said Grantee s, their heirs and assigns forever,
against the lawful claims and demands of all persons.

In Witness Whereof, I, SIMON A. SNYDER, being unmarried,

~~joining in this deed as Grantee and conveying the same to the said Grantee s~~
~~by the power and authority in the premises, have hereunto set~~
my hand and seal this 20th
day of May in the year of our Lord one thousand nine
hundred and eighty-two.

Signed, Sealed and Delivered
in presence of


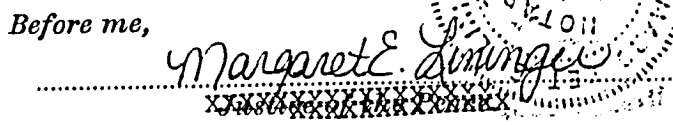

Simon A. Snyder

Florida
State of ~~Maine~~ } ss.
ORANGE

May 20 1982

Personally appeared the above named
SIMON A. SNYDER
and acknowledged the above
instrument to be HIS free act and deed.

Notary Public, State of Florida at Large
My Commission Expires Feb. 18, 1983
Bonded by American Fire & Casualty Company

Before me,

Notary Public

STATE OF MAINE
CUMBERLAND, ss.
Received at 3 H 05 M P M on MAY 25 1982 and recorded in
Book 4962 Page 219
Attest
Edward J. Benstein Register



OPTION TO PURCHASE REAL ESTATE

THIS AGREEMENT is made as of March 20, 2021, by and between Simon A. Snyder ("Owner") and David Gendron and/or assigns ("Optionee"), WHO AGREE AS FOLLOWS:

1. Option Property: Owner is the owner of certain premises situated at 1772 Westbrook Street, Portland, ME and 695 Stroudwater Street, Westbrook, consisting of approximately 61± acres of land, together with all buildings and improvements thereon and all rights and easements appurtenant thereto, which parcel is further identified in the City of Portland tax assessor's records on Map 239-A-3, Map 242-A-1, Map 243-A-1, Map 245-A-1, Map 246-A-1; and the City of Westbrook tax assessor's records on Map 9 Lot 13; and is outlined in heavy line on the attached **Exhibit A** (the "Property").
2. Option: In consideration of the "Option Consideration" herewith paid to Owner by Optionee as identified below, Owner hereby grants to Optionee the exclusive, irrevocable right to purchase the Property on the terms set forth in this Agreement (the "Option"). If Optionee elects to purchase the Property, such election shall be made by written notice given to Owner at any time on or before the end of the "Option Period" identified below. Optionee shall have the right, on each occasion by written notice, to extend the Option Period for up to eight (8) consecutive "Extension Periods" as described below, in exchange for the corresponding "Extension Consideration" payments set forth below. Each such extension notice and payment shall be made on or before the end of the Option Period (as then extended). The Option and Extension Periods (hereinafter collectively the "Option Period") and their corresponding Option and Extension Consideration payments (hereinafter collectively the "Option Consideration") are as follows:

Option Period

From execution through October 30, 2021

Option Consideration

██████████ paid herewith

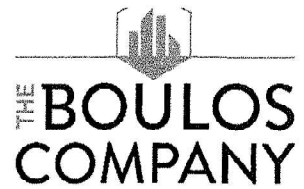
Extension Periods

Eight (8) Periods of Thirty (30) days each

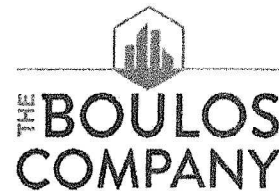
Extension Consideration

██████████ for each Option Period. Funds shall be non-refundable but applicable to the sale price.

3. Purchase Price: If this Option is exercised, the Purchase Price for the Property shall be ██████████. The Option Consideration shall be credited against the Purchase Price payable at the closing. If Optionee does not exercise this Option, or if Optionee fails to close, Owner shall retain all Option Consideration then paid as full consideration and as its sole remedy. Optionee shall be entitled to a refund of the Option Consideration only if Owner's title to the Property proves defective, as provided below.



4. Testing, Inspection, Approvals: During the Option Period, Optionee and its employees, contractors and agents shall have the right at their expense to enter upon the Property, after reasonable notice to Owner, for the purposes of conducting inspections, survey work, soils tests, and/or other testing. Owner agrees to cooperate and join with Optionee or its designees in obtaining any rezoning, permits and approvals or the like as Optionee desires, at Optionee's expense. Upon request Optionee agrees to furnish to Owner a copy of any soils testing reports it obtains.
5. Closing: If Optionee elects to purchase the Property, Owner shall convey the Property to Optionee (or its designee) by good and sufficient general Quit Claim Deed with Covenant conveying marketable title, free and clear of all encumbrances, defects, liens, tenants and occupants ("Title Defects"), and utilizing the description obtained by Optionee's survey if requested. The closing shall take place within thirty (30) days after written notice from Optionee that it has exercised the Option at the date, time and place specified in the notice. Optionee shall have the right to apply the Purchase Price at the Closing to the removal of any Title Defects. The parties agree to execute and deliver such documents as are reasonably necessary and customary to complete the closing. Real estate taxes and utilities shall be prorated as of the closing date. Real estate transfer taxes shall be split 50/50 between Owner and Optionee as customary in Maine. Income taxes and gains taxes shall be paid by Owner.
6. Broker: The parties agree that no broker, other than The Boulos Company has been involved in this transaction. The Seller shall be responsible for all fees due to The Boulos Company through a separate brokerage agreement.
7. Ownership/Risk of Loss: Owner hereby warrants that Owner is the owner of the Property in fee simple, that Owner has the full right and authority to grant the Option described in this Agreement and that there is no other option, contract or other right to purchase the Property in existence. The risk of loss to the Property or taking by eminent domain during the Option Period shall be on Owner.
8. Owner's Warranties: To the best of Owner's knowledge and belief there are no and have never been "Hazardous Materials" on, under, in or about, or migrating to or from the Property. The presence of such materials at or any time prior to the Closing shall constitute a Title Defect, rendering the title unmarketable as aforesaid. As used herein, "Hazardous Materials" means any hazardous or toxic materials, waste, substances or matter, oil or other petroleum products, underground tanks, asbestos, or similar materials, including as defined in any federal, state or local law or regulation, or any other substances constituting a hazard or threat to the health of persons, animals or plants. This warranty shall survive the Closing and any expiration or other termination of this Option.
9. Memorandum of Option: Owner agrees to execute a document for recording purposes which will include the terms outlined herein, other than the Purchase Price.
10. Notice: Any notice required to be given by Optionee to extend or exercise this Option shall be in writing, shall be addressed as set forth above, and shall be sent by registered or certified mail, return receipt requested, or by a reputable overnight carrier that provides a receipt, such as Federal Express or Airborne, and shall be deemed delivered on the date postmarked or the date deposited with the overnight carrier



11. Binding Effect: This Option Agreement shall be binding upon the parties and their heirs, administrators, successors and assigns upon full execution by Owner and Optionee in the spaces provided below. Optionee may assign its rights hereunder.

IN WITNESS WHEREOF, Owner and Optionee have executed this Agreement effective as of the date first set forth above.

OWNER:

DocuSigned by:

3A3BF89728F5477...

Simon Snyder

Date: 3/20/2021, 2021

OPTIONEE:

By: 

Date: 3-19-2021, 2021

[illegible]

ASSIGNMENT OF OPTION TO PURCHASE REAL ESTATE

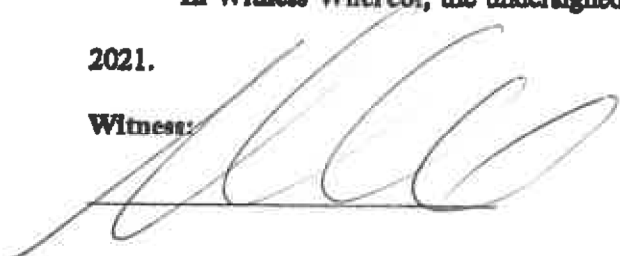
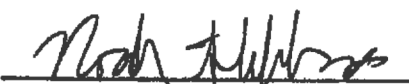
David M. Gendron with a mailing address c/o 1035 Lisbon Street, P.O. Box 1915, Lewiston, Maine 04241-1915 (the "Assignor") hereby assigns, transfers, and conveys to Chris Paszye with a mailing address c/o One Canal Plaza, Suite 500, Portland, Maine 04101 (the "Assignee"), all of the Assignor's right, title and interest in, and rights arising under, that certain Option To Purchase Real Estate dated March 20, 2021 between Simon A. Snyder, as Owner, and David M. Gendron and/or assigns, as Optionee (the "Option"), a copy of said Option being attached hereto as Exhibit "A."

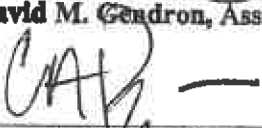
The Assignee hereby expressly assumes all liabilities and obligations of the Optionee and Assignor under the terms of said Option.

Notwithstanding the foregoing assignment, if the Assignee exercises the Option and closes on the Property described therein, the Assignee shall pay to the Assignor an amount equal to [REDACTED] simultaneous with transfer of title to the Assignee.

In Witness Whereof, the undersigned has hereunto his hand effective this 30th day of July, 2021.

Witness:


David M. Gendron, Assignor

Chris Paszye, Assignee

STATE OF MAINE
ANDROSCOGGIN, SS.

July 30, 2021

Personally appeared before me, the above-named David M. Gaudron, and acknowledged the foregoing instrument to be his free act and deed.

Barbara E. Tracy

Notary Public

Print Name: _____

My Commission Expires: _____

Barbara E. Tracy
Notary Public, State of Maine
My Commission Expires May 11, 2023

STATE OF MAINE
CUMBERLAND, SS.

July 28, 2021

Personally appeared before me, the above-named Chris Pamyre, and acknowledged the foregoing instrument to be his free act and deed.

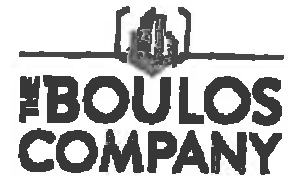
Micki B. Francombe

Notary Public

Print Name: *Micki B. Francombe*

My Commission Expires: *1/29/2025*

MICKI FRANCOMBE
Notary Public, State of Maine
My Commission Expires January 29, 2025



One Canal Place
Portland, ME 04101
(207) 772-1333 Tel
(207) 871-1288 Fax
www.boulos.com

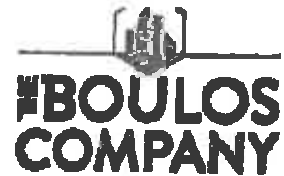
OPTION TO PURCHASE REAL ESTATE

THIS AGREEMENT is made as of March 20, 2021, by and between Simon A. Snyder ("Owner") and David Gendron and/or assigns ("Optionee"), WHO AGREE AS FOLLOWS:

1. **Option Property:** Owner is the owner of certain premises situated at 1772 Westbrook Street, Portland, ME and 605 Stroudwater Street, Westbrook, consisting of approximately 61± acres of land, together with all buildings and improvements thereon and all rights and easements appurtenant thereto, which parcel is further identified in the City of Portland tax assessor's records on Map 238-A-3, Map 242-A-1, Map 243-A-1, Map 245-A-1, Map 246-A-1; and the City of Westbrook tax assessor's records on Map 9 Lot 13; and is outlined in heavy line on the attached Exhibit A (the "Property").
2. **Option:** In consideration of the "Option Consideration" herewith paid to Owner by Optionee as identified below, Owner hereby grants to Optionee the exclusive, irrevocable right to purchase the Property on the terms set forth in this Agreement (the "Option"). If Optionee elects to purchase the Property, such election shall be made by written notice given to Owner at any time on or before the end of the "Option Period" identified below. Optionee shall have the right, on each occasion by written notice, to extend the Option Period for up to eight (8) consecutive "Extension Periods" as described below, in exchange for the corresponding "Extension Consideration" payments set forth below. Each such extension notice and payment shall be made on or before the end of the Option Period (as then extended). The Option and Extension Periods (hereinafter collectively the "Option Period") and their corresponding Option and Extension Consideration payments (hereinafter collectively the "Option Consideration") are as follows:

<u>Option Period</u> From execution through October 30, 2021	<u>Option Consideration</u> \$80,000 paid herewith
<u>Extension Periods</u> Eight (8) Periods of Thirty (30) days each	<u>Extension Consideration</u> \$10,000 for each Option Period. Funds shall be non-refundable but applicable to the sale price.
3. **Purchase Price:** If this Option is exercised, the Purchase Price for the Property shall be Seven Hundred Thousand Dollars (\$700,000). The Option Consideration shall be credited against the Purchase Price payable at the closing. If Optionee does not exercise this Option, or if Optionee fails to close, Owner shall retain all Option Consideration then paid as full consideration and as its sole remedy. Optionee shall be entitled to a refund of the Option Consideration only if Owner's title to the Property proves defective, as provided below.





4. **Testing, Inspection, Approvals:** During the Option Period, Optionee and its employees, contractors and agents shall have the right at their expense to enter upon the Property, after reasonable notice to Owner, for the purposes of conducting inspections, survey work, soils tests, and/or other testing. Owner agrees to cooperate and join with Optionee or its designees in obtaining any rezoning, permits and approvals or the like as Optionee desires, at Optionee's expense. Upon request Optionee agrees to furnish to Owner a copy of any soils testing reports it obtains.
5. **Closing:** If Optionee elects to purchase the Property, Owner shall convey the Property to Optionee (or its designee) by good and sufficient general Quit Claim Deed with Covenant conveying marketable title, free and clear of all encumbrances, defects, liens, tenants and occupants ("Title Defects"), and utilizing the description obtained by Optionee's survey if requested. The closing shall take place within thirty (30) days after written notice from Optionee that it has exercised the Option at the date, time and place specified in the notice. Optionee shall have the right to apply the Purchase Price at the Closing to the removal of any Title Defects. The parties agree to execute and deliver such documents as are reasonably necessary and customary to complete the closing. Real estate taxes and utilities shall be prorated as of the closing date. Real estate transfer taxes shall be split 50/50 between Owner and Optionee as customary in Maine. Income taxes and gains taxes shall be paid by Owner.
6. **Broker:** The parties agree that no broker, other than The Boulos Company has been involved in this transaction. The Seller shall be responsible for all fees due to The Boulos Company through a separate brokerage agreement.
7. **Ownership/Risk of Loss:** Owner hereby warrants that Owner is the owner of the Property in fee simple, that Owner has the full right and authority to grant the Option described in this Agreement and that there is no other option, contract or other right to purchase the Property in existence. The risk of loss to the Property or taking by eminent domain during the Option Period shall be on Owner.
8. **Owner's Warranties:** To the best of Owner's knowledge and belief there are no and have never been "Hazardous Materials" on, under, in or about, or migrating to or from the Property. The presence of such materials at or any time prior to the Closing shall constitute a Title Defect, rendering the title unmarketable as aforesaid. As used herein, "Hazardous Materials" means any hazardous or toxic materials, waste, substances or matter, oil or other petroleum products, underground tanks, asbestos, or similar materials, including as defined in any federal, state or local law or regulation, or any other substances constituting a hazard or threat to the health of persons, animals or plants. This warranty shall survive the Closing and any expiration or other termination of this Option.
9. **Memorandum of Option:** Owner agrees to execute a document for recording purposes which will include the terms outlined herein, other than the Purchase Price.
10. **Notice:** Any notice required to be given by Optionee to extend or exercise this Option shall be in writing, shall be addressed as set forth above, and shall be sent by registered or certified mail, return receipt requested, or by a reputable overnight carrier that provides a receipt, such as Federal Express or Airborne, and shall be deemed delivered on the date postmarked or the date deposited with the overnight carrier.



11. ~~Binding Effect~~: This Option Agreement shall be binding upon the parties and their heirs, administrators, successors and assigns upon full discussion by Owner and Optionee in the spaces provided below. Optionee may assign its rights hereunder.

IN WITNESS WHEREOF, Owner and Optionee have executed this Agreement effective as of the date first set forth above.

OWNER:

Executed by

3438FB720F0471

Simon Snyder

Date: 3/20/2021 2021

OPTIONEE:

By: 

Date: 3-19-2021 2021

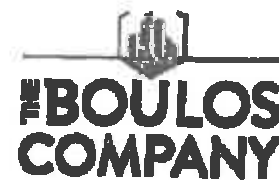


EXHIBIT A

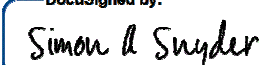


AMENDMENT 4
TO OPTION TO PURCHASE REAL ESTATE LOCATED AT
1772 WESTBROOK STREET, PORTLAND, ME & 695 STROUDWATER STREET, WESTBROOK, ME
BETWEEN SIMON A. SNYDER AND DAVID GENDRON AND/OR ASSIGNS
DATED MARCH 20, 2021
ASSIGNED TO CHRIS PASZYC BY DAVID GENDRON JULY 30, 2021

The Extension Periods referenced in Section 2 of the Option shall be amended as follows:

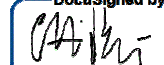
- a. One (1) Extension Period of Four (4) months Two (2) weeks starting November 1, 2021 for [REDACTED]
- b. One (1) Extension Period of approximately Four (4) months Two (2) weeks starting March 15, 2022 for [REDACTED]
- c. One (1) Extension Period of Four (4) months starting August 1, 2022 for [REDACTED]
- d. Four (4) Extension Periods of One (1) month starting December 1, 2022 each for [REDACTED] for each additional Extension Period.
- e. Funds for all Extension Periods shall be non-refundable but applicable to the sale price.
- f. In the event the Optionee terminates the Option, Optionee shall provide Owner with all due diligence materials, reports, surveys, and designs developed during the Option. Such materials shall be due immediately upon termination.

OWNER:

DocuSigned by:

By: 3A3BF89728F5477...
Simon A. Snyder

Date: 4/27/2022, 2022

OPTIONEE:

DocuSigned by:

By: 0A03E06C7826408...
Chris Paszyc

Date: 4/27/2022, 2022

5. CONSISTENCY WITH PORTLAND'S PLAN 2030

The City's Planning and Urban Development Department establishes content requirements for a zoning map amendment application, including considerations of *Portland's Plan 2030*. The following applies these lenses to the proposed zoning district change for 1772 Westbrook Street.

Portland's Plan 2030 focuses on eight aspects of Portland's identity and performance: environment; waterfront; transportation; housing; recreation and open spaces; facilities; historic resources; and economy. The sections that are most relevant to the proposed project are environment, economy, and recreation and open spaces; the other sections generally focus on municipal operations.

5.1 Vision Statement

The six interconnected themes of the *Plan* constitute a vision statement for the City. This vision provides the foundation for City policies and priorities, and for gauging success. Select parts of the vision statement that correlate to this project are below:

- **Sustainable**
 - "Portland has been built and rebuilt to endure; we will balance our historic fabric, sound infrastructure, and the best of new technology and design for the future."
 - "We will use sound fiscal decision making as an essential element of our city's future health."
 - "Portland will grow in order to sustain our community, infrastructure, and economy."
- **Secure**
 - "We will strive to create a resilient economy through innovation, investment, and commitment to diversity."
- **Authentic**
 - "We will invest in and support our local economy."

5.2 Local Goals

The proposed zone change for this property is consistent with the following local goals.

- **ENVIRONMENT**
 - "Identify and protect Portland's critical natural resources."
 - The proposed project will provide access to, but not infringe upon, a resource protection zone and the Stroudwater Trail (located south of the project site). This will provide a connection to this valuable resource from the north that does not currently exist.
- **ECONOMY**
 - "Create economic prosperity by growing Portland's tax and employment base."

- The proposed project will promote economic prosperity by providing a zoning district (I-M) for which there is current demand.
- **"Respect that our unique quality of place is key to our current and future economic success."**
 - This project will allow growth within the moderate impact industrial sector that respects surrounding natural resources.
- **RECREATION AND OPEN SPACES**
 - **"Strengthen connections between open spaces."**
 - The proposed zone change will strengthen the connection to the Stroudwater River area (consistent with the existing moderate impact industrial zone in the Hutchins Drive area to the south).

Att. F

Via Electronic Mail

August 22, 2022



James Rather
Development Review Services Manager
City of Portland
389 Congress Street
Portland, ME 04101

Re: 1772 Westbrook Street
Application for Zoning Map Amendment

Dear James:

We are pleased to submit this application for a zoning map amendment on behalf of Touchstone Enterprises, Inc. for the subject property located at 1772 Westbrook Street. The property is approximately 52 acres and is currently zoned as Industrial – Low Impact (I-L). With this application, we are requesting that the zoning for this property be amended to Industrial – Moderate Impact (I-M). It is our belief that this request is consistent with the City of Portland Comprehensive Plan (Portland's Plan 2030) and will encourage responsible development of the site to its best use.

The Applicant is requesting this zoning map amendment to permit Warehousing, Storage, and Distribution Facilities uses greater than 10,000 square feet (SF) – which is the current limitation of the I-L zone. The applicant has identified low- and moderate-impact industries in the greater Portland area that is unmet by the current inventory of commercial real estate larger than 10,000 SF. Approving this map change will permit the development of approximately five new industrial lots with the sufficient flexibility to provide a variety of building footprints.

The application materials and supporting documents will be uploaded into the Eplan folder when it is made available for the project. We look forward to working with you on this project. If you have any questions regarding this application, please feel free to contact me at (207) 558-3662 or by email at dstairs@woodardcurran.com.

Sincerely,

WOODARD & CURRAN, INC.

A handwritten signature in black ink, appearing to read "D. Stairs", is written over a horizontal line.

Darrin B. Stairs, PE
Project Manager

cc: Chris Paszyc - Touchstones Enterprises, Inc.

PN: 0238858.01



Ruth Barton <rbartondesigns@gmail.com>

Sep 30, 2022, 2:26:26 PM (2 days ago)

to planningboard@portlandmaine.gov

This email is to express my opposition to the above referenced project by Developer Mr. Paczyc. Westbrook Road is far too busy already to accommodate the type of traffic that is sure to come from such a development or zoning change. What he proposes is nothing like the current small businesses along that stretch of road. This two lane road already carries an incredible amount of traffic between Westbrook and Portland, passes two major public schools and numerous residential driveways and streets. I am a resident of Stroudwater Preserve and we do not want this project and vehemently reject a zoning change. As we have found, Developers get a project approved and then begin to make changes that seem small on their own, but end up having an impact on neighborhood residents, usually to their own advantage. Our neighborhood already attracts many walkers because the noise of traffic on Westbrook is extremely loud. The sidewalk, where there is one, is quite narrow, and is only on one side of the street for the most part. There are no left hand turning lanes. Speed is already a problem and adding more, larger vehicles is disaster waiting to happen.

We have also had to contend with a great deal of noise this summer and fall coming from Eco Maine. The sound carries right across the highway and has been very loud during the day as well as at night. We complain, it gets better, but then is right back to a terrible noise level. This developer uses Eco Maine as a positive neighbor, when, in fact, it is not.

Apparently the Developer has not yet purchased the property and we would like him to take his project elsewhere where the trucks and noise will not impact a residential neighborhood.

Thank you,

Ruth Barton
26 Black Sparrow Drive
Portland ME 04102

rstclair@aol.com <rstclair@aol.com>

Sep 28, 2022, 2:37:38 PM (4 days ago)

to planningboard@portlandmaine.gov, egermani@dwmlaw.com

To: Portland Planning Board

RE: Touchstone Enterprises, Inc. has submitted a Zoning Map Amendment application to rezone a 52 acre parcel at 1772 Westbrook Street from I-L Low Impact Industrial to I-M Moderate Impact Industrial to allow the future siting of Warehousing, Storage, and Distribution Facility uses greater than 10,000 square feet at this location.

We would like to express our significant concern over how this project, and the re-zoning from Low Impact to Moderate Impact, will influence traffic on the Stroudwater neighborhood.

Trucks loading or unloading, and then traveling to Congress Street, airport facilities, or to the Maine Turnpike (exit 46) will result in heavy use of Westbrook Street and severe negative effect on our (already busy) neighborhood street.

We are opposed to this re-zoning and to the overall development of this project.

There are better locations than this particular site, which consists of mostly residential homes.

Thank you for your consideration.

Roy St.Clair
Elizabeth Germani
48 Stroudwater Road
Portland, ME 04102

Maryann Cocca-Leffler <mcleffler@aol.com>

Sep 30, 2022, 11:54:04 AM (3 days ago)

to planningboard@portlandmaine.gov, Maryann Cocca-Leffler

Dear Portland Planning Board-

We are residents of the Stoudwater Preserves Neighborhood. We were recently informed that real estate developer Chris Paszyc, owner of Touchstone Enterprises and Partner at Boulos Commercial Real Estate, is under contract to purchase a 60-acre parcel of land on Westbrook Street. His plans are to construct warehouses and is seeking a zoning change.

We would like to strongly voice our concern and disapproval of this proposal. This site is in a residential area and NOT the proper place for warehouses and the traffic in will cause, including trucks and tractor trailers traveling through the Stroudwater Historical District. Besides many safety issues, there will be congestion, noise & pollution.

Neither Westbrook St nor Stroudwater St in Westbrook has direct access to 95. This will be a dangerous nightmare for our quiet community.

Please consider building much needed affordable housing on this site.

Thank you-

Maryann & Eric Leffler
18 Black Sparrow Dr
Portland ME
[207-245-2332](tel:207-245-2332)

Margaret Dion-Marovitz <margaretdionmarovitz@gmail.c... Sep 30, 2022, 7:18:19 PM (2 days ago)
to Kathleen Gardner, planningboard@portlandmaine.gov, Maryann Cocca-Leffler, Stroudwater Preserve Neighbors

Bravo, Kathleen! Thank you!

Margaret Dion-Marovitz
31 Trailhead Way
Portland, ME 04102

Sent from my iPhone

> On Sep 30, 2022, at 12:31 PM, Kathleen Gardner <kgardner1me@gmail.com> wrote:

>

> Hello,

>

> I am writing to express my concern with the proposed Westbrook Street Warehouse development which is right down the street from our neighborhood- Stroudwater Preserve.

>

> As I'm sure you have heard our neighborhood was built to provide a quiet, trail accessible environment for families. Given that our neighborhood has many young children, pets (one of my dogs is blind) and many work from home families, the increased presence of large capacity truck traffic will make the area unsafe and noisier.

>

> Also Westbrook Street houses the ARLGP, Westbrook Middle School and High School, as well as being a main route for many Rescue Services. Just the increase in large vehicle traffic alone would make it harder for residents, buses and emergency vehicles to travel safely.

>

> I Agree with some of our fellow neighbors, that adding more actual affordable housing in this high priced housing market would be far more beneficial, and allow people working in the Portland area to live in Portland.

>

> Thank you for hearing me out.

>

> Sincerely,

> Kathleen Gardner

> 16 Trailhead Way

> Portland, Me

>

Kathleen Gardner <kgardner1me@gmail.com> Sep 30, 2022, 12:31:24 PM (3 days ago)
to planningboard@portlandmaine.gov, Maryann Cocca-Leffler, Stroudwater Preserve Neighbors

Hello,

I am writing to express my concern with the proposed Westbrook Street Warehouse development which is right down the street from our neighborhood- Stroudwater Preserve.

As I'm sure you have heard our neighborhood was built to provide a quiet, trail accessible environment for families. Given that our neighborhood has many young children, pets (one of my dogs is blind) and many work from home families, the increased presence of large capacity truck traffic will make the area unsafe and noisier.

Also Westbrook Street houses the ARLGP, Westbrook Middle School and High School, as well as being a main route for many Rescue Services. Just the increase in large vehicle traffic alone would make it harder for residents, buses and emergency vehicles to travel safely.

I Agree with some of our fellow neighbors, that adding more actual affordable housing in this high priced housing market would be far more beneficial, and allow people working in the Portland area to live in Portland.

Thank you for hearing me out.

Sincerely,
Kathleen Gardner
16 Trailhead Way
Portland, Me

James R Alexander <jimalexander@me.com>

Oct 1, 2022, 2:13:08 PM (yesterday)

to planningboard@portlandmaine.gov, kgardner1me@gmail.com, Maryann Cocca-Leffler, Stroudwater Preserve Neighbors, Susan Griffin

Dear Board Members,

We agree and support many of the comments that our neighbor, Kathleen Gardner, made in her email. We have recently moved back to Maine after having been away for 25 years. We decided to build in Stroudwater Preserve because of its quality and location. More specifically, we did not want to live in a condo or a 55+ community, but rather in a place with a real neighborhood feel, with residents and children of all ages. To our mind, Stroudwater Preserve is ideal.

We do not support the rezoning of the 60 acre parcel from I-L (low impact) to I-M (moderate/medium impact) for several reasons, namely;

1. the negative impact on property values for Stroudwater Preserve as well as the abutting neighborhood. Currently, Phase 1 is nearing completion and some current owners like us are looking forward to the start of Phase 2 which we think will further enhance the value of our neighborhood. A large commercial presence with more trucks and noise could slow the growth of Phase 2 and make for a harder, more difficult "selling environment" for the developer.
2. the increase in traffic and noise from heavy vehicles as well as the traffic tie-ups that will occur at the Congress/Westbrook traffic light. Getting into Portland via Congress or the Maine Mall could become even more of a hassle. It's now easier to take Westbrook Street into Westbrook to shop for groceries and other necessities.
3. the definitions of light industrial vs medium industrial state that light industrial is an appropriate buffer to residential housing while medium industrial is better suited for direct access to arterials, thereby protecting residential neighborhoods from drive-through traffic. It seems to us that significant due diligence was given to this property when originally zoned - why change it now?
4. although some have suggested making the site available for affordable housing, this will only work if you have good public transportation, which would also mean increased bus traffic on Westbrook Street. We feel that keeping the property in its present zoning classification is most appropriate.

Thank you for your time,

Jim & Pam Alexander

Oct 2, 2022, 1:18:19 PM (24 hours ago)

B Beale <rousher3stg@aol.com>

to jimalexander@me.com, planningboard@portlandmaine.gov, kgardner1me@gmail.com, mcleffler@aol.com, stroudwater-preserve-neighbors@googlegroups.com, sgriffin@jhrdevelopment.com

I agree, I relocated from NH to have a home built in this development to be with my family who live nearby after much deliberation and am very pleased with the community.

Was distressed upon learning of the proposed development being warehouses and the impact on the infrastructure, the traffic specifically trucks and the subsequent noise.

Jim eloquently pointed out the other numerous reasons that we as neighbors should rally to see this does not go forward.

Thank you Jim, et all

Robert Beale

Written Public Comments OCT 11 meeting/ 1772 Westbrook St SITE/Zoning

Subscribe ☐

0 views



Maryann Cocca-Leffler <mcleffler@aol.com>
to planningboard@portlandmaine.gov, eleffler@aol.com

7:53 AM (1 hour ago)

Dear Portland Planning Board-

We are residents of the Stroudwater Preserves Neighborhood, off Westbrook St in Portland. We are unable to make the Oct 11 planning board meeting at which you will be discussing the rezoning of a 52-acre parcel from I-L Low Impact Industrial to I-M Moderate Impact Industrial, in relation to Chris Paszyc/ Touchstone Enterprises, Inc's plans to construct warehouses.

We would like our Written Public Comments published in the agenda packet:

We strongly voice our concern and disapproval of the proposal to change the zoning of the 52-acre site at 1772 Westbrook St and the building of warehouses. This site abuts the quiet residential neighborhood of Stroudwater Historical District and is NOT the proper place for warehouses and the traffic it will cause, including trucks and tractor trailers traveling through our neighborhood. Besides many safety issues, there will be traffic congestion, noise & pollution.

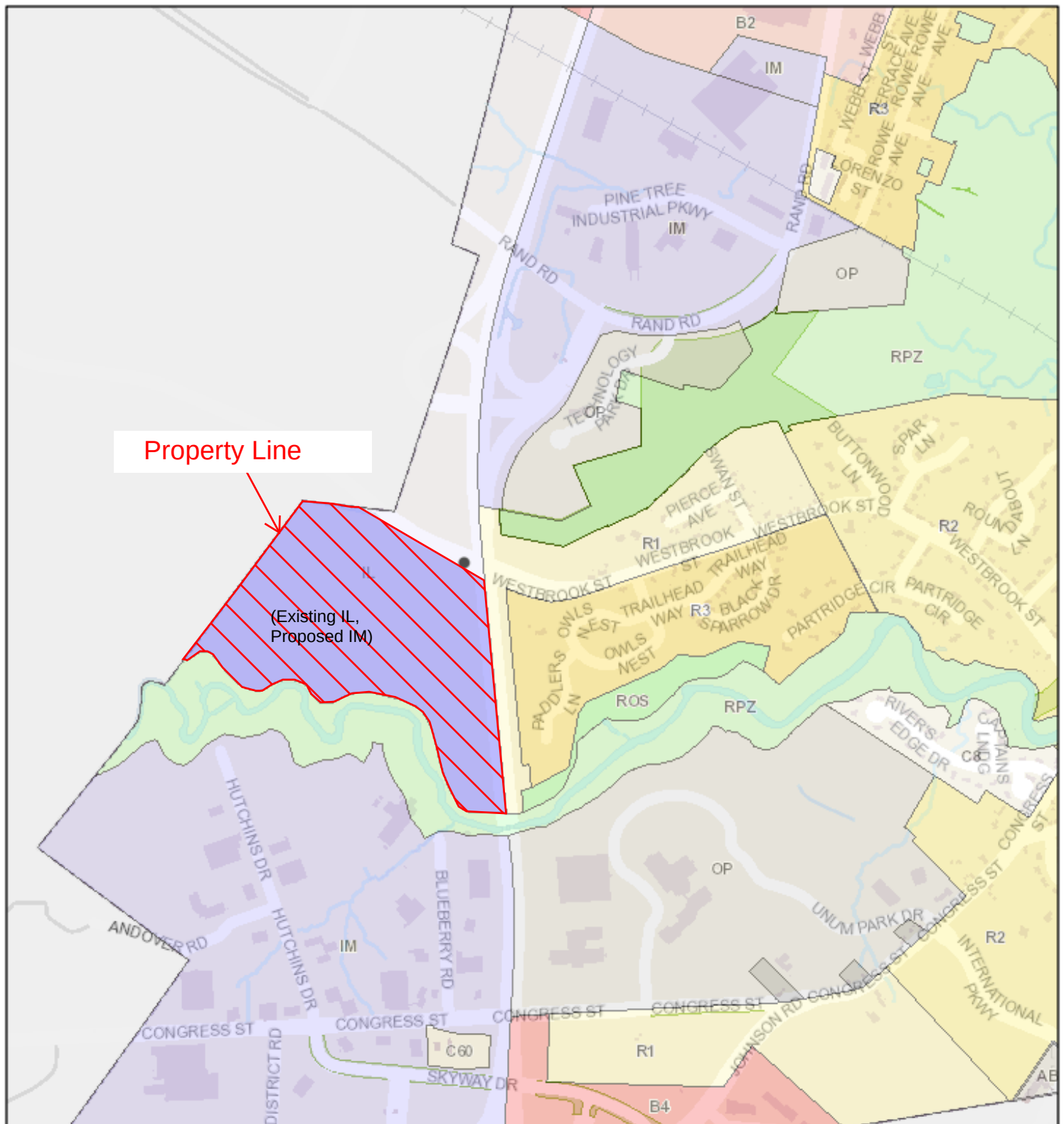
Furthermore, neither Westbrook Street nor Stroudwater Street in Westbrook have direct access to 95. The Congress & Westbrook St intersection is a dangerous intersection now. We can't imagine trucks making that turn and then stopping traffic on Westbrook St to turn left into the site. This entire project is a dangerous nightmare for this community, even at the I-L zone. If the developer really wants to do the right thing for the neighborhood they would build an exit over the river to the EcoMaine site area to access 95. No trucks should travel on Westbrook St/ Stroudwater St.

We urge you to deny this request and instead, push for building much needed, affordable housing on this site.

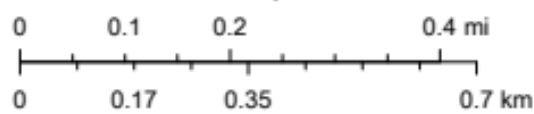
Thank you-

Maryann & Eric Leffler
18 Black Sparrow Dr
Portland ME
[207-245-2332](tel:207-245-2332)

Proposed Zoning



1:13,160



Vicinity Map

