1. Legal Ad

   Documents: 6-24-15 LEGAL AD.PDF

2. Agenda

   Documents: 6-24-15 AGENDA.PDF

3. 58 Fore Street

   3.I. Memo

   Documents: FORE ST. - 58 (MEMO).PDF

   3.II. Attachment 1

   Documents: ATT. 1 - EXCERPTS FROM PORTLANDS HP ORDINANCE.PDF

   3.III. Attachment 2

   Documents: ATT. 2 - THE PORTLAND CO. HISTORIC SIGNIFICANCE AND INTEGRITY.PDF

   3.IV. Attachment 3

   Documents: ATT. 3 - PORTLAND CO. COMPLEX GENERAL BLD. CONDITION REPORT.PDF

   3.V. Attachment 4

   Documents: ATT. 4 - EVALUATION OF EXISTING BUILDINGS AT THE PORTLAND CO. PROPERTY.PDF

   3.VI. Attachments 5 And 6

   Documents: ATT. 5 (APPENDIX A) AND 6 (DRAFT BOUNDARIES FOR PORTLAND CO. HP DISTRICT).PDF

LEGAL ADVERTISEMENT
HISTORIC PRESERVATION BOARD
CITY OF PORTLAND
Public comments are taken at all meetings.

On **Wednesday, June 24, 2015** at 5:30 p.m., Room 209, 2nd Floor, City Hall, the Portland Historic Preservation Board will meet in Room 209, City Hall, to discuss the following items. (Public comments will be taken at this meeting):

1. PUBLIC HEARING

i. Historic Preservation Board Recommendation to Planning Board and City Council regarding Designation as a Local Historic District; 58 FORE STREET, PORTLAND COMPANY COMPLEX; District Nominated by Historic Preservation Board.

CITY OF PORTLAND, MAINE
HISTORIC PRESERVATION BOARD

Scott Benson, Chair
Bruce Wood, Vice Chair
Glenn Harmon
Ted Oldham
Penny Pollard
Julia Sheridan
John Turk

HISTORIC PRESERVATION BOARD AGENDA
June 24, 2015, 5:30 p.m.
Room 209, 2nd Floor, City Hall
Public comment is taken at all meetings.

1. ROLL CALL AND DECLARATION OF QUORUM
2. COMMUNICATIONS AND REPORTS
3. REPORT OF DECISIONS OF JUNE 17, 2015: *There are no decisions to report. The 6-17-15 agenda consisted of workshop items only.*

4. PUBLIC HEARING

i. Historic Preservation Board Recommendation to Planning Board and City Council regarding Designation as a Local Historic District; 58 FORE STREET, PORTLAND COMPANY COMPLEX; District Nominated by Historic Preservation Board.

5. CONSENT AGENDA

Contact the Department of Planning and Urban Development, Planning Division, 874-8726 for further information. To access agenda materials on-line, please visit the following web address on or after the Friday preceding the meeting date: http://www.portlandmaine.gov/historic.htm

HISTORIC PRESERVATION BOARD
CITY OF PORTLAND, MAINE

PUBLIC HEARING
PORTLAND COMPANY COMPLEX
58 FORE STREET

TO: Chair Benson and Members of the Historic Preservation Board

FROM: Deborah Andrews, Historic Preservation Program Manager

DATE: June 19, 2015

RE: June 24, 2015 **Public hearing, Final Deliberations and Recommendation on Nomination of Portland Company Complex as Local Historic District**

Address: former Portland Company complex
58 Fore Street

Property Owner: CPB2, represented by principals Jim Brady, Kevin Costello and Casey Prentice

Introduction

Following four preliminary workshops and two site visits, the Historic Preservation Board will hold a public hearing on the nomination of the Portland Company complex at 58 Fore Street as a local historic district. At the conclusion of the public hearing and further discussion/deliberations by the Board, it is anticipated that the Board will vote on a formal recommendation regarding historic district designation.

As outlined in Portland's historic preservation ordinance, the Historic Preservation Board's role in the designation of landmarks and historic districts is to review the merits of the nomination and, based on findings as to whether or not the nominated resource meets the ordinance's designation criteria, forward a recommendation regarding designation to the Planning Board and Council for their consideration. The ordinance requires that the Historic Preservation Board's recommendation be accompanied by a report which includes the following information (see Sec. 14-617):

- Explanation of the significance or lack of significance of the nominated district as it relates to the ordinance's criteria for designation.
- Explanation of the integrity or lack of integrity (as defined in the ordinance) of the nominated historic district.
- Any proposed design guidelines for review of alterations or construction in the proposed historic district

- Explanation of the relationship of the nominated district to the ongoing effort by the Historic Preservation Board to identify and nominate potential areas, sites and structures that meet the criteria for designation.
- A map showing the boundaries of the nominated district.
- A list of every site, structure and object in the nominated historic district indicating their degree of cultural, historic, architectural or archaeological significance by classification as of a landmark or contributing significance.

Background, Documentation and Assessments Prepared for Consideration of Designation

In preparation for the Board's formal deliberations on the proposed designation, the Planning Department commissioned two detailed reports to provide the level of documentation and assessment needed to fairly evaluate the nominated resource and its eligibility for local historic district designation. Mindful of the fact that the Maine Historic Preservation Commission identified the Portland Company as eligible for listing in the National Register of Historic Places as early as 1976 but that the detailed documentation required for nomination had never been prepared, the Planning Department contracted with Sutherland Conservation & Consulting to document the history of the company (which remained in continuous operation on Fore Street from 1847to 1982) and to assess its place in the history of Portland and its significance in the history of manufacturing and transportation at the local, state and national levels. The Sutherland report provides a detailed description of the development history of the complex itself as the company evolved to accommodate changes and expansion in production over time. The report also provides a description and assessment of the individual extant historic structures within the complex, describing their role in the Portland Company's operations and their level of historic and architectural integrity. Finally, the Sutherland report provides an analysis of the visual character of the building complex. See **Attachment 2** for a copy of the Sutherland report.

The Planning Department also commissioned a building condition report on the individual structures within the complex. A condition report was important in this instance given the fact that the historic structures within the Portland Company complex appear not to have received any significant level of maintenance, repair or rehabilitation in recent decades and given that the historic preservation ordinance requires that a nominated district not only meet the ordinance's designation criteria related to *significance*, but also a separate criterion related to the *integrity* of the resource. In order to designate a landmark or historic district, the nominated resource must be found to have sufficient integrity of location, design, *condition*, materials and workmanship to make it worthy of preservation (see Sec. 14-611). The Sutherland report provided adequate information to assess the question of several other relevant aspects of integrity, but it did not address the question of condition.

Although the owners of the property had retained Becker Structural Engineers to provide a condition assessment for their own planning purposes and had provided a copy of the report to the City (see **Attachment 4**), Planning and Historic Preservation staff determined that an independent condition assessment would be important to the Board's deliberations. Resurgence Engineering & Preservation, a structural engineering firm with expertise and experience in historic rehabilitation, was hired by the City to conduct the assessment. It should be noted that the Resurgence report, like the Becker report, was necessarily limited in scope and taken from a "30,000-foot view". Given the number of buildings to be assessed, the limited budget for the report and the fact that no specific use had yet been identified for any of the buildings which

would inform a full assessment of applicable building code, life safety and other requirements, the review was limited to the current condition of the building envelope and structural systems. (The limited parameters of the assessments were acknowledged in both reports.) Additionally, neither consulting firm was asked to explore or recommend specific solutions to address identified building envelope and structural deficiencies.

Although the two condition reports include a fairly detailed written narrative for each building that describes the building envelope and structural system and include observations and identification of issues, both reports also summarize their findings in a rating system for ease of reference—with 1 representing very poor condition and 5 representing a good structural condition. Although the Resurgence report, which came after the Becker report, used the same rating system for ease of comparison, Resurgence provided an alternative rating system as well. As stated in the Resurgence report, "REP believes there is a more accurate and further defined way to classify the buildings in terms of condition."

In addition to the condition index, both reports provide a "relative structural renovation cost index". As stated in the Becker report, the cost index was prepared "in an effort to quantify what a renovation might cost". An inverse rating system was used here—with 1 representing a relatively low renovation cost and 5 representing a relatively high renovation cost.

A copy of Resurgence Engineering's *Portland Company Complex General Building Condition Report* is enclosed as **Attachment 3**. **Attachment 5** is an excerpted chart from the Resurgence Report (Appendix A, pg. 1) that provides a building-by-building comparison of Resurgence Engineering's findings as regards condition and relative rehab cost with those of Becker Structural Engineers.

Summary of Preliminary Board Review Sessions

As noted in the introduction, the Historic Preservation Board has held four preliminary workshops on the proposed historic district designation to date, as well as two site walks.

<u>Workshop and Site Visit to Review History and Significance of Complex</u>

The first workshop, held on September 24, 2014, followed the completion of the Sutherland report. Sutherland's Scott Hanson made a detailed, illustrated presentation on the history of the Portland Company itself, explaining that it was built in conjunction with construction of the Atlantic & St. Lawrence Railroad and was the first complex in the country built specifically for the manufacture of railroad equipment where the foundry and all of the necessary related shops were located on a single site. He reviewed the extraordinary range of machines, engines and products related to the fields of transportation, industry, manufacturing, and architecture that were produced over the company's 135-year history, as well as the distribution of its products to industries and communities throughout the country. Mr. Hanson also described the pivotal role the Portland Company played in the city of Portland's development and economy (it was the single largest business in the City in the mid-19th century), as well as that of the state of Maine.

Mr. Hanson also discussed the Portland Company's "period of significance", noting that National Register listing requires the identification of a period of significance. (Portland's ordinance does not specifically require the identification of a period of significance.) The Maine Historic Preservation Commission had determined a period of significance extending from the

company's founding in 1847 to its closing in 1982. Within that period, however, Sutherland found that there are more specific (and more limited) periods of significance for key aspects of the Portland Company's production. Mr. Hanson indicated that as of the end of World War II, most of the Portland Company's marine and transportation-related work--the type of engines, machinery and products the company had been founded to produce--had ended and it had diversified its operations to produce a wide range of architectural, industrial and other products.

In his presentation, Mr. Hanson described the specific role each of the extant buildings played in the overall manufacturing process and the sequence in which products moved throughout the complex—from the initial drawing and pattern-making stage onto the foundry and machine shops and finally, onto assembly in the Erecting Building or Car Shop. Mr. Hanson explained that while some of the Portland Company's original buildings were lost due to fires or were replaced or expanded over time to respond to changing production needs, the historic buildings that remain on the site today collectively encompass the complete historic manufacturing process of the Portland Company. In this respect alone, the Portland Company complex as it exists today is highly significant and underscores Sutherland's finding that the Portland Company property derives its significance *as a complex of related, interdependent structures.* Collectively, the buildings provide a substantially complete record of the type of industry that was located at this site and of the specific functions or steps involved in its fabrication process. The number and size of extant buildings on the site also convey the company's scope and scale of operations during the 19th and 20th centuries.

Mr. Hanson also reviewed Sutherland's findings regarding the historic integrity of each of the extant buildings on the Portland Company property. As Mr. Hanson explained, historic integrity, as defined by the National Register," is based on the retention of sufficient essential physical features from the historic period, including location, design, setting, materials, workmanship, feeling, and/or association, to convey the significance of a property." Sutherland found that all of the buildings retained sufficient historic integrity to convey the significance of the property. Most of the buildings were found to retain a high degree of historic integrity.

Finally, Mr. Hanson reviewed the visual character of the Portland Company site and described how the complex's visual character contributed to the overall significance of the historic property. Contributing elements to the complex's visual character are the primary entrance drive into the site from Fore Street, which has been the entrance since 1847, as well as the entrance yard which serves the function of entranceway to the linear manufacturing paths of circulation. The entrance yard is also the point from which one can best appreciate the linear alignment of the manufacturing complex. The historic functional organization and placement of the Portland Company buildings in linear proximity to each other is also a major visual characteristic of the site and is unique to Portland in the way that the industrial buildings form private streets or alleys. The overhead pedestrian bridges spanning these private streets were also found to be unique in Portland and contribute to the visual character of the site. As summarized in the Sutherland written report, "to a large degree, the architectural significance of the Portland Company exists in the relationship of the buildings to each other within the complex. The proximity and orientation of the buildings to each other permitted related manufacturing processes to take place in a way that allowed for the efficient progress of stages in the production of the company's products."

But for a follow-up site walk of the complex in December led by Mr. Hanson, the Historic

Preservation Board's consideration of potential historic district designation of the Portland Company was temporarily suspended until April of 2015. Board review was suspended at the request of the Planning Director in order to allow the property owners' pending rezoning request for the property to proceed through review by the Planning Board and Council to conclusion and provide for a sequential review process. Rezoning was felt to be a threshold issue for any potential redevelopment of the site and that consideration of potential historic district designation would appropriately follow.

Formal District Nomination

On February 23, 2015, Board members John Turk and Ted Oldham submitted a formal letter to the Planning Department nominating the Portland Company complex as a local historic district, consistent with the requirements for nomination and designation set forth in the preservation ordinance. While the previous workshops had been conducted in anticipation of/preparation for the formal designation review process, the nomination letter set the formal process into motion. The letter of nomination was filed as the Planning Board was concluding its review of the rezoning request and the matter was being sent to the City Council for final action.

Workshops and Site visit to Review Building Condition

On April 1, 2015, Al Hodson, principal of Resurgence Engineering, presented his analysis and findings regarding building condition in a detailed workshop session. Like Mr. Hanson, Mr. Hodson provided a building-by-building analysis, describing each building's original structural system and building envelope as well as any modifications which had affected the structural system over time. He reviewed his general observations of condition and highlighted specific areas of concern. He also presented the ratings he had assigned to each building based on his analysis and explained that he had adopted the same rating system used in the Becker report for ease of reference and comparison, while noting that perhaps a more nuanced rating system would provide a more accurate summary of the condition and potential of the buildings. An alternative building condition index was offered for consideration.

Mr. Hodson explained that while all of the buildings had suffered some level of deterioration due to years of deferred maintenance, three buildings stood out as presenting the greatest structural and building envelope challenges. The buildings found to be in the most compromised condition were Building #7 (Car Shop), Building #10 (Paint Shop), and Building #11 (Pattern Storehouse). (*See pg. 2 of written report's Executive Summary, pgs. 25-28 for written condition analysis of each building, pg. 1 of Appendix A for assigned condition and cost rating and pg. 6 for an explanation of the basis for cost opinion conclusions for these 3 buildings.*)

Mr. Hodson also identified Building #4 as having unique condition issues with an exterior brick masonry wall system that is integrated with built-up iron or steel structural columns, which columns are exposed to weather and in an advanced state of disrepair. The columns at the building exterior would require replacement as part of any rehabilitation program. Detailing for replacement would need to consider both improved performance as well as preservation of historic integrity, including degree of replacement of original material. Like the roof structures at Buildings #1, #2, and #3, the roof structure at Building #4 will need to be evaluated for snow load capacity, the decking above the beams will need to be replaced at deteriorated areas and all of the roof sheathing may need replacement. Mr. Hodson's report also notes the large and

consistently framed building has fewer variations in its framing than many other structures on the Portland Company site and this repetition in detailing along with open access to structural members may serve to simplify necessary structural repairs. *(See pg. 1 of Executive Summary, pgs. 19-22 for written condition analysis of Building #4, pg. 1 of Appendix A for assigned condition and cost rating, and pg. 6 of Appendix A for an explanation of the basis for cost opinion conclusions for Building #4.)*

In preparation for the April 1 workshop, Board members were provided copies of the Resurgence Engineering report as well as the Becker Structural Engineers report, which had been produced for the current property owner. During the workshop session, Mr. Hodson made frequent reference to the findings of the Becker report as well as his own. Based on Resurgence's written report and Mr. Hodson presentation, it appeared that the findings of the two reports were quite similar. (A comparison chart of the summary rankings for building condition and relative cost to address condition was provided in Mr. Hodson's report (Appendix A, pg. 1) and is enclosed with this report as a separate attachment -- **Attachment 5.**

On May 20, a second site walk was conducted of the Portland Company complex, this walk focusing on the issue of condition. Both Mr. Hodson and Paul Becker of Becker Structural Engineers provided commentary, summarizing their findings relative to each building. Given the constraints of a site visit in terms of providing opportunity for Board discussion or public comment, a follow-up workshop session was scheduled for May 27th in City Hall. At the May 27 workshop, Board members shared their observations from the site visit. Staff also provided information about the requirements of the federal and state historic tax credit program and summarized discussions held with staff of the Maine Historic Preservation Commission (MHPC) regarding potential access to tax credits. As the availability of historic tax credits can be a significant factor in the feasibility of an historic rehabilitation project, staff and the HP Board had identified early on in the review process that it would be important to learn more about what might affect the property owners' eligibility for the tax credits. Staff explained that distinctions between Portland's local designation criteria and National Register designation criteria (especially as regards the issue of building condition) made the question of whether current or future owners of the property would be able to take advantage of tax credits fairly complicated. Eligibility for tax credits might be particularly challenging if several buildings were determined under Portland's designation criteria to be noncontributing by virtue of condition. MHPC staff had indicated, however, that if a strong case could be made that the *local* Portland Company Historic District was clearly based on and supported by its local designation criteria, it might be approved as a "Certified Local Historic District" and thereby make the project eligible for federal and state tax credits. A clear and rational basis would have to be demonstrated for the boundaries of the local district and the assigned classifications of individual buildings (landmark, contributing, and noncontributing).

Final Workshop – Preliminary Board Deliberations

On June 10th, the Historic Preservation Board held a final workshop to begin to synthesize the information provided in the various consultant reports, staff reports, site visits and preliminary workshop sessions. While each of the previous workshops had focused on a specific aspect of

the Board's overall deliberations, the June 10 session was the first opportunity for Board members to consider the various applicable designation criteria in the aggregate and begin to assign a "preservation value" for each structure within the complex. The Board also took up the question of appropriate, defensible district boundaries. Chair Benson organized the discussion, focusing on the specific designation criteria that must be met in the ordinance and the questions that must be addressed in the designation report that accompanies the Board's recommendation to the Planning Board and City Council—see Sec. 14-617.

Following is a summary of the Board's preliminary deliberations in the order discussed:

CRITERIA FOR DESIGNATION

Sec. 14-610 (a) Minimum Criteria for Designation (*Note: nominated districts must satisfy a minimum of one of the following criteria*)

1. Its value as a significant example of the cultural, historic, architectural, archeological or related aspect of the heritage of the City of Portland, State of Maine, New England region, or the United States.

   Board finding: the Portland Company complex exhibits local, state *and* national significance, as described in detail in the Sutherland report, *The Portland Company: Historic Significance and Integrity.* The Board identified the following major areas of significance:

   National significance
   - Research suggests that the Portland Company was the first complex in the country built specifically for the manufacture of railroad equipment with all necessary shops and foundry on a single site.
   - Rare surviving example of a pre-civil War foundry, machine shop and car shop complex, and apparently the only surviving plant in the nation where locomotives were built for the US Government as part of the war effort.

   Significance to the State of Maine
   - Contributed significantly to the development of Maine's railroads and maritime industries through manufacture of locomotives, railroad cars, marine engines and boilers.
   - Played a significant role in the development of Maine's paper-making, textile and canning industries.
   - The state's largest 19th century foundry/machine shop

   Local significance
   - Founding was directly tied to the establishment of the Atlantic & St. Lawrence Railroad. Company was founded to manufacture railroad locomotives for the railroad.

- Company's founding was directly associated with the creation of Commercial Street and filling of Broad and Clay Coves, as well as the organization of rail service throughout the City
- Only intact 19th and early 20th century industrial complex remaining in the city.
- Largest 19th century employer in the city.

2. Its location as a site of significant historic or prehistoric activity which may have taken place within or which involved the use of any existing structure on the property.

   Board finding: The Portland Company complex was the site of significant industrial activities of local, state and national importance, as detailed in #1 above, which took place within extant structures on the property.

3. Its identification with a person or persons who significantly contributed to the cultural, historic, architectural, archaeological or related aspect of the development of the City of Portland, State of Maine, New England region, or the United States.

   Board finding: The Portland Company was founded by John Poor, director of the Atlantic and St. Lawrence Railroad and the person most responsible for Portland's successful bid over Boston to become Montreal's winter port via rail. Other stockholders in the company included noted industrialist, developer and civic leader J.B. Brown and U.S. Secretary of the Treasury William Pitt Fessenden. William Chapman, electrical engineer in charge of the company's research department, did important work in the research that led to the development of microwave technology as well as experimentation and invention related to the use of electricity in manufacturing. Chapman's inventions were used in mills and factories throughout the state.

4. Its exemplification of a significant architectural type, style or design distinguished by innovation, rarity, uniqueness or overall quality of design, detail, materials or craftsmanship.

   Board finding: The building complex as a whole, and the individual structures included in it express the evolution of construction techniques developed for industrial building types as was required to enclosed increasingly complex and large scale manufacturing processes. Located within the complex are substantially unaltered examples of several distinctive industrial building types constructed between 1847 and 1920. The Portland Company buildings from the 1840's and 50's are the only industrial buildings of that period remaining in the city today.

5. Its identification of the work of an architect, designer, engineer or builder whose individual work is significant in the history or development of the City of Portland, the State of Maine, the New England Region or the United States.

   Board finding: Although noted Portland architect Frederick Tompson was responsible for the design of the projecting shed dormers that were added to the roof of Building # 2 (Machine Shop), this designation criterion is not applicable for the Portland Company.

6. Its representation of a significant cultural, historic, architectural or related theme expressed through distinctive areas, site, structures or objects that may or may not be contiguous.

   Board finding: The Portland Company complex is representative of Portland's role as a major center of rail and maritime transportation for Maine and northern New England as described in detail in the Sutherland report.

Sec. 14-610 (b) In the case of a nominated historic district, the historic preservation board shall also determine whether a substantial number of the properties, site, structures or objects have a high degree of cultural, historic, architectural or archaeological significance and integrity, many of which may qualify as landmarks, and which may also have within its boundaries other properties site, structures or objects, which while not of such cultural,….significance to qualify as landmarks, nevertheless contribute to the overall visual characteristics of the significant properties, sites structures or objects located within it.

Given the high degree of significance of the district as a whole, the Board discussed the possibility of designating it as "landmark district", however this designation type is not included in the preservation ordinance. Consideration was also given to the area's classification as a landmark "site", but "site" as referred to in the ordinance text did not appear to fit the nature of this historic resource. Also discussed was the possibility of classifying each building as a landmark. Ultimately, the Board determined that the individual buildings are appropriately characterized as "contributing" structures to the overall complex, which is highly significant.

Sec. 14-611 Integrity of landmarks and historic districts.

Any area structure or object that meets the criteria in Section 14-610 must also have sufficient integrity of location, design, condition, materials and worksmanship to make it worthy of preservation or restoration. *(Note that this integrity standard applies to the district as a whole; the question of integrity also applies in the assignment of a classification or "preservation value" to each individual building or structure within the nominated district boundary.)*

Board finding: As described in the Sutherland report, the complex as a whole retains a high degree of *historic and architectural integrity* to the identified period of significance* for the complex.
*Note: For National Register purposes, the Sutherland report defined as the period of significance as 1847-1982, the year the Portland Company closed. This was consistent with the determination of the Maine Historic Preservation Commission and follows the criteria that guide National Register designations. For local district purposes, the Historic Preservation Board determined that the period of significance extends to 1920, when the last building associated with the Portland Company's core transportation and/or marine-related business was constructed. Note that Portland's ordinance does not require a determination of period of significance, but the Board discussed the question as it related to determining a "preservation value" for the more recent extant structures on site.

As regards the question of *integrity of condition*, the Board found that although a number of the 16 extant structures are so deteriorated due to deferred maintenance as to make their rehabilitation infeasible (see following assessment of individual structures), the complex as a whole retains sufficient integrity of condition to make it worthy of preservation and rehabilitation. This finding is based on assessments provided in two separate condition reports prepared by Resurgence Engineering & Consulting and Becker Structural Engineers.

CLASSIFICATION OF INDIVIDUAL STRUCTURES WITHIN THE COMPLEX

Following discussion of the integrity of the complex as a whole, the Board discussed the integrity (*historic/architectural* as well as *condition)* of each building and assigned a preliminary classification to each. In taking up each building, Chair Benson summarized the salient findings for each structure included in each of the consultants' reports.

The assignment of a classification is required by the ordinance as part of the designation process. A list of every building, object or site within a nominated historic district must be included in the designation report and assigned a classification of "landmark", "contributing" or "noncontributing" indicating its degree of significance and that a list of structures.

The ordinance's definitions for these terms are instructive in assigning a classification:

<u>Landmark</u>: A property, site, structure or object designated by the Council as having a high degree of historical, cultural and/or architectural significance.

<u>Contributing</u>: A classification applied to a site, structure or object within a historic district signifying that it contributes generally to the qualities that give the historic district cultural, historic, architectural or archaeological significance as embodied in the criteria for designating an historic district, but without being itself a landmark.

<u>Noncontributing:</u> A classification applied to a site, structure, object, or portion thereof within a historic district signifying that 1) it does not contribute generally to the qualities that give the district…significance as embodied in the criteria for designating a historic district; 20 was built within 50 years of the date of district designation unless otherwise designated in the historic resources inventory; or 3) where the location, design, setting, materials, workmanship and association have been so altered or have so deteriorated that the overall integrity of the site, structure or object has been irretrievably lost. A portion of an otherwise contributing or landmark structure may be determined by the historic preservation board to be noncontributing if it meets one or more of the above conditions.

Following are the preliminary classifications assigned to each building at the June 10 workshop, together with any qualifying language or relevant Board discussion. Note that the individual classifications were discussed at length and that opinion was split 4-3 on the classification of Building #4 as a contributing building. All Board members supported the addition of a explanatory note to express the Board's recommendation for further study and willingness to reconsider the designation upon the findings of that study.

Building #	Function	Construction Date	Preliminary Classification ( ) = see note
Building 1	Erecting Shop	1918	Contributing
Building 2	Machine Shop	c. 1847	Contributing (a)
Building 3	Machine Shop	c. 1847	Contributing
Building 4	Foundry	1895	Contributing (b)
Building 5	Foundry Addition	c. 1980's	Noncontributing (c)
Building 6A, 6B B	Blacksmith 7 Tank shop	1883, 1896-1904	Contributing
Building 7	Car Shop	1873, 1904	Noncontributing (d)
Building 10	Paint Shop	c. 1873	Noncontributing (e)
Building 11	Pattern Storehouse	1885	Noncontributing (f)
Building 12	Pattern Storehouse	1895	Contributing
Building 14	Drafting Room/Storehouse	1858-64	Contributing
Building 15	Boiler House	1848-64	Noncontributing (g)
Building 16	Brass Foundry	1864-71	Contributing
Building 24	Vault	c. 1905	Contributing
Building 30	Office Building	1950	Noncontributing (h)

Notes:

(a) Cantilevered roof addition noncontributing due to structural instability

(b) Given the importance of the foundry as a key contributing element of the historic core of the complex, more detailed structural/architectural analysis is warranted. If the degree of reconstruction required to put the building into service would result in undue loss of original

building fabric, the Historic Preservation Board is prepared to reclassify Building 4 as noncontributing. A noncontributing classification would allow for the building's demolition. As retention of Building 4 may prove critical in terms of the property owner's eligibility for historic tax credits and as historic tax credits may become important to the overall feasibility of the property's redevelopment, the Historic Preservation Board maintains that it is premature at this time to classify the building as noncontributing.

(c) Constructed in 1980's; outside the period of significance
(d) Noncontributing due to severely deteriorated condition
(e) Noncontributing due to severely deteriorated condition
(f) Noncontributing due to significant structural instability
(g) Noncontributing due to severely deteriorated condition
(h) Constructed in 1956, outside the period of significance

DESIGN GUIDELINES

In the report which is required to accompany the Historic Preservation Board's recommendation regarding designation, the Board may recommend specific design guidelines for the review of alterations or new construction within the proposed district—See Sec. 14-617-(c). Following discussion, the Board elected not to recommend specific design guidelines for the Portland Company district, but to include in the designation report a description of the complex's major visual characteristics that contribute to the district's significance and should be recognized in evaluating future proposals for alterations and infill construction within the district. The visual character of the site is described in the Sutherland report (see pg. 4). Major visual characteristics include the presence of a major entrance off Fore Street at the west end of the complex; the open entrance yard; the linear alignment and east-west orientation of the buildings; the separation of connected buildings by private streets and alleys; the presence of overhead pedestrian bridges; the predominance of brick and granite building exteriors; and large scale windows typical of industrial structures.

DISTRICT BOUNDARY DELINEATION

Based on the above assessments and in consideration of the identified visual character of the Portland Company complex, which was determined by the Board to contribute significantly to one's understanding of and appreciation of the historic resource, the Board determined that the draft boundary as delineated on **Attachment 6** should be advertised for purposes of the public hearing.

Note that the City's GIS system is temporarily down, therefore the boundaries shown on ***Attachment 6*** *are hand-drawn. A substitute map will be provided at the public hearing.*

Order of Proceedings

Following an opportunity for additional questions or requests for clarification from Board members, the meeting will be opened for public comment. At the conclusion of the public hearing, Board members will begin formal deliberations. Note that the preliminary findings, draft building classifications and draft district boundary discussed by the Board at its June 10 workshop may be subject to change based on public input and/or the Board's final deliberations.

Following deliberations, the Board will vote on a series of findings related to the ordinance's designation criteria. Based on these findings, the Board will then vote on a final recommendation

regarding designation of the Portland Company as a local historic district subject to the provisions of Article IX of the Land Use Code (Historic Preservation).

Following the Board decision, staff will prepare a formal designation report that addresses all of the requirements itemized under Sec. 14-617 and as described in the introduction to this report. The Board will have an opportunity to review the draft designation report prior to forwarding it to the Planning Board and Council for consideration.

Motions for Consideration

A. On the basis of the staff report prepared for the June 24, 2015 Public Hearing, the documentation and analysis provided in a reports prepared by Sutherland Conservation & Consulting, Resurgence Engineering and Preservation, Inc., and Becker Structural Engineers, as well as four preliminary workshops and two site visits, the Historic Preservation Board finds:

   1) that the historic Portland Company complex meets the historic preservation ordinance's Minimum Criteria for Designation under Sec. 14-610(a) and (b). The specific criteria met under Sec. 14-610 (a) are as follows: Criteria , , , , &…. ; and

   2) that the Portland Company complex and its extant historic resources exhibit sufficient integrity of location, design, condition, materials and worksmanship to make it worthy of preservation or restoration, as required under Sec. 14-611 <u>Integrity of Landmarks and Districts</u>.

B. Based on these findings, the Board recommends designation of the former Portland Company complex as a local historic district subject to the provisions of Article IX (Historic Preservation) of the Land Use Code. The boundaries of said district are delineated on Attachment 6 of the June 24 staff report *(as amended)* and the individual buildings within the district, with their assigned classification, are listed on pages 10 and 11 of the staff report *(as amended).*

Attachments

1. Excerpts from Portland's historic preservation ordinance (Article IX of the Land Use Code).
2. *The Portland Company: Historic Significance and Integrity*, prepared for City of Portland by Sutherland Conservation & Consulting
3. *Portland Company Complex General Building Condition Report*, prepared for City of Portland by Resurgence Engineering and Preservation Inc.
4. Evaluation of *Existing Buildings at the Portland Company Property*, prepared for CPB2 by Becker Structural Engineers
5. Appendix A: Comparative Condition/Cost Analysis (excerpted from Resurgence report)
6. Draft boundaries for Portland Company Historic District

ATTACHMENT 1

(s) To annually report to the council with following matters:

1. Survey work in progress or completed;

2. The number of projects reviewed (by type);

3. How many certificates of each type were issued.

(Ord. No. 235-90, 2-26-90; Ord. No. 165-08/09, 3-16-09)

DIVISION 3. CATEGORIES AND CRITERIA FOR DESIGNATION

Sec. 14-610. Minimum criteria for designation.

(a) The historic preservation board shall limit its consideration to the following criteria in making a determination on a proposed nomination of an area, site, structure or object for designation by ordinance as a landmark or district:

(1) Its value as a significant example of the cultural, historic, architectural, archeological or related aspect of the heritage of the City of Portland, State of Maine, New England region, or the United States;

(2) Its location as a site of a significant historic or prehistoric event or activity which may have taken place within or which involved the use of any existing structure on the property;

(3) Its identification with a person or persons who significantly contributed to the cultural, historic, architectural, archeological or related aspect of the development of the City of Portland, State of Maine, New England region, or the United States;

(4) Its exemplification of a significant architectural type, style or design distinguished by innovation, rarity, uniqueness or overall quality of design, detail, materials or craftsmanship;

(5) Its identification as the work of an architect, designer, engineer or builder whose individual work is significant in the history or development of the City of Portland, the State of Maine, the New England region, or the United States; or

(6) Its representation of a significant cultural, historic,

architectural, archeological or related theme expressed through distinctive areas, sites, structures or objects that may or may not be contiguous.

(b) In the case of a nominated historic district, the historic preservation board shall also determine whether a substantial number of the properties, sites, structures or objects have a high degree of cultural, historic, architectural or archeological significance and integrity, many of which may qualify as landmarks, and which may also have within its boundaries other properties, sites, structures or objects which, while not of such cultural, historic, architectural or archeological significance to qualify as landmarks, nevertheless contribute to the overall visual characteristics of the significant properties, sites, structures or objects located within it.

(c) In the case of a nominated historic landscape district, the historic preservation board shall also consider its significance as a geologic, natural or man-made landscape feature associated with the development, heritage or culture of the City of Portland, State of Maine, New England region, or the United States.

(d) The planning board and council shall apply the criteria of subsections (a), (b) and (c) but shall also consider the effect of such designation on other aspects of the comprehensive plan of the city.
(Ord. No. 235-90, 2-26-90)

Sec. 14-611. Integrity of landmarks and historic districts.

Any area, structure or object that meets the criteria in section 14-610 must also have sufficient integrity of location, design, condition, materials and workmanship to make it worthy of preservation or restoration.
(Ord. No. 235-90, 2-26-90)

Sec. 14-612. Designation of historic landscape districts.

An historic landscape district may be nominated and considered for designation only if the entire area of the district is owned by a unit of federal, state or local government, or any combination of such ownership.
(Ord. No. 235-90, 2-26-90; Ord. No. 220-93, § 2, 5-17-93)

Sec. 14-613. Reserved.

DIVISION 4. NOMINATION, CONSIDERATION AND DESIGNATION

Sec. 14-614. Procedure.

The provision of this division shall govern the nomination, consideration and designation of landmarks and districts.
(Ord. No. 235-90, 2-26-90)

Sec. 14-615. Initiation of nomination.

(a) Nomination of an area, site, structure or object for consideration of designation as a landmark, historic district or historic landscape district shall be submitted to the department, on a form provided by the department, by the following:

(1) Any two (2) members of the historic preservation board on their own initiative, by written notice to the department; or

(2) By written petition of any owner, in the case of a landmark; or

(3) By written petition of one (1) or more owners of affected property in the case of a district; provided two (2) members of the historic preservation board must sponsor the petition.

(b) A nomination shall be completed and filed with the department with all required signatures and any fees specified therefore for the nomination to be pending.

(c) Upon nomination, the department shall notify the owner or owners of the nomination and shall transmit the nomination to the historic preservation board for its consideration at its next scheduled meeting, which in no event shall be held later than thirty (30) days following nomination.

(d) At any time after a complete nomination is filed for an historic district, the owner of a structure who seeks a permit for demolition may apply to the historic preservation board for a determination that the structure to be demolished is noncontributing and eligible for a demolition permit. The determination of the historic preservation board that the structure is eligible for a permit shall be conclusive.
(Ord. No. 235-90, 2-26-90; Ord. No. 165-08/09, 3-16-09)

Sec. 14-616. Notification of nomination and public hearing.

(a) A public hearing on the nomination shall be held by the historic preservation board within thirty (30) days following the first scheduled meeting referred to in section 14-615(c), but in no event later than sixty (60) days following receipt of the completed nomination form by the department. Notice of the nomination and of the public hearing shall be in accordance with the procedures for public hearings before the planning board for site plan approval.

(b) The hearing shall be conducted in accordance with procedures adopted by the historic preservation board. The historic preservation board shall consider all testimony or evidence relating to the designation criteria in division 3 from any person who makes written submissions or appears at the public hearing. Historic preservation board members may also present testimony or make submissions. The owner of a nominated landmark or of property within a nominated district shall be allowed reasonable opportunity to present testimony or evidence concerning the applicability of the designation criteria in division 3.
(Ord. No. 235-90, 2-26-90)

Sec. 14-617. Recommendation by historic preservation board.

Within thirty (30) days following the close of the public hearing, the historic preservation board shall make recommendation to the council in the case of a landmark, or to the planning board in the case of a district, upon the evidence as to whether the nominated landmark or district meets the criteria for designation in division 3. Such recommendation shall be approved by at least four (4) members of the historic preservation board and shall be accompanied by a report to the council or planning board containing the following information:

(a) Explanation of the significance or lack of significance of the nominated landmark or district as it relates to the criteria for designation.

(b) Explanation of the integrity or lack of integrity of a nominated landmark or historic district.

(c) Proposed design guidelines for review of alteration or construction. The specific design guidelines may provide explanation by text and/or schematic examples of visual compatibility for purposes of division 7.

(d) Relationship of the nominated landmark or district to the ongoing effort by the committee to identify and nominate

department evidencing a determination that specific plans for alteration of a structure or new construction on a site do not require approval under this article.

Contributing: A classification applied to a site, structure or object within a historic district signifying that it contributes generally to the qualities that give the historic district cultural, historic, architectural or archeological significance as embodied in the criteria for designating an historic district, but without being itself a landmark.

Council: The city council.

Demolition: Any act or process that partially or totally destroys a structure or object.

Department: The department of planning and urban development.

Design guidelines: Any design standard specified for alteration or new construction which is unique to a particular landmark, historic district or historic landscape district.

Design manual: The historic resources design manual described in section 14-675.

District: An historic district or historic landscape district.

Historic district: An area designated as an "historic district" by the council.

Historic landscape district: An area designated as an "historic landscape district" by the council.

Landmark: A property, site, structure or object designated as a "landmark" by the council as having a high degree of historical, cultural and/or architectural significance.

Major development: As defined in article V of this chapter.

Minor development: As defined in article V of this chapter.

New construction: The adding to a structure by an addition; the erection or placement of any new structure on a lot or property; or the comprehensive redesign/renovation of an existing structure.

Noncontributing: A classification applied to a site, structure, object, or portion thereof, within a historic district signifying that 1) it odes not contribute generally to the qualities that give the historic district cultural, historic, architectural or archaeological significance as embodied in the criteria for designating a historic district; 2) was built within 50 years of the date of district designation unless otherwise designated in the historic resources inventory; or 3) where the location, design, setting, materials, workmanship and association have been so altered or have so deteriorated that the overall integrity of the site, structure or object has been irretrievably lost. A portion of an otherwise contributing or landmark structure may be determined by the historic preservation board to be non-contributing if it meets one or more of the above conditions.

Object: Anything constructed, fabricated or created, the use of which does not require permanent or semi-permanent location on or in the ground.

Open space: Any park and any other area outside of a building open to the public.

Ordinary maintenance: Acts of maintenance or repair which do not include a change in the design, material or outer appearance of a structure, including without limitation repainting, replacement of materials or windows of the same scale, texture and color, and landscaping other than within an historic landscape district.

Owner: The person or persons holding record title to the building, site or property; provided, however, the last previous tax roll in the records of the city assessor's office may be relied upon as showing record ownership in the absence of substantial evidence to the contrary.

Property: Land and improvements identified as a separate lot for purposes of subdivision, site plan, or zoning regulation.

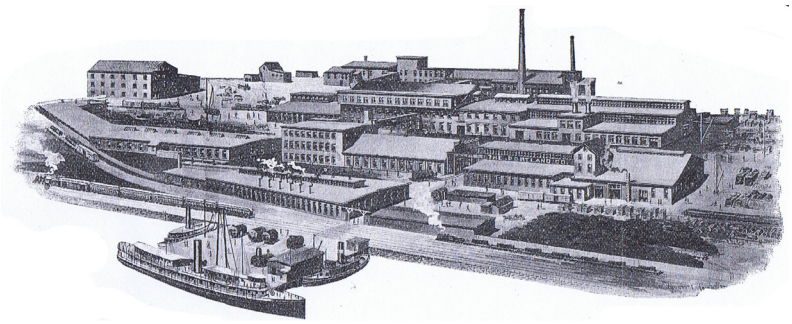
Relocation: Any removal or relocation of a structure on its site or to another site.

Restoration: Any act which returns a structure or a feature of a structure to a prior state of historic significance.

Sign: As defined in section 14-47.

Site: The location of an event, activity, structure or object.

Att. 2



The Portland Company
Historic Significance and Integrity

Sutherland Conservation & Consulting
2014

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The Portland Company: Historic Significance and Integrity

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Introduction

Sutherland Conservation & Consulting (SCC) has been retained by the City of Portland to research, document and analyze the historic and architectural significance of the Portland Company complex. The historic assessment report is intended to address the place and significance of the Portland Company within the city of Portland, the state of Maine, and beyond; especially in the context of national trends in manufacturing and transportation during the company's years of operation (1847-1982).

This historic assessment report will:

- identify the areas of historic significance for the complex at the National, State, and Local levels
- identify the historic period(s) of significance for the complex
- use developmental modeling to analyze and assess the relative historic significance of the individual structures as well as the role each structure played in the manufacturing processes of the Portland Company and within the complex as a whole, and how each contributes to the ability to understand and appreciate the evolution of complex over time.

Additionally, SCC has been asked to assess the historic integrity of the individual buildings and the complex as a whole. Historic integrity is distinct from structural integrity. Historic integrity is based on the retention of sufficient essential physical features from the historic period, including location, design, setting, materials, workmanship, feeling, and/or association, to convey the significance of a property.

The work of this report does not duplicate the Inventory of Historic Buildings by Tremont Preservation Services dated January, 2014 or the Evaluation of Existing Buildings at the Portland Company Property by Becker Structural Engineers dated March 28, 2014, but it does utilize the same numbering system for the buildings in the complex to the greatest extent possible to facilitate cross-referencing the reports. The text of the Tremont report has been included as an appendix to this report with annotations that have been added to provide additional information and clarifications based on research completed by Sutherland Conservation & Consulting.

A summary history of the Portland Company has not been included in the body of this report because the Historical Context section of the Tremont report (pages 44-51) provides this information.

Methodology

Primary and secondary sources were reviewed and utilized including extensive research in the Portland Company records at the Maine Historical Society and in depth research into the early history of railroad locomotive manufacturing in the United States. Using historic maps, site plans, building plans and numerous historic photographs, the historic development and evolution of the buildings of the Portland Company complex have been documented and compiled in a series of site plans and developmental models to illustrate how the complex has changed over time. A site visit was completed on July 23, 2014 to inspect and photo-document the interiors and exteriors of all the existing buildings to assess how much of the original design and materials remain intact for the buildings individually and the complex collectively.

The historic photographs and developmental models were compared to the existing conditions photographs to evaluate the historic integrity and significance of the buildings individually and the complex as a whole. The historic and architectural significance and integrity of the Portland Company complex has been assessed utilizing the criteria of the National Register of Historic Places, which is recognized as the standard for determining historic and architectural significance in the United States and is also the basis for the City of Portland's Designation Criteria.

Executive Summary

The Portland Company was established in 1846 in conjunction with construction of the Atlantic & St. Lawrence Railroad which was built to connect Portland to Montreal. John A. Poor, the individual most responsible for Portland's successful bid over Boston to become Montreal's winter port via rail, was a Director of the Atlantic & St. Lawrence Railroad and became the first President of the Portland Company.[1] Other Atlantic & St. Lawrence Directors were also stockholders in the Portland Company, including Portland's wealthiest individual John Bundy Brown, who would become President of the company in 1864; Congressman and later Senator and U. S. Secretary of the Treasury William P. Fessenden; and Captain George Turner, who was given a seat on the railroad's Board between the regular annual Director's elections, shortly after selling property to the Portland Company for their works.

The period of significance for the Portland Company complex begins with the start of operations in 1847 and extends to the end of foundry work at the Portland Company in 1982. Within this period, specific periods of significance are identified for different areas of significance in Appendix G. During the period of significance, the plant experienced several substantial expansions and numerous small alterations. In 1873, fire destroyed several buildings at the south end of the property which were then rebuilt. No substantial changes have been made since 1920 except for the demolition of the wooden blacksmith and tin shop and the replacement of the late-19th century wooden boiler shop by a large modern steel building in the second half of the 20th century. A modern brick and wood office building was built on the site of earlier stables circa 1950. Through all of this, a number of the pre-Civil War buildings have remained largely intact and would be easily recognizable to John A. Poor and the original company directors and employees of the Portland Company.

The use of cast metals, particularly iron, was central to the rapid industrialization and expansion of the United States in the nineteenth century. Although the technology was ancient, the use of it at the scale undertaken during the period the Portland Company was founded was unprecedented. Cast iron has been called, "the plastic of the nineteenth century" for the way it transformed production and expanded the range of products available to industry and the public. Putting all of the stages of production for large machines, like steam locomotives, in one place was a radical advance over traditional practices. Combined with the use of patterned cast iron parts, as opposed to individually hand-crafted unique parts, this advance laid the foundation for Henry Ford's next step in the progression of efficient production, the assembly line. The Portland Company complex represents an important advance in this process and is possibly the only surviving example of such a complex documenting this stage of industrial production in the United States. Its survival in largely intact condition in 2014 is noteworthy and remarkable.

National, State and Local Historic Significance

The Portland Company has national historic significance because it appears to have been the first complex in this country built specifically for the manufacture of railroad equipment with all of the necessary shops and a foundry on a single site. The Portland Company complex as it stands today is a rare surviving example of a pre-Civil War foundry, machine shop, and car shop complex because it retains a number of its original and early buildings, whereas most, if not all, other pre-Civil War complexes have been substantially or wholly demolished. As such, the Portland Company complex contains the oldest surviving railroad shop buildings in the nation still within their historic manufacturing complex context. Recent research indicates the Portland Company appears to be the only surviving pre-Civil War locomotive manufacturing plant in the nation, making it the only one surviving where locomotives were built for the U.S. Government as part of that war effort.

The Portland Company has statewide historic significance because the company made a significant

1 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890

contribution to the development of Maine's railroads (including the state's iconic two-foot gauge lines) and maritime shipping industry. The locomotives, railroad cars, marine engines and boilers, and maritime navigation aids produced entirely or in part at the Portland Company were important to the development of rail and maritime transportation in the state of Maine from the middle of the nineteenth century into the twentieth century. Industrial expansion, natural resource extraction, commerce, and tourism all benefited from improved transportation made possible by products of the Portland Company.

The Portland Company was the state's largest nineteenth century foundry-machine shop, with those two shops combined in a way that was unprecedented in Maine. The company grew to be the state's most substantial engineering and machine manufacturing business, employing 150 of the 500 machinists in the state at one point. The Portland Company also played a significant role in the development of many important industries in Maine including the paper-making, textile, and canning industries. A number of industrial processes likewise benefitted from the research and development of electrical engineer and inventor William Chapman for the Portland Company and through the Chapman Electric Neutralizer Company at the Portland Company.

The Portland Company has local historic significance because it is the only intact nineteenth and early twentieth century industrial complex remaining in the city. Thirty-three manufacturing plants can be identified in the 1876 Bird's Eye View of Portland. Only the Portland Company complex remains largely intact 138 years later. Portland had 60 sizable companies engaged in industrial production of various sorts in 1924, occupying more than 85 buildings. Of these 85 buildings, fewer than a dozen survive outside the Portland Company, none as complexes.

The Portland Company has local historic significance for its association with several significant 19th century planning and development initiatives within the city of Portland. As part of John A. Poor's vision for creating a modern international port at Portland, he conceived of a wide new street along the waterfront which would contain railroad tracks to connect the Atlantic & St. Lawrence R. R. on the east end of the city to the Portland, Saco & Portsmouth R. R. on the west end while providing both railroads access to the numerous wharves between their terminals. The narrow original waterfront street, Fore Street, followed the natural landform, snaking along the shore around Clay and Broad coves. The new street would be built by filling between the existing wharves below Fore Street, far enough out into the harbor to allow the construction of large new warehouse buildings along the land side of the street. Broad Cove would be filled for construction of the Atlantic & St. Lawrence Railroad terminal and for the Portland Company works and Clay Cove would be filled for the street and new buildings. The Portland Company site alone is seven acres, the majority of it made by filling the mud flats and cove. This project was undertaken cooperatively by the two railroads, the Portland Company, and the city of Portland, with the railroads paying the cost of filling between the wharves and the City paying wharf owners for the value of their properties seized through eminent domain. The mile-long and one hundred foot wide street would be named Commercial Street.[2] This project was the largest urban planning initiative undertaken in the city of Portland in the nineteenth century and was transformative in its effects.

Historic Architectural Significance

The buildings of the Portland Company complex have historic architectural significance because they remain substantially unaltered from the time of their original construction and consequently show clearly the distinguishing characteristics (design and construction materials) of several distinctive types of industrial buildings constructed between 1847 and 1920. Additionally, the Portland Company buildings from the 1840s and 1850s are the only industrial buildings of that period remaining in the city of Portland today.

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2 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890.
Records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

The buildings of the Portland Company also have historic architectural significance because each of the remaining buildings served distinctive function(s) in the historic manufacturing process. Collectively, the existing buildings encompass the complete historic manufacturing process of the Portland Company.

Historic Significance and Visual Character of the Portland Company Site

The primary entrance to the site off Fore Street is a curving roadway that follows the grade between the original shoreline at Fore Street and the filled mudflat land on which the complex is built. This has been the entrance to the property since 1847 and is historically significant as an original site feature that has not been substantially altered. This curving roadway leads to the historic entrance yard of the complex.

The entrance yard has historically been, and continues to be, an open space serving the function of entranceway to the linear manufacturing paths of circulation. It is the point from which these streets and alleys of the complex are accessed. Historically, it also served as a fire break between the manufacturing facilities, the paint shop and the pattern storage buildings. At different points in time a car shop and other buildings have projected into this space, especially prior to the construction of the much larger erecting shop (building 1) in 1918. The entrance yard has been in its current configuration for nearly 100 years.

The historic functional organization and placement of the Portland Company buildings in linear proximity to each other creates a visual character for the site that is unique for Portland in the way that the industrial buildings form private streets or alleys. The overhead pedestrian bridges spanning these private streets are also unique in Portland and contribute to the visual character and historic significance of the site.

To a large degree, the architectural significance of the Portland Company exists in the relationship of the buildings to each other within the complex. The proximity and orientation of the buildings to each other permitted related manufacturing processes to take place in a way that allowed for the efficient progression of stages in the production of the company's products.

Findings:

- The Portland Company complex is historically significant within local, state and national historic contexts related to industry, transportation, community planning and architecture.
- The buildings individually and the complex as a whole retain a high degree of architectural integrity to the period of significance for the complex (Portland Company production 1847 – 1982).
- All of the buildings of the complex constructed over 50 years ago contribute to the historic significance and integrity of the Portland Company complex.
- Collectively, the existing buildings encompass the complete historic manufacturing process of the Portland Company with the exception of one shop for the construction of boilers.
- Together, the historic significance and historic integrity of the Portland Company complex make it one of the most historically important sites in the city of Portland.
- The removal of any of the historic buildings existing in the complex will diminish the ability of the complex to demonstrate the historic manufacturing process of the Portland Company.
- The Portland Company was the largest business in the city in the mid-nineteenth century and is the only remaining intact nineteenth and early twentieth century industrial complex in the city of Portland today.
- The Portland Company buildings remaining from the 1840s and 1850s are the only industrial buildings of that period surviving in the city of Portland.

- The outstanding nature of the architectural integrity of the complex and exceptional historic value of the Portland Company as the first self-contained complex in the nation built specifically for the manufacture of railroad equipment may make it a strong candidate for National Historic Landmark eligibility consideration.

- The historic Portland Company complex is a compact manufacturing facility characterized by two distinct areas, the entrance yard and the manufacturing corridors.

- The historic functional organization and placement of the Portland Company buildings in linear proximity to each other along the manufacturing corridors creates a visual character for the site that is unique for Portland in the way that the industrial buildings form private streets or alleys. This is similar to the character found in large textile mill complexes in Maine cities like Lewiston, Biddeford, and Sanford but not found elsewhere in Portland.

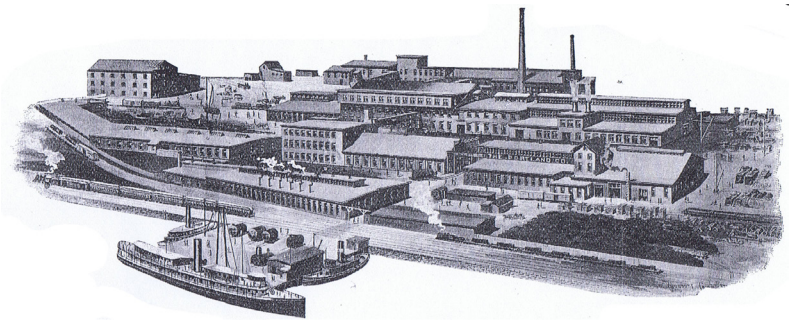
- The compact nature, visual continuity and circulation routes of the historic manufacturing facility of the Portland Company are significant character defining features of the site. The removal of any contributing building would adversely impact the historic significance and character of the whole complex.

- Currently the only modern intrusion into the visual continuity of the complex is building 5, located on the northeast side of the foundry building (building 4).

- In considering the redevelopment of the property for new uses while retaining the essential physical features that give it integrity, a large city-owned vacant parcel to the southwest of the site might provide an opportunity for a connection from the site to Thames Street, allowing enhanced access without altering the historic entrance to the site or the visual character of the entrance yard and "streets" between the historic buildings.

- A large area of vacant land on the east end of the site abuts the largest building on the property, the not-historically-significant modern building wrapping around the two sides of the Foundry. Removal of the modern building could allow access to new development at the east end of the site in a way that maintains the visual character of the "street" between the Erection Shop, Machine Shop, and Foundry and the Car Shop and Blacksmith Shop.

- Compatible new buildings on the sites of the demolished Boiler Shop and Tin and Smith Shop could reinforce the historic character of the site's "streets."

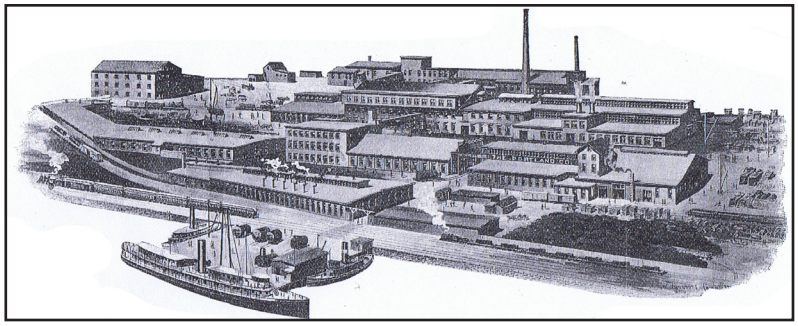


Section I:
Historic Significance of the Portland Company

National Historic Significance of the Portland Company

The Portland Company complex is a rare surviving example of a pre-Civil War foundry, machine shop, and car shop complex built for the manufacture of railroad equipment in 1847. It appears to have been the first such self-contained complex in the nation built specifically for that purpose, with all of the necessary shops and a foundry on a single site. It also contains the oldest surviving railroad shop buildings in the nation.

The first companies to produce railroad locomotives in the United States beginning in 1830 were existing machine shops and/or foundries which adapted existing machinery and practices to build steam locomotives. The few companies established specifically to produce locomotives in the 1830s and early 1840s used outside foundries for the necessary castings. This included the Norris Steam Carriage Company (later Norris Locomotive Works) in Philadelphia and the Baltimore & Ohio Railroad shops at Mount Clare, Maryland, which were begun in 1829. The first foundry at the Mount Clare Shops, now a National Historic Landmark, was not constructed until after the Civil War. The earliest surviving shop building at Mount Clare dates from 1869-70. A number of early locomotives were manufactured by the West Point Foundry in New York, established after the War of 1812 to produce armaments and ammunition for the American forces. This plant exists now only as fragmentary ruins in a state park Baldwin Locomotive Works, which would become America's largest producer of steam locomotives, began when former watchmaker Mathias Baldwin built a working model steam locomotive for the Peale Museum in Philadelphia in 1831. Baldwin and a partner had established a machine shop in 1825 to manufacture bookbinding tools and textile printing cylinders. In 1832, they built the first full scale Baldwin locomotive, again using an outside foundry. The original Baldwin works were demolished in 1937, after a new plant was built at another location. The neighboring Norris Locomotive Works buildings had been demolished in 1896. Surviving railroad locomotive foundries and shops from before the Civil War are extremely rare today. It appears from recent research that except for a possible few individual buildings that were once part of locomotive manufacturing complexes, the pre-1860 Portland Company buildings are the only ones remaining. As mentioned above, the Portland Company complex was apparently the first fully self-contained complex built specifically for locomotive construction. It is also the only surviving plant where locomotives were built for the U.S. Government for the use of the Union Army as part of the Civil War effort.[1]



Sketch of the Portland Company c. 1910. Courtesy of the Maine Historic Preservation Commission.

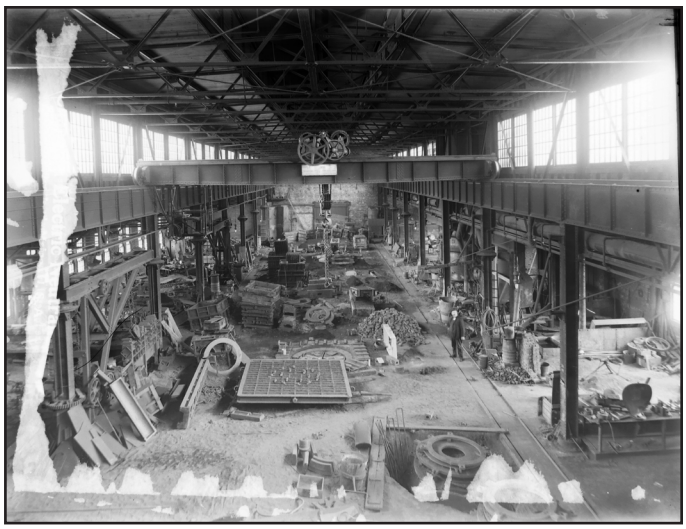
Locomotive rendering, 1851. Courtesy of the Maine Historical Society.

1 Information contained in this paragraph was compiled from numerous sources, the most important being:
Meyer, David R. *Networked Machinists: High-Technology Industries in Antebellum America*.
Converse, John H. "Locomotive Building in the United States," *Cassier's Magazine*, Volume 20, 1901. 221-237.
Colburn, Zerah. *The Locomotive Engine: Including a Description of Its Structure, Rules for Estimating Its Capabilities, and Practical Observations on Its Construction and Management*, 1851.
Lamb, J. Parker. *Perfecting the American Steam Locomotive*, 2003.
Simmons-Boardman Publishing Company. "The Norris Locomotive Works," *Railway Age and Railway Review*,

The use of cast metals, particularly iron, was central to the rapid industrialization and expansion of the United States in the nineteenth century. Although the technology was ancient, the use of it at the scale undertaken during the period the Portland Company was founded was unprecedented. Cast iron has been called, "the plastic of the nineteenth century" for the way it transformed production and expanded the range of products available to industry and the public. Putting all of the stages of production for large machines, like steam locomotives, in one place was a radical advance over traditional practices. Combined with the use of patterned cast iron parts, as opposed to individually hand-crafted unique parts, this advance laid the foundation for Henry Ford's next step in the progression of efficient production, the assembly line. The Portland Company complex represents an important advance in this process and is possibly the only surviving example of such a complex documenting this stage of industrial production in the United States. Its survival in largely intact condition in 2014 is noteworthy and remarkable.

State Historic Significance of the Portland Company

The Portland Company made a significant contribution to the development of Maine's railroads (including the state's iconic two-foot gauge lines) and maritime shipping industry. The locomotives, railroad cars, marine engines and boilers, and maritime navigation aids produced entirely or in part at the Portland Company were important to the development of rail and maritime transportation in the state of Maine from the middle of the nineteenth century into the twentieth century. Industrial expansion, natural resource extraction, commerce, and tourism all benefited from improved transportation made possible by products of the Portland Company. The Portland Company was the state's largest nineteenth century foundry-machine shop, with those two shops combined in a way that was unprecedented in Maine. The company grew to be the state's most substantial engineering and machine manufacturing business, employing 150 of the 500 machinists in the state at one point.[2] The Portland Company also played a significant role in the development of many important industries in Maine including the paper-making, textile and canning industries. A number of industrial processes likewise benefitted from the research and development of electrical engineer and inventor William Chapman for the Portland Company and through the Chapman Electric Neutralizer Company located at the Portland Company.



Interior view of the Foundry Building, c. 1880. Courtesy of the Maine Historical Society.

Railroads

The Portland Company was created as an adjunct to the Atlantic & St. Lawrence Railroad shortly after

Volume 47, 1909. 231-236.
Swank, James Moore. *History of the Manufacture of Iron in All Ages: And Particularly in the United States from Colonial Time to 1891*.
White, John H. *A History of the American Locomotive: Its Development, 1830-188*0.
A. Sinclair Company. *Railway and Locomotive Engineering: A Practical Journal of Railway Motive Power and Rolling Stock*, Volume 16, 1903.
Solomon, Brian. *American Steam Locomotive*, 1998.
Kinert, Reed. *Early American Steam Locomotives*, 2012.

2 Rivard, Paul E. *Made in Maine: From Home and Workshops to Mills and Factories*, 2007, 144.

that line was chartered to run from Portland to Montreal. The principal proponent of the Atlantic & St. Lawrence Railroad, John A. Poor, was the first president of the Portland Company as well as a director of the railroad company.

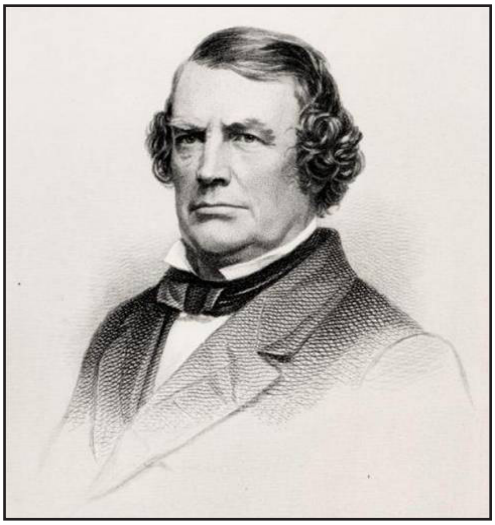
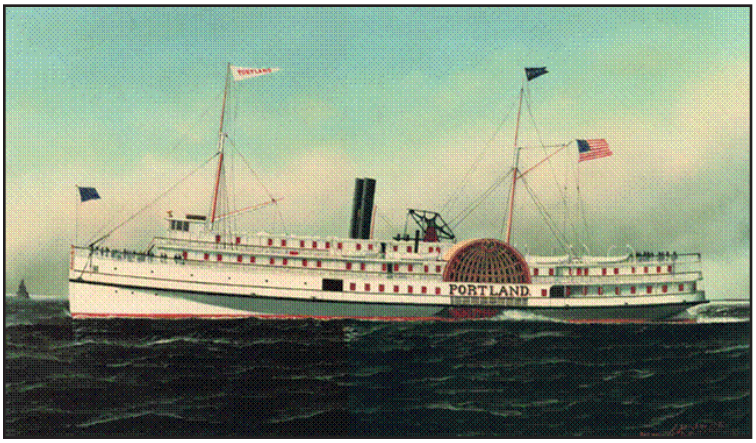


Illustration of John A. Poor. Courtesy of the Maine Historical Society.

Maine railroads that used Portland Company produced locomotives and cars included the Atlantic & St. Lawrence, the Grand Trunk, the Portland, Saco & Portsmouth, Portland & Kennebec, Portland & Rochester, Portland & Ogdensburg, Eastern, Maine Central, Boston & Maine, and Rumford Falls & Buckfield railroads. A number of locomotives were built for Maine's iconic two-foot gauge railroads including the Phillips & Rangely, Sandy River, Kennebec Central, Bridgton & Saco River, and the Wiscasset & Quebec. Maine's logging railroads also used Portland Company equipment, including geared locomotives to run on the rough temporary tracks of logging railroads and log bunks to transport logs on. In addition to locomotives, the Portland Company manufactured passenger and freight cars, wheels, and rail components including switch frogs.

Portland Company locomotives were also built for many out-of-state railroads. One hundred locomotives were manufactured for the Northern Pacific Railroad, with half delivered overland and half loaded on ships and sent around Cape Horn to the West Coast. Locomotives were also built for Canadian railroads including the New Brunswick & Canada and the Quebec, Montreal, and the Ottawa, & Occidental, as well as for the Panama Railroad in Central America. Appendix C contains a list of all the railroads named in the records of the Portland Company at the Maine Historical Society.[3]



Courtesy of the Maine Historical Society.

Maritime Transportation

The directors of the new Portland Company received the first request for the company to build a boiler for a steam ship before the first buildings were completed or operations begun. During the course of its history, the Portland Company manufactured and installed boilers, marine engines and other equipment for hundreds of vessels constructed at shipyards from Kennebunkport to Lubec, as well as its own shipyard in South Portland. Outside of Maine, Portland Company supplied boilers, engines, and other equipment to hundreds of vessels built at yards as close as Massachusetts and as far away as Oregon. Vessels included massive passenger steamers like the *Portland* (280' long), trawlers and porgy boats for commercial fishing, freighters, passenger ferries, tow and tug boats, private yachts, and the 205' long steam gun ships *Agawam* and *Pontoosuc*, built for the U. S. Navy during the Civil War.[4]

3 Records of the Portland Company, Maine Historical Society.
Fletcher, David H. *The Portland Company, 1846-1982*, 2002.
4 Records of the Portland Company, Maine Historical Society.
Fletcher, David H. *The Portland Company, 1846-1982*, 2002.

Also significant to marine transportation was the Portland Company's production of lighthouse components and navigation buoys. Drawings at the Maine Historical Society from the late 1860s through the late 1890s include cast iron parts such as lanterns, lamp decks, spiral stairways, doors, sashes, walkways, railings, and other parts for lighthouses in Maine, New Hampshire and Massachusetts. In some cases, such as "Bug Light" at the entrance to Portland Harbor, they manufactured the entire Greek Revival style cast iron structure. They also produced elaborate fog signal whistles which included a boiler, timer, and whistle for installation at light stations and fog signal stations.

Other Maine Industries

Maine companies that used Portland Company equipment include the Burnham & Morrill and Portland Packing Company canning companies, S. D. Warren Paper Company, and Sanford Mills. Specialized equipment for the paper industry included chipper discs and massive debarking drums, washing drums, and sulphite digesters. Numerous large industrial plants and mills were heated and powered by Portland Company steam boilers. In the mid-twentieth century the Portland Company produced parts for rotary welding inside pipes used in nuclear power plants and manufactured neutron reactor shells for those plants. They also manufactured machinery for forming and extruding plastics.

View of a Portland Company digester sitting between the Blacksmith & Tank shop and Boiler Shop. Courtesy of the Maine Historical Society.

William H. Chapman

In the early twentieth century, inventor and electrical engineer William H. Chapman (1860 - 1944) was in charge of the Portland Company's research department and did important work in the basic research that led to the development of microwave technology as well as experimentation and invention related to the use of electricity in manufacturing.[5] Portland Company voltage regulators were used in mills and factories throughout Maine and beyond. Chapman also invented the Chapman Electric Neutralizing Machine while at the Portland Company in 1906.[6] This device removed static electricity during the manufacturing process and was critical to the paper and textile industries of Maine. *Who's Who in New England*, 1909, lists Chapman as electrical engineer for the Portland Company and also as director and electrical engineer for Chapman Electric Neutralizer Company, with an office at 58 Fore Street – indicating that Chapman had his own company within the complex of the Portland Company while working for the company. Chapman received a second patent for improvements to the original electric neutralizing design in 1916, the same year he patented an elevator brake.

Local Historic Significance of the Portland Company

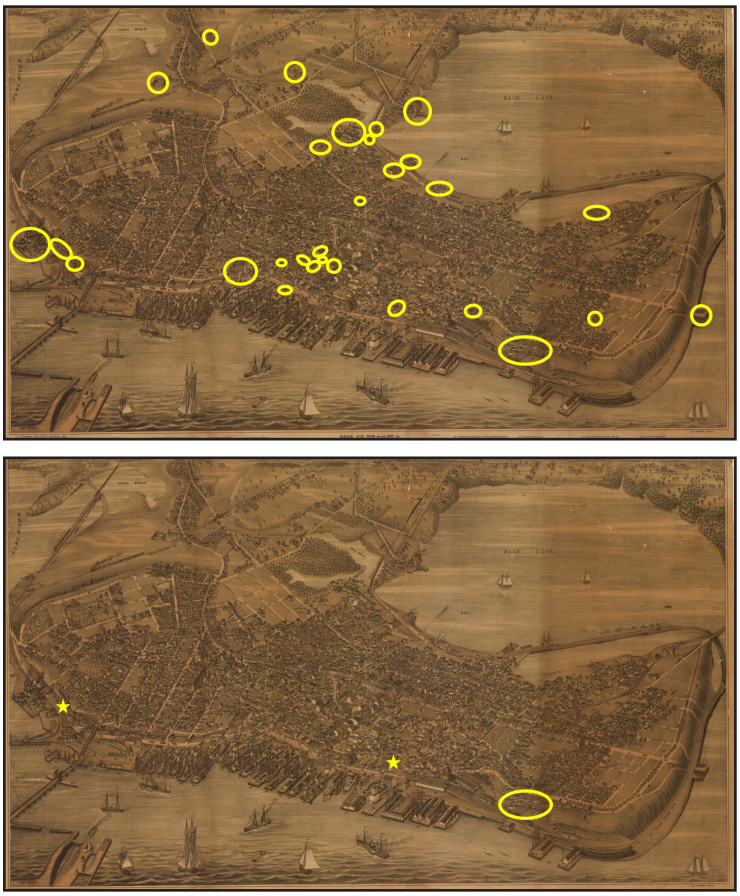
Portland Company is the only intact 19th – early 20th century industrial complex in the city of Portland

The Portland Company has local historic significance as the largest business in the city in the mid-nineteenth century and the only remaining intact nineteenth and early twentieth century industrial complex in the city of Portland. Virtually all evidence of Portland's nineteenth century industrial history has been lost with the exception of the Portland Company complex. In *Portland Maine, Its Representative Business Men and Points of Interest*, author George F. Bacon wrote of the Portland Company in 1891, "Since the

5 Sprague, Phineas. Society for Industrial Archaeology conference tour of the Portland Company complex, June 16, 2014.

6 US Patent #878273 A, filed May 25, 1906, granted February 4, 1908.

incorporation of the Portland Company about 45 years ago it has done more than any other one corporation or firm to make the name of the city well and favorably known throughout the United States, and if there is one enterprise entitled above all others to be classed as representative it is that conducted by the company in question, for this is a Portland undertaking, has always been conducted by Portland men, is located on Portland territory, and by distributing about a quarter of a million of dollars in wages annually has been and is a most powerful factor in attracting skilled workmen to and otherwise promoting the growth of the city."[7]



Top: view showing 1876 aerial drawing with industrial complexes circled in white. Below: similar view with remaining industrial sites highlighted.

Thirty-three manufacturing plants can be identified in the 1876 Bird's Eye View of Portland. Of the thirty-three, which include Portland Stove Foundry, J. B. Brown & Son's Sugar Refinery, Forest City Sugar Refining Company, Eagle Sugar Refining Company, Portland Packing Company, and Portland Stoneware Company, only three complexes survive to any extent in 2014. Two of these have only a single surviving building, one from the Star Match Factory on West Commercial Street and one from the original Burnham & Morrill Cannery complex on Franklin Street (yellow stars at left). Only the Portland Company complex remains largely intact 138 years later. In 1924 Portland had 60 sizable companies engaged in industrial production of various sorts, occupying more than 85 buildings. Of these individual buildings, fewer than a dozen survive outside the Portland Company. Six companies had large complexes of buildings, including the E. T. Burrowes Company, Thomas Laughlin Company, and Southworth Machine Company.[8] Fragmentary remains of some of these complexes, such as the early twentieth century Thomas Laughlin Company foundry building on Hampshire Street now used by Shipyard Brewery, only hint at the history of these sites where hundreds of Portland residents made their livings over many decades.

Portland Company development associated with the creation of Commercial Street

The Portland Company has local historic significance for its association with several significant 19th century planning and development initiatives within the city of Portland. As part of John A. Poor's vision for creating a modern international port at Portland, he conceived of a wide new street along the waterfront which would contain railroad tracks to connect the Atlantic & St. Lawrence R. R. on the east end of the city to the Portland, Saco & Portsmouth R. R. on the west end while providing both railroads access to the numerous wharves between their terminals. The narrow original waterfront street, Fore Street, followed the natural landform, snaking along the shore around Clay and Broad coves. The new street would be built by filling between the existing wharves below Fore Street, far enough out into the harbor to allow the construction of large new warehouse buildings along the land side of the street. Broad Cove would be filled

7 Bacon, George F. *Portland Maine, Its Representative Business Men and Points of Interest*, 1891, 156.
8 Compiled from the City of Portland 1924 Tax Records.

for construction of the Atlantic & St. Lawrence Railroad terminal and for the Portland Company works and Clay Cove would be filled for the street and new buildings. The Portland Company site alone is seven acres, the majority of it made by filling the mud flats and cove. This project was undertaken cooperatively by the two railroads, the Portland Comapny, and the city of Portland, with the railroads paying the cost of filling between the wharves and the City paying wharf owners for the value of their properties seized through eminent domain. The mile-long and one hundred foot wide street would be named Commercial Street.[9]

This project was the largest urban planning initiative undertaken in the city of Portland in the nineteenth century and was transformative in its effects. Before arrival of the Atlantic & St. Lawrence Railroad and Portland Company with the related construction of Commercial Street, Portland had a waterfront infrastructure left over from the eighteenth century that was inefficient and ill suited to the age of steam. Shipyards building wooden sailing vessels still launched into Broad Cove. The last vessel launched from these, on November, 9, 1847, was the *Lemuel Dyer*, which struck the railroad trestle then under construction across Broad Cove during its launching.[10] Following the construction of Commercial Street, wharves were extended and directly accessible by rail. Goods could be efficiently transferred between ships and trains, connecting industry and agriculture in interior Maine, New Hampshire, and Vermont to ports in America and Europe via sail and steam ships. With the completion of the Atlantic & St. Lawrence Railroad to Montreal, and subsequent leasing of the line to the Canadian and British owned Grand Trunk Railroad, all of the wharves on the Portland waterfront were connected to interior Canada. As the Grand Trunk extended westward in Canada, eventually reaching the Mid-West of both countries, the Portland waterfront had a direct connection to the agricultural products of the Mid-West and to cities such as Detroit and Chicago with Portland Company-built locomotives pulling Portland Company freight and passenger cars. Direct service between Portland and Chicago began in 1889. The massive grain elevators that would rise over the Grand Trunk yard where Broad Cove had been were the result of this connection. Trans-Atlantic passenger steamship service was instituted the year the railroad to Canada was completed, turning Portland into an international port of entry. This direct connection between Portland and Europe resulted in the immigration of people of numerous nationalities and ethnicities to Portland, diversifying and expanding the population of the city.

The cooperation between the City of Portland in the planning and implementation of the various components of Poor's modernization plan can clearly be seen in the City's investment of $2 million dollars in the construction of the railroad to Canada, approved by the legislature and funded through municipal bonds approved by the City Council and voters.[11] Existing plans for the first stone retaining wall for the Portland Company along Fore Street, in the collections of the Maine Historical Society, were drawn for the company by City Engineer William Goodwin. This wall was constructed in the 1870s to allow room for the company to expand on its increasingly tight site between Munjoy Hill and the Grand Trunk Railroad tracks. It stood on Portland Company property but was rebuilt by the City of Portland in the 1890s, when the original wall developed structural issues[12].

Residential development of the portion of Munjoy Hill across Fore Street from the Portland Company was clearly triggered by the opening of the plant in 1847. Atlantic, St. Lawrence, Sherbrooke, and Waterville streets were laid out opposite the site while the original Portland Company buildings were under construction. The city directory from 1850 shows a heavy concentration of Portland Company employees residing on these streets, including 12 machinists, 6 blacksmiths, a boiler maker, a "car builder." Sixty-five additional Portland Company workers lived on other nearby streets including Fore, Adams, India,

9 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890.
Records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

10 Thurston & Company. ***The Portland Reference Book and City Directory, 1850-1851*, 221.**

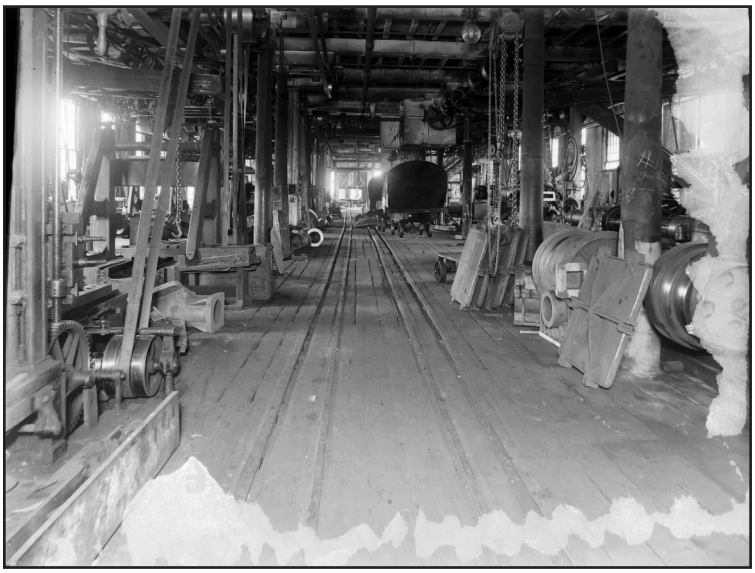
11 Records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

12 Drawings in City of Portland Public Service vault. 55 Portland Street, Portland, ME.

Sumner, Mountfort, Hancock, Hampshire, and Federal. Nine "steam engineers" were also residing in the neighborhood but it is unclear whether they were involved with the Portland Company or Atlantic & St. Lawrence Railroad locomotive engineers, possibly some of each.[13] By 1858, another street, called Warren Street (now Kellogg), had been extended from Adams, parallel with Waterville, Atlantic, and St. Lawrence. The 1876 Bird's Eye View illustration of Portland shows two rows of five identical two-story buildings. Such a development pattern suggests housing built for employees of an industrial concern. The Portland Company was the only major industry near the site and one of its original directors was George Warren, suggesting a possible connection between the housing and the company. Minutes of the Director's meeting held August 3, 1866, record a vote of the Board authorizing the Treasurer to lease unoccupied lands of the company across Fore Street for the erection of temporary housing for employees of the company made homeless by the Great Fire. The buildings in the Bird's Eye View are likely the result of this action. At a meeting of the Board in 1871 the Directors authorized the sale of the company's lands north of Fore Street, which may have included the temporary housing built after the fire. The Portland 1924 tax record photos indicate that all of those buildings were gone by that date, replaced by three story "triple-decker" tenement housing facing onto Kellogg and Sheridan streets. Most of the triple-deckers were replaced by contemporary multiunit housing in the 1960s, but several houses of the 1860s period remain on the opposite side of the street that was home to the displaced Portland Company workers in 1866.

Historic Architectural Significance of the Portland Company Buildings and Site

The buildings of the Portland Company complex have historic architectural significance because they remain substantially unaltered from the time of their original construction and consequently clearly show the distinguishing characteristics (design and construction materials) of several distinctive types of industrial buildings built between 1847 and 1920.



Interior view of the Machine Shop. Courtesy of the Maine Historical Society.

The Portland Company buildings remaining from the 1840s and 1850s are the only industrial buildings of that period surviving in the city of Portland.

The buildings of the Portland Company also have historic architectural significance because each of the remaining buildings served distinctive function(s) in the historic manufacturing process. Collectively, the existing buildings encompass the complete historic manufacturing process of the Portland Company.

The earliest buildings constructed by the Portland Company were typical of industrial buildings of the period, with brick walls, granite lintels, and slate roofs. Projecting pilasters on the exterior walls provided a suggestion of the Greek Revival style then dominant while adding strength to the walls. The large multi-light wood double-hung windows were also typical of the period, when it was essential to maximize the amount of daylight reaching the interior of the building. The additional buildings constructed for the complex between the 1850s and the 1880s are in the same architectural vocabulary and use the same materials as the 1840s buildings.

13 Thurston & Company. ***The Portland Reference Book and City Directory, 1850-1851.***

As the company grew rapidly in the early years, some buildings or building additions were constructed of wood for the sake of speed and cost. Many of these were replaced with brick buildings, sometimes after being destroyed by fire.[14] Alterations were made to the buildings over time to accommodate the changing needs of the manufacturing processes that took place in the plant, as is typical of industrial buildings. One of the more interesting alterations was the early twentieth century addition of projecting shed dormers to the 1847 Machine Shop building designed by Portland architect Frederick A. Tompson to create space for the company's offices and drafting department as well as the research and development laboratory of inventor/engineer William H. Chapman. The vault in the "tower" along Fore Street was part of this same project by Tompson for which the blueprints survive.[15] The Foundry building of 1895 and Erecting Shop of 1918 are typical of industrial buildings built after the introduction of structural steel for this type of building. This change in technology allowed for the creation of much larger open floor spaces with over-head traveling cranes to facilitate more efficient production.

View of the Portland Company yard. Courtesy of the Maine Historical Society.

The buildings of the complex retain a high degree of architectural integrity to the period of significance for the complex (Portland Company production 1847 – 1982). While much of the manufacturing machinery has been removed, evidence of industrial uses can be found throughout the buildings, such as overhead shafting for operating machinery, and wood and iron cranes attached to support columns. Overhead traveling cranes remain in the Foundry and Erecting Shop. The most significant loss to the architectural integrity of the complex was the demolition of the boiler shop building (1858, 1890) in the late-20th century and its replacement by a larger modern metal building that abuts two sides of the foundry building. The one story Tin and Smith Shop (1882), which stood to the southeast of the Blacksmith Shop, was removed before 1949. The attached timeline (Appendix D) details the construction and alteration dates for the buildings of the complex.

The various buildings of the complex contain examples of a wide variety of building construction engineering techniques employed to increase the strength or functionality of the buildings. These include a number of wood and metal roof truss systems; large floor areas hung from wooden roof truss systems; brick barrel vaulting; cast concrete and steel beam vaulting; cantilevered shed dormers; and single and double trussed girders used to increase the load carrying capacity of upper floors without obstructing the lower floors with posts. The earliest buildings are of load- bearing masonry wall construction with internal timber framing and later buildings utilize steel framing systems. The 1895 Foundry uses an unusual integrated steel column and brick exterior wall system. This was a comparatively early use of structural steel in Maine and represents a transitional phase in the construction technology as large buildings moved from load-bearing masonry walls to steel skeleton framing.

Historic Significance and Visual Character of the Portland Company Site

The primary entrance to the site off Fore Street is a curving roadway that follows the grade between the original shoreline at Fore Street and the filled mudflat land on which the complex is built. This has been the

14 See attached Developmental Timeline and Development Modeling.
15 Portland Company Records, Maine Historical Society.

Historic view of the lab/office space, third floor of the machine shop. Courtesy of the Maine Historical Society.

Current view of the lab/office space.

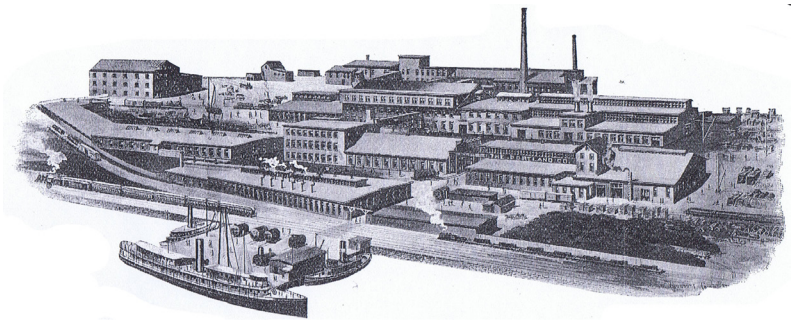
entrance to the property since 1847 and is historically significant as an original site feature that has not been substantially altered. This curving roadway leads to the historic entrance yard of the complex.

The entrance yard has historically been, and continues to be, an open space serving the function of entranceway to the linear manufacturing paths of circulation. It is the point from which these streets and alleys of the complex are accessed. Historically, it also served as a fire break between the manufacturing facilities, the paint shop and the pattern storage buildings. At different points in time a car shop and other buildings have projected into this space, especially prior to the construction of the much larger erecting shop (building 1) in 1918. The entrance yard has been in its current configuration for nearly 100 years.

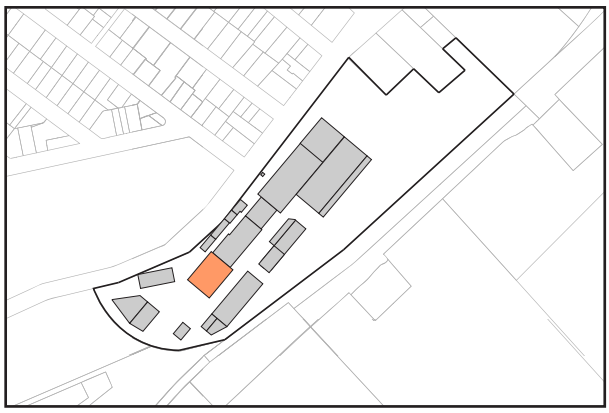
The historic functional organization and placement of the Portland Company buildings in linear proximity to each other creates a visual character for the majority of the site that is unique for Portland in the way that the industrial buildings form private streets or alleys. This is similar to the character found in large textile mill complexes in Maine cities like Lewiston, Biddeford, and Sanford but not found elsewhere in Portland. The overhead pedestrian bridges spanning these private streets are also unique in Portland and contribute to the visual character of the site. Although the railroad tracks that once served many of these buildings have been removed or buried under pavement, the arrangement of the buildings retains a lineal character that resulted from that historic infrastructure serving the buildings. The placement of several buildings outside these rows of buildings also documents considerations for their historic uses. Both the Pattern Storage buildings and the Paint Shop were placed away from other buildings to reduce the risk of fire spreading to them or from them. This was important for the Pattern buildings because they contained very valuable wood patterns for all of the products made by the Portland Company and for the Paint Shop because of the flammable nature of oil paints. The only significant fire at the complex started in the previous Paint Shop and spread to other nearby wooden buildings, destroying several.

Also unique in Portland is the manner in which the Fore Street retaining wall forms the rear wall of the buildings along the northwest side of the alley, with the side walls of the buildings forming buttresses to help support the retaining wall. The brick barrel vaults of the Boiler House support the retaining wall above and allow the space to project under the Fore Street sidewalk.

To a large degree, the architectural significance of the Portland Company exists in the relationship of the buildings to each other within the complex. The proximity and orientation of the buildings to each other permitted related manufacturing processes to take place in a way that allowed for the efficient progression of stages in the production of the company's products. Certain buildings focused on the later stages of manufacturing for particular categories of product, such as the Erecting Shop, Car Shop or Boiler Shop, with the earlier stages of production for all categories of product undertaken in the Foundry and Machine Shop. Research and development, design/drafting, drawing storage, pattern making, pattern storage, and paint storage buildings also served all of the product categories collectively.



Section II:
Integrity of the Existing Portland Company Resources

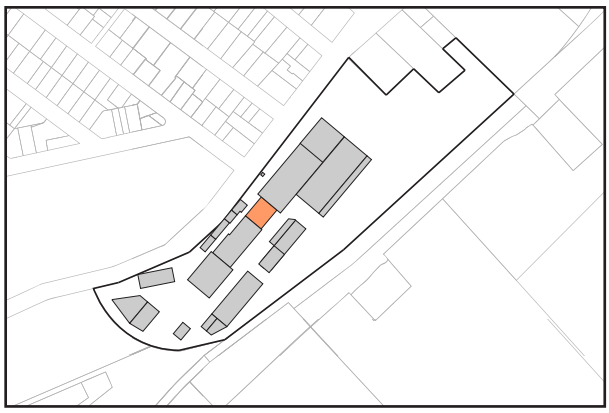


Building 1: Erecting Shop
Construction Date: 1918

The Erecting Shop was built to replace an earlier wooden erecting shop, built between 1871 and 1880 on the same site. The Foundry, Machine Shop, and Erecting Shop were closely related in the production process, and were aligned so the steps of the work could flow from the Foundry, through the Machine Shop, and into the Erecting Shop, where a locomotive or other large piece of machinery could be assembled above railroad tracks that led from the building to the Grand Trunk rail yard. The brick wall construction relates it to earlier buildings on the site, but its steel truss roofing system, electric overhead traveling crane, clerestory, and large steel framed windows provided maximum utility with a large open floor space and considerable natural light for the assembly process. The building retains a very high degree of integrity to the time of its construction with some alterations to the south and east elevations. These involve increasing the size of the bay doors on the south elevation, likely during the period of significance; and infilling two windows on the east elevation with modern siding material. The remainder of original windows are intact, with some limited areas of deterioration to the frames.

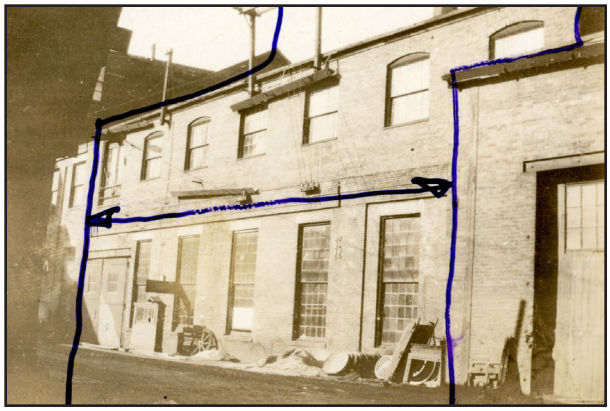
Building 2: Machine Shop
Construction Date: c. 1847

The Machine Shop is one of the first buildings constructed on the site and was one of the key buildings in the production process of locomotives. It is where castings made in the Foundry were finished and prepared for installation. Prior to the construction of the first Erecting Shop (c. 1880) locomotive assembly took place in the Machine Shop. The boilers for the earliest locomotives were also assembled here, before the Boiler Shop was built. Post-mounted cranes and carts were used to move heavy items within the shop, with smaller items moved to the second floor for machining. A truss system allowed the second floor to hang from the roof, leaving the first floor largely open. Some wooden posts have been added in the first floor, to meet modern code requirements for the second story to function as a public assembly space. The building retains a high degree of integrity to the time of its construction with early 20th century alterations to the roof and attic. The c. 1905 Frederick A. Tompson designed offices, drafting room, and electrical laboratory at the attic level are intact, including beadboard office partitions, drafting tables, desks drawing storage drawer units, and electrical equipment in the laboratory. The apparatus used to reflect sunlight from a skylight to develop blueprints remains in place below the roof. Historic plans show tables for 17 draftsmen; desks for 21 clerks and assistant clerks; bookkeeper; purchasing agent; and office boy; with cubicles for the assistant electrical engineer, assistant elevator engineer, assistant mechanical engineer, assistant manager, sales manager, superintendant, and manager; with a private office for the general manager and three additional private offices. An upper attic level above the laboratory contains a walkway lined with storage bins for wooden casting patterns, still full of patterns. The original wood and wrought iron Queen Post Truss roof system remains in place with the second floor suspended from it. The use of iron rods for the Queen Posts in the trusses represents an advance in technology from the all-wood trusses common in New England in the 18th and early 19th centuries, as America's increased industrialization made the use of structural metals possible.

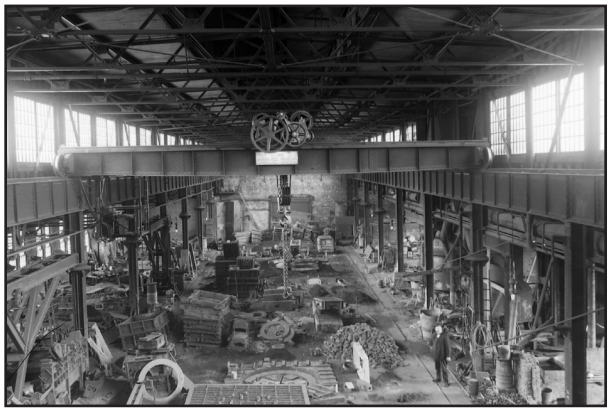


Building 3: Machine Shop
Construction Date: c. 1847

This section of the Machine Shop was built in 1847 as a one story blacksmith shop. When the second story was added, c. 1895, the original wood and wrought iron Queen Post Truss roof system was left in place and the floor hung from it with iron rods and double-strut trussed girders. The added wall height essentially creates full-length shed dormers on each side of the original roof and a double-pitched roof with the original gable peak remaining above the much shallower pitch of the shed dormers on either side. Because both ends of the building abut other buildings, this unusual roof form is not visible from the ground. A monitor, probably dating from the original construction, extends along the center portion of the ridge. The ingenious approach taken to expanding this building allowed a second story to be added while retaining the original roof truss structure and the open first floor it made possible. This section of the Machine Shop retains a very high degree of integrity to the period of its expansion into a two story building, c. 1895, while retaining nearly all of the materials from its original 1847 construction. Some wooden posts have been added in the first floor, to meet modern code requirements for the second story to function as a public assembly space. The second floor was the pattern shop, where wooden patterns were made for the iron castings made in the Foundry.



Building 4: Foundry and Acetylene House
Construction Date: 1895; 1904-09

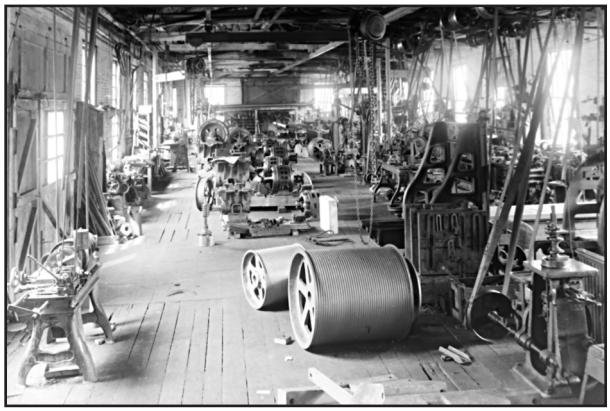


The Foundry was the most important building in the production process, being the space where molten iron and steel were cast in sand molds to produce the parts for the various machines and engines made by the company. Using then cutting-edge technology, it was built in the late 19th century to replace the original 1847 foundry and additions on the same site. The 1896 foundry features a steel truss roof system and could be wider and taller than the earlier building, with a tall clerestory for lighting the center of the building and a modern electric overhead traveling crane to move cauldrons of molten metal and heavy castings. The building utilizes an unusual transitional construction system in its exterior walls. The riveted steel roof trusses were erected on posts formed of back-to-back U channel steel with spacers between them to allow the roof truss gusset plate to be riveted in place between the two U channels at the top. Once the roof system was erected, the spaces between the posts were filled with brick laid up in common bond and engaging with the posts by extending into the recess of the U channel. Above the tops of the posts, the brick wall encased and engaged the steel trusses to the eaves. It appears that once the brick was in place, the roof trusses were supported primarily by the brick walls, not by the steel posts. The Foundry building retains a high degree of integrity to the period of significance and stands largely as built in 1895 except for the northeast end, which was removed entirely when the building was extended in the mid-20th century. Much of the southeast elevation is now contained within the abutting modern metal building and its windows have been infilled. There is some infill construction along this side for offices and storage areas. The original exterior wall and roof system appear to be intact within the later building addition.

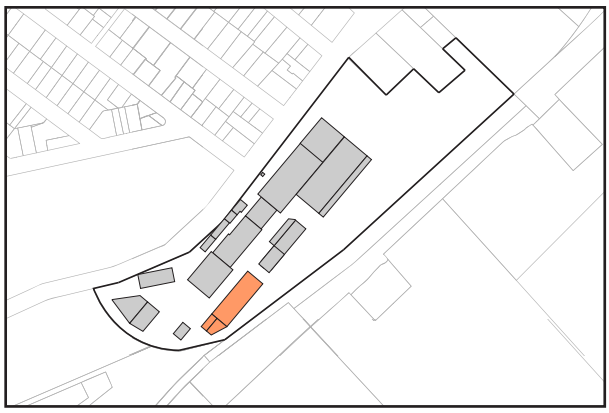
The Acetylene House, located on the terrace below the upper retaining wall to the west of the foundry, was a simple brick box, approximately eight feet square. Its roof has failed, and the masonry arch over the door has collapsed. Original drawings for the acetylene house show a shed roof.

Building 6: Blacksmith & Tank Shop
Construction Date: 1883; 1896-1904

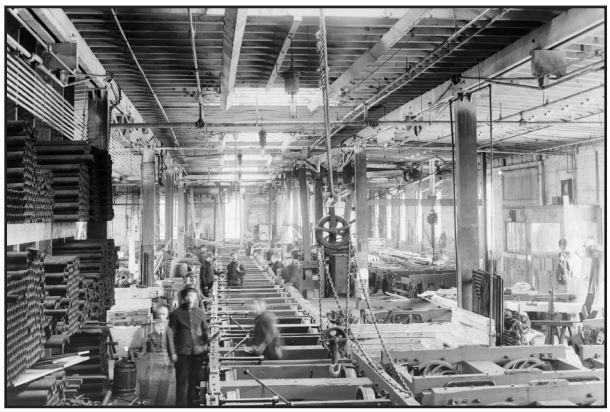
As the plant expanded during the 19th century, additional blacksmith shops were constructed to serve different areas of production. Originally freestanding and serving both the machine shop and car shop, this blacksmith shop later served the attached tank shop, where the company produced tanks for various uses from industrial water tanks to municipal standpipes. This building replaced an earlier and wider blacksmith shop on the same site and was likely built reusing the brick and granite of the earlier shop. Its design and use of materials are more like the 1840s and '50s buildings on the site than the 1860s and '70s buildings that followed. It is unclear why the building was rebuilt, but its change in width increased the clearances between the blacksmith shop and the machine shop and foundry, which had additions made to their width during this period. This may have been the reason for rebuilding. The Blacksmith & Tank Shop retains a high degree of integrity to the period of significance. The former Tank Shop now contains the Maine Narrow Gauge Railroad Museum with exposed structural framing and brick walls. Original drawings for the building show it to be longer than it currently exists. A portion of it was likely demolished for the construction of the three story block between 1896 and 1904. This portion of the building contained the Chapman Electric Company, a subsidiary of the Portland Company run by the company's electrical engineer, William Chapman. The Portland Company's electric elevator production also occurred in this building, starting in the early 20th century. The three-story block retains integrity to the period of significance



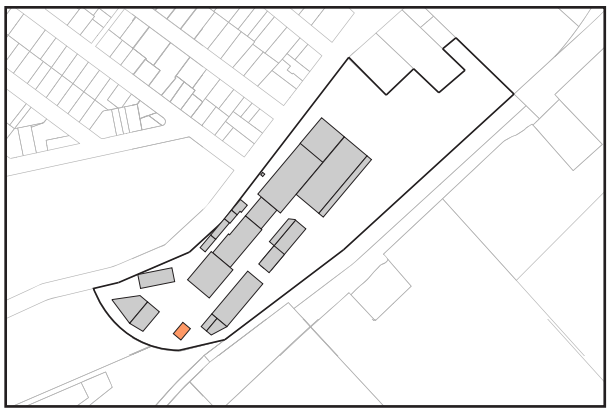
with some alterations to the interior spaces to create offices on the third floor and a meeting room on the second floor. The elevator tower, with historic machinery remains attached to the north side of the building. Many original windows in the three-story block have been replaced.



Building 7: Car Shop
Construction Date: c. 1873; 1904



The Portland Company was founded to manufacture railroad passenger and freight cars as well as locomotives and other equipment. The first wooden car shop was built south of the blacksmith shop around 1847-48. A second car shop was constructed between 1858 and 1864 just slightly to the southwest of the first car shop. Both buildings were destroyed by fire in 1873, and replaced by this brick building. Like the Pattern Storage Building and its additions from the same period, this building uses segmental brick arches over the windows in place of the granite lintels on the earlier buildings. The placement of this building was dictated by the need to have railroad tracks enter the building from the south end. Railroad cars of the period were largely of wood construction with cast and wrought iron fittings, hence the 1904 lumber storage addition to the building. Prior to the construction of the lumber sheds, the car shop had an open car shed adjacent to the original 50' x 21' painting and erecting area of the car shop (projecting from the south end). Like the Foundry/Machine Shop/Erecting Shop, the Car Shop was aligned with the Blacksmith Shop, allowing ironwork for the cars to be efficiently transported into the car shop. It is possible that the car frames and wheel sets were assembled in the blacksmith shop and then rolled over to the Car Shop for construction of the superstructure and finishing. After the Portland Company ceased production of railroad cars, around 1900, the Car Shop was used as a showroom and repair shop for automobiles produced by the Knox Automobile Co. and others and sold by the Portland Company. Subsequently, the Car Shop was used for steel fabrication and had a related sandblasting room built into it. The Car Shop retains a high level of integrity with some alterations to openings to create additional garage bay entry doors. Some easily reversible modern finishes have been installed on the interior. The Lumber Shed addition at the southeast corner is largely intact from construction, with exposed wood framing.

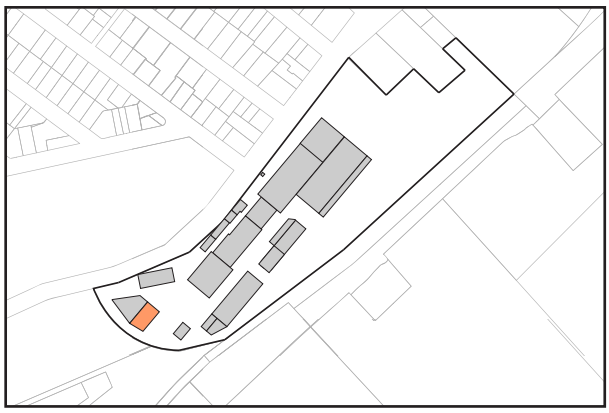


Building 10: Paint Shop
Construction Date: c. 1873

An earlier wood paint shop (likely one of the earlier car shops, converted for use) was destroyed by fire in 1873, taking the car shop and several other buildings with it. It was rebuilt in brick, probably to be less flammable, and was originally located at some distance from other buildings, likely to limit the possibility of fire spreading. Fires in paint shops were quite common, given the highly flammable nature of the paints and solvents used. At the other end of Portland, the railroad shops at Thompson's Point were destroyed in 1903 by a fire that started in the paint shop there. The Paint Shop retains integrity as a simple brick structure with a wood-framed roof. In 1904, the large lumber shed connected to the east elevation of the Paint Shop and extended down to connect to the Car Shop. The portion of the lumber shed connecting to the Paint Shop has since been demolished. The south wall has been partially reconstructed and the interior features many modern surfaces to create various ventilated painting areas. Original wood structural members are visible throughout the building, though most of the original window openings have been infilled with brick.

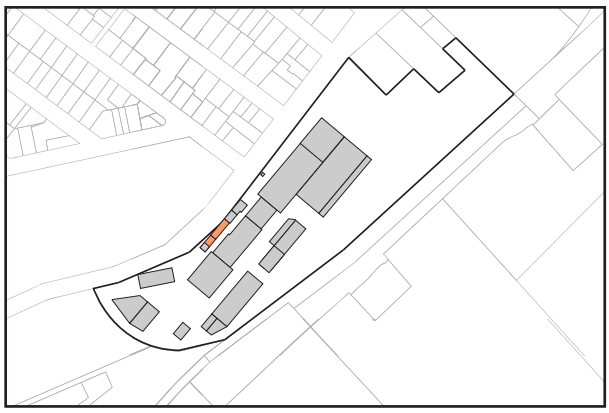
Building 11: Pattern Storehouse
Construction Date: 1885; 1895

The design and production of the hand-made wood patterns that were used for casting iron and steel in sand molds was central to the functioning of the Portland Company, and represented a large capital investment for the company. Patterns were reused over long periods of time and their preservation was of critical importance. Documentation indicates that patterns were stored in several locations, including the attic of the Machine Shop, for the first several decades of operation. In 1885, a separate Pattern Storehouse was constructed for their storage. It is not coincidental that it was located at some distance from the other buildings and was built of brick with a slate roof. It was also placed up-wind from the prevailing breezes. This provided additional protection for the company's large investment in flammable wooden patterns if other buildings in the complex caught fire. The Pattern Storehouse retains a high level of integrity to the period of significance. The interior still has an exposed wood structural system and brick walls. The first floor has been fitted for a retail space, though original materials are still exposed. The second floor has a modern drop ceiling and carpet installed over the originally exposed elements.



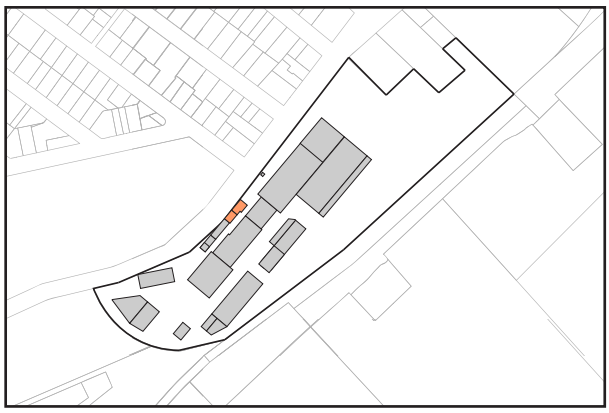
Building 12: Pattern Storehouse Addition
Construction Date: 1895

The Pattern Storehouse Addition was built immediately adjacent to the original storehouse, built a decade earlier, using the same materials and technology. From an early date, this building has had "PORTLAND CO." painted across its south elevation, making the complex immediately recognizable from Fore Street and the waterfront. The Pattern Storehouse Addition has a high level of integrity to the period of significance. The building has had no alterations to the interior and still contains many patterns used by the Portland Company.



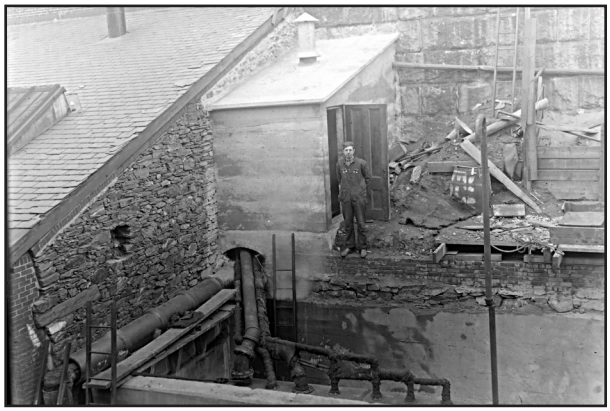
Building 14: Drafting Room and Storehouse
Construction Date: 1858-64

The Portland Company constructed a variety of smaller service structures along the Fore Street retaining wall during the 19th century, and made alterations to many of them to adapt them to differing uses into the 20th century. The masonry side walls of all the spaces along the north side of the alley, including the Boiler House and Brass Foundry, serve as buttresses for the stone retaining wall along Fore Street. The spaces were created by roofing over the recesses between the buttresses and building a wall along the alley. The placement of the Drafting Room and Storehouse, separate from the manufacturing buildings and adjacent to the original office building, is both functionally and symbolically relevant. As the company grew, the drafting department outgrew the space, and was moved to the new offices on the expanded third floor of the Machine Shop around 1905. The old drafting room was then used for drawing storage, with a new vault for drawings constructed above it (See Building 24 – Vault Storage). The Drafting Room and Storehouse retain integrity and has had little alterations over their history. The south portion of the original Drafting Room became part of the Vault upon its construction in the beginning of the 20th century. Numerous labeled wooden bins that were used for storage of parts during the Portland Company's operation remain in several of the spaces.

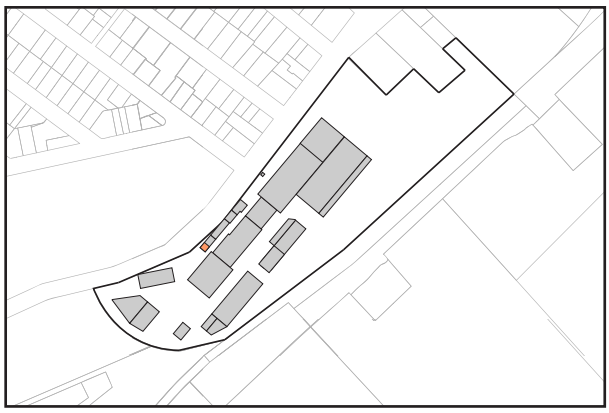


Buildings 15 & 16: Boiler House and Brass Foundry
Construction Date: 1858-64; 1864-71

Based on maps and plans of the complex, it appears the existing Boiler House was constructed between 1858 and 1864; the Brass Foundry was constructed between 1864 and 1871. The 1858 plan of the complex (in the collection of the Maine Historical Society) shows a brick building in this general location, though it is not likely either of the extant buildings. The 1886 Sanborn Map of the Portland Company does not show another Boiler House as suggesting in the Tremont Report. There is a Boiler Shop, where boilers were fabricated, in the northeast quadrant of the complex which may have led to the confusion. The side walls of these buildings, and of the small storage spaces to their west, serve as buttresses for the granite retaining wall the supports Fore Street as it climbs Munjoy Hill adjacent to the complex. The conversion of these voids between the structural buttresses into functional spaces for the complex is an example of ingenuity and determination to utilize every available space on the increasingly crowded site with Fore Street and Munjoy Hill containing one side of the property and the Grand Trunk Railroad properties containing the others. The Boiler House has suffered the loss of a majority of its façade, though remnants illustrate key architectural features that were included in the original construction. The interior, however, retains a remarkable pair of tall brick barrel vaults on stone walls that extend the space under the Fore Street esplanade and sidewalk. The Brass Foundry retains a high degree of integrity on the exterior. The interiors of both buildings appear to retain integrity. The Boiler House still contains the boilers



and machinery used by the Portland Company. At the north side of the Brass Foundry, exposed piping and valves remain from a small shed once attached to the Brass Foundry.



Building 24: Vault
Construction Date: c. 1905

As noted with Building 14 – Drafting Room/ Storehouse, the Vault was added on top of one end of the original drafting room when the new drafting room was constructed c. 1905. It was connected to that space on the top floor of the Machine Shop by an overhead pedestrian bridge. With brick walls and vaulted iron beam and concrete floors, the space was intended to protect paper drawings in case of fire. An additional story was added at some point by 1924 to contain the electrical transformers for the plant. The Vault retains a high degree of integrity as it has undergone very few changes over time. The top floor continues to be used for electrical transformers. The c. 1905 vault containing Portland Company drawings (assumed) is not accessible due to safety concerns with the bridge that supplies access from the office and drafting room in the attic of the Machine Shop.

Building 30: Office
Construction Date: 1950

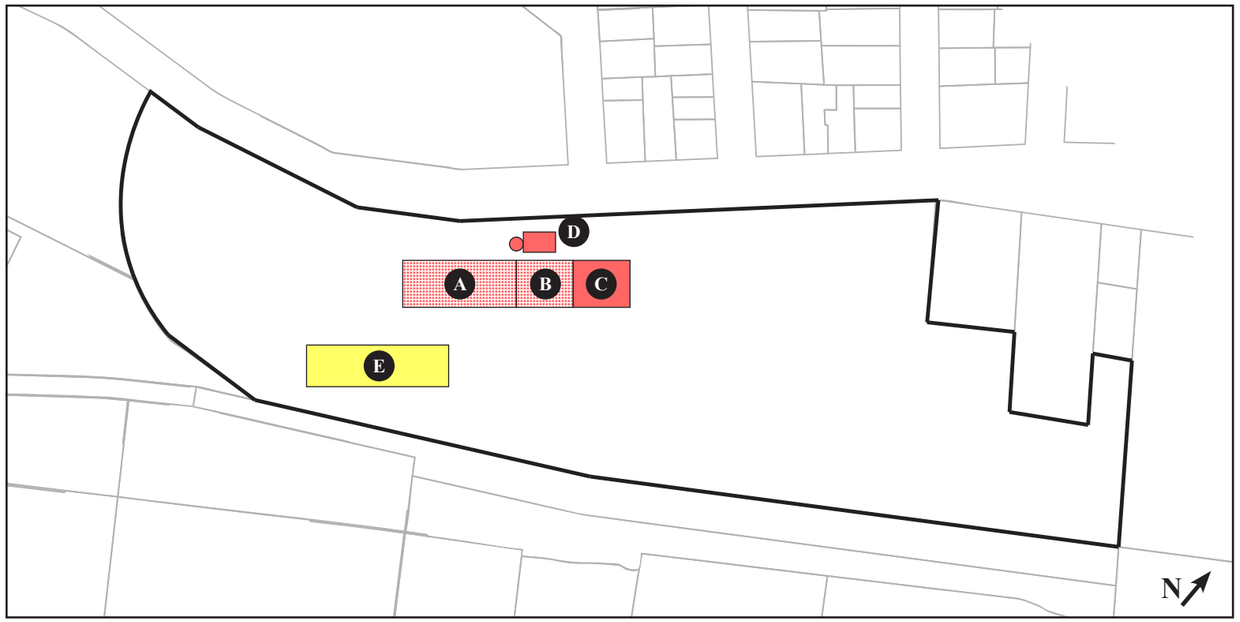
Like most of the earlier buildings at the Portland Company, the 1950 Office Building was representative of architecture and technology of the time of its construction. It was located just to the southwest of the site of the original wood office building, retaining access to the offices from Fore Street without entering the manufacturing complex itself. This building was built after the company had ceased its transportation related work and it is not associated with that area of significance. At an earlier date, sheds and stables for the company were located on the site. It is a modern building, clad in a combination of wood siding and brick. The interiors contain typical features of the period such as pressed-paper acoustical tile ceilings, fluorescent lighting, and aluminum Venetian blinds on the windows. A (non-functional) period office kitchen with built-in dishwasher, range, and refrigerator remains in its original location. The Office Building retains a relatively high degree of integrity. Relatively minor alterations to the interior of the space do not detract from the minimal detail of the mid-century architectural style, much of which still exists. Although built more recently than the other contributing buildings, the Office Building helps to maintain a sense of enclosure for the entrance yard that had previously been provided by the sheds, stables, and fencing that occupied this site. This sense of enclosure is important to the integrity of the entrance yard, a primary feature of the site.

The Portland Company site retains a high level of historic integrity. The property has been the site of the company since its founding in 1846. Located north of the former Grand Trunk Railroad site, the Portland Company retains its feeling as a complex significant for its association with industrial manufacturing. The site features parallel rows of buildings aligned with the former Grand Trunk Railroad tracks with interiors of large, open spaces for heavy manufacturing. The Portland Company was largely built on filled land on the former site of Broad Cove with a large two-tiered retaining wall along Fore Street. Across the street is a residential neighborhood where many of the Portland Company workers lived historically. To the south of the site, modern commercial buildings are located on the former Grand Trunk Railroad yard site on the east side of Fore Street. Within the Portland Company complex, the proximity of the buildings to each other documents how each building played an important role in the production process. Catwalks connect buildings over the private streets of the complex and the historic function of individual buildings relates to that of adjacent buildings.

The individual buildings of the Portland Company generally retain a high level of integrity as they illustrate typical design and construction technologies of industrial buildings between the mid-19th century and early-20th century. The Portland Company complex as a whole also has a high degree of integrity through the retention of essential physical features related to its significance in the areas of industry, transportation, and architecture. Over the history of the Portland Company site, some important buildings were lost to fire (particularly a large conflagration in 1873 that destroyed several buildings at the southeast corner of the property). Other buildings were replaced with new over time, as is common in industrial complexes. The majority of these changes occurred within the period of significance. Of the three original brick buildings built in 1847, two remain. All of the other buildings except two predate 1920. The most recent construction appears to be the addition at the north end of the foundry and the replacement of the boiler shop, both of which occurred between 1951 and 1980. These two buildings were later connected with infill construction. Small secondary buildings were located around the property and had different uses during the history of the complex. Most of these wooden buildings are no longer present, leaving the primary industrial structures to illustrate the manufacturing industry of locomotives, railroad cars, marine, boilers, etc.

The following maps and models illustrate the evolution of the site from 1847 until 2014.

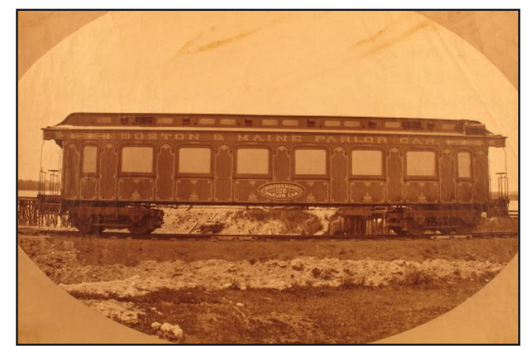
See Appendix E for listing of Portland Company's contemporaries and their current significance, configuration and integrity.



The Portland Company 1847

- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

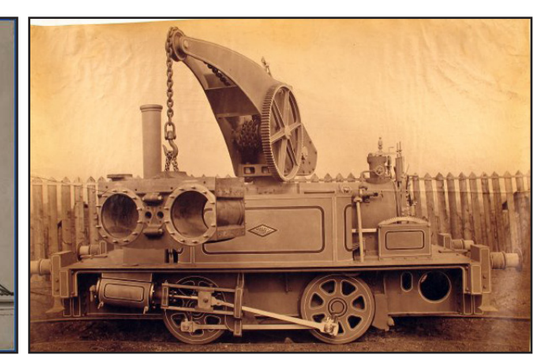
A: Machine Shop
B: Smith Shop
C: Foundry
D: Boiler House
E: Car Shop



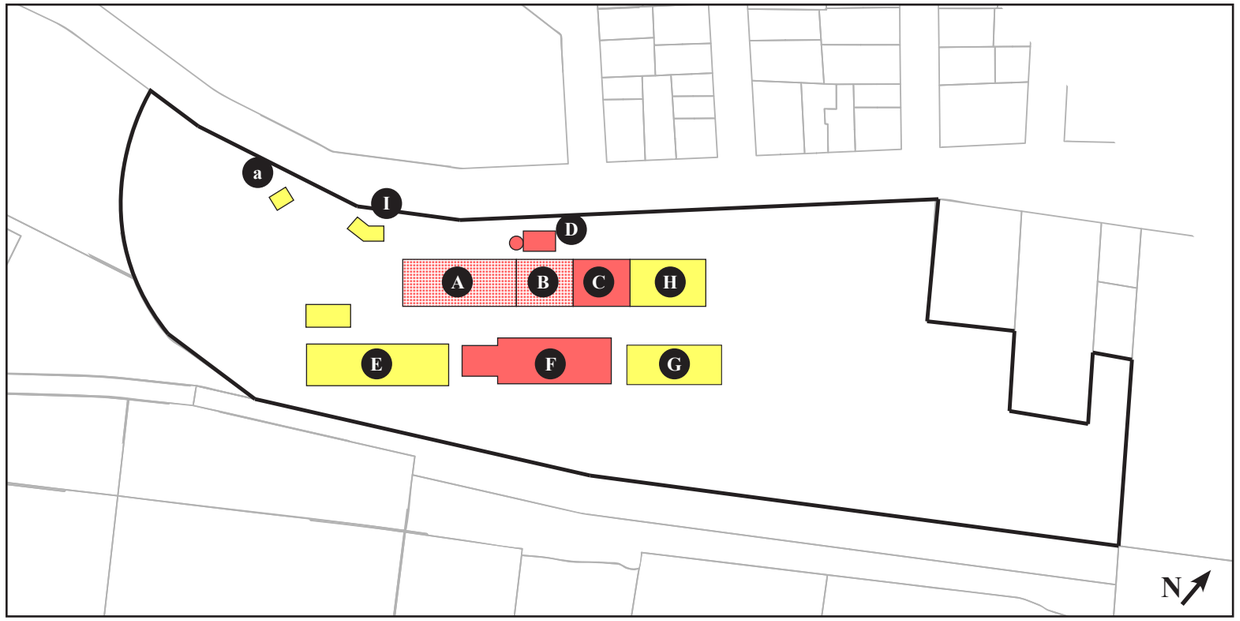
Boston & Maine parlor car. Courtesy of the Maine Historical Society.

Locomotive from the Portland Company. Courtesy of the Maine Historical Society.

1851 drawing of a locomotive. Courtesy of the Maine Historical Society.



Locomotive crane. Courtesy of the Maine Historical Society.



The Portland Company
1858

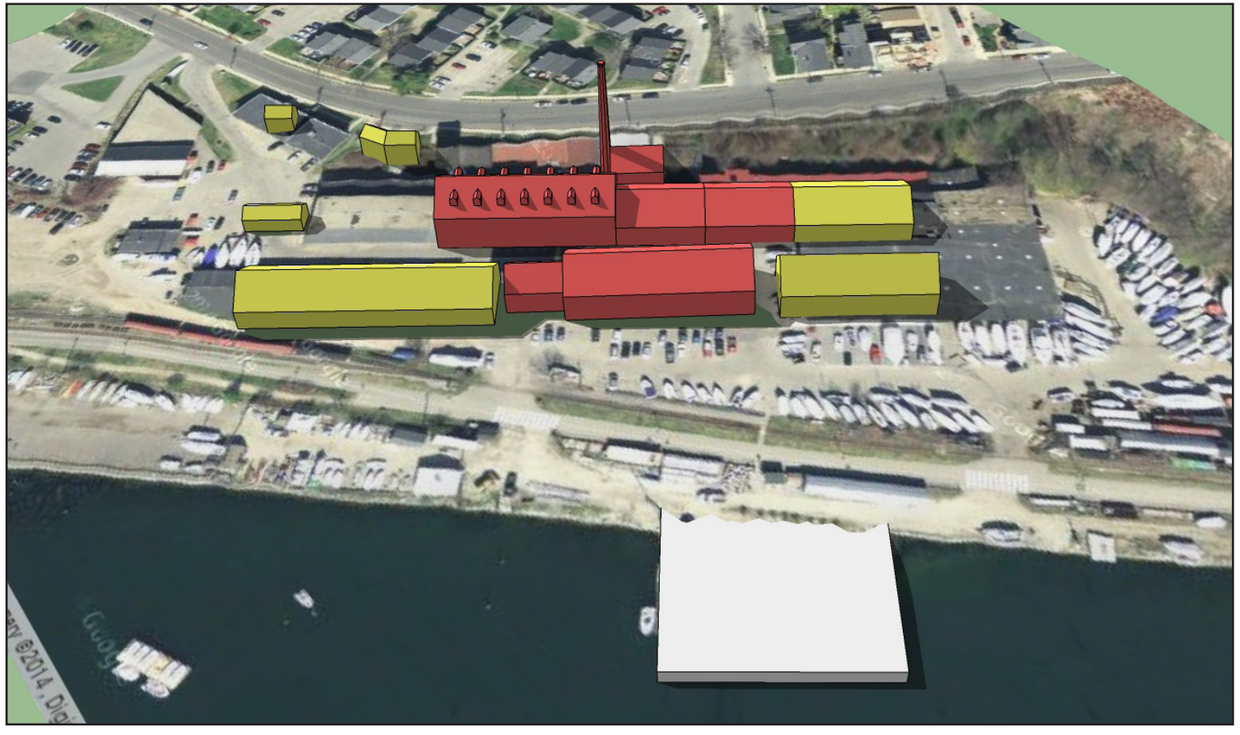
- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

PRIMARY:

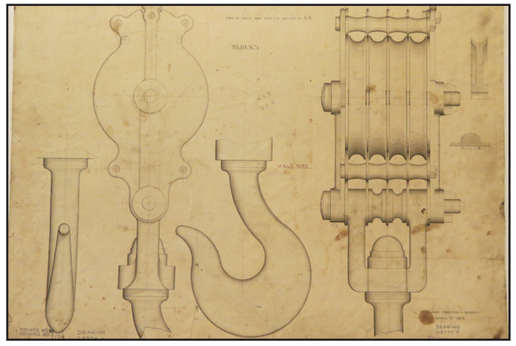
A: Machine Shop
B: Smith Shop
C: Foundry
D: Boiler House
E: Car Shop
F: Blacksmith Shop
G: Boiler Shop
H: Foundry Expansion
I: Office Building

SECONDARY:

a: Stable

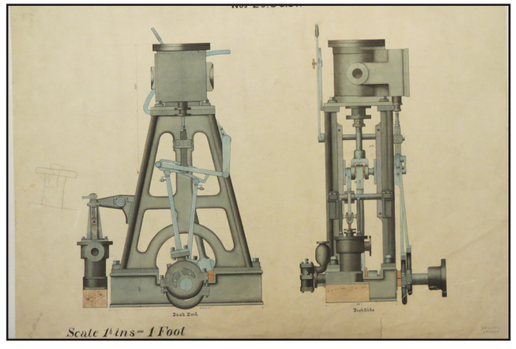


Colon railroad engine. Courtesy of the Maine Historical Society.

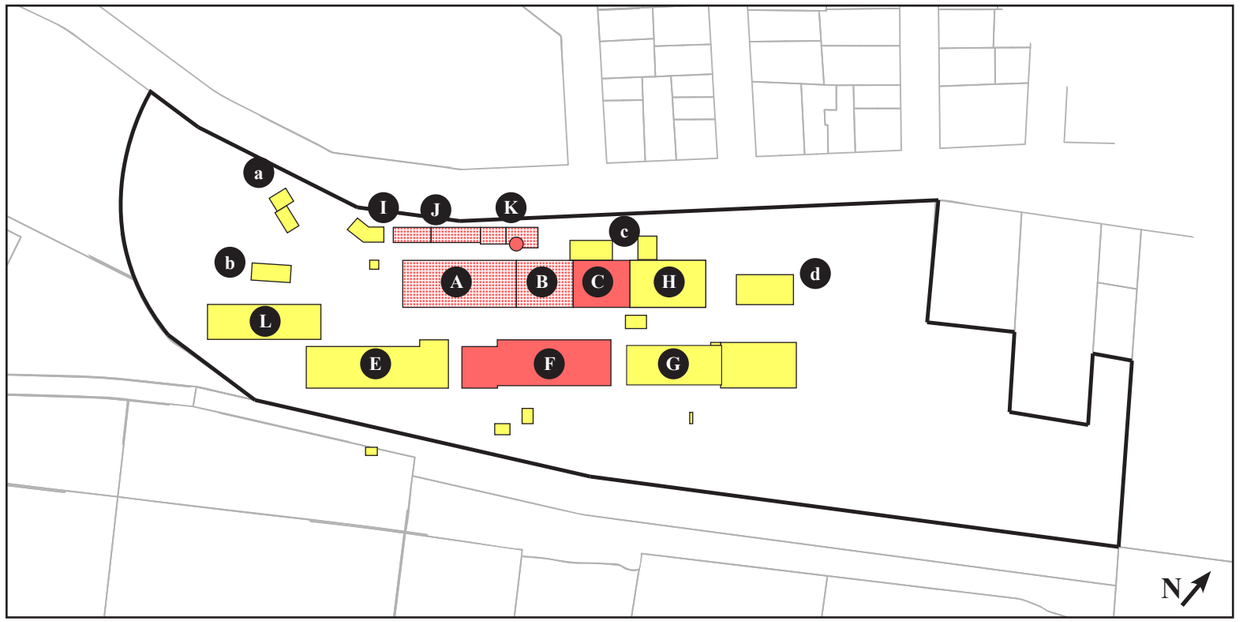


"Blocks" drawing from the Portland Company. Courtesy of the Maine Historical Society.

Portland & Ogdensburg locomotive. Courtesy of the Maine Historical Society.



Propeller Engines. Courtesy of the Maine Historical Society.



The Portland Company
1871

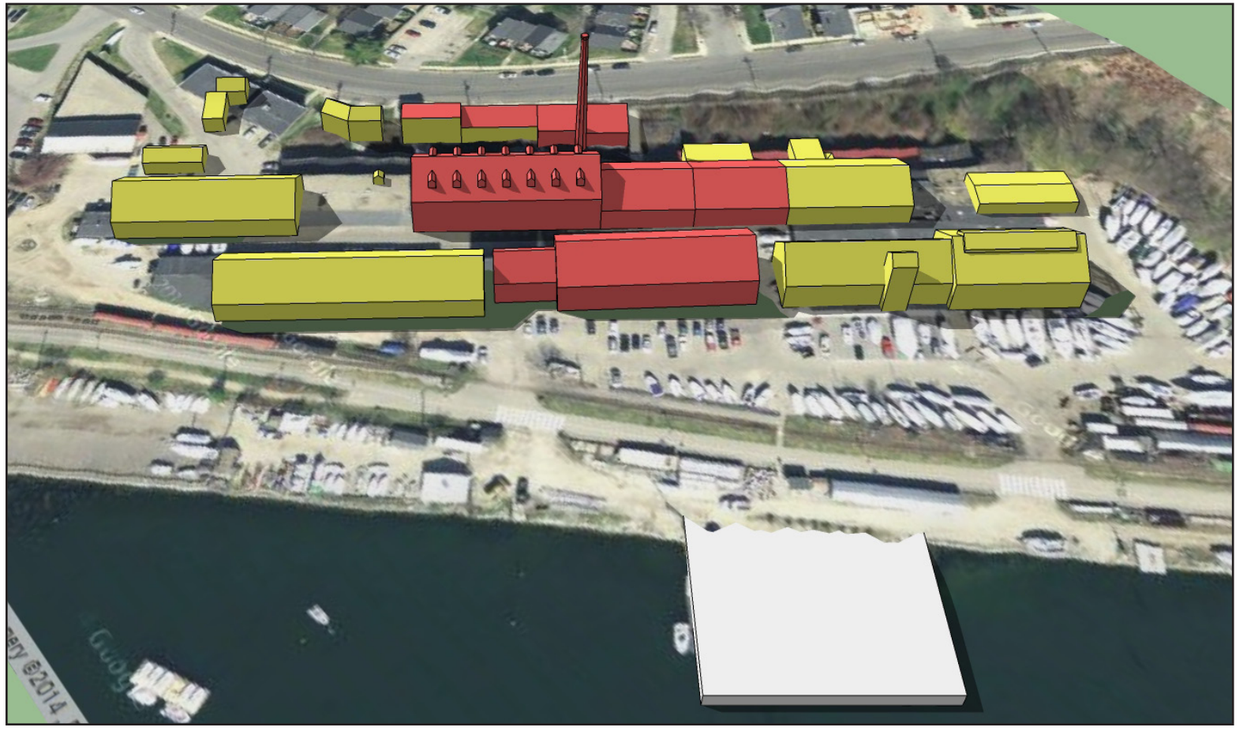
- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

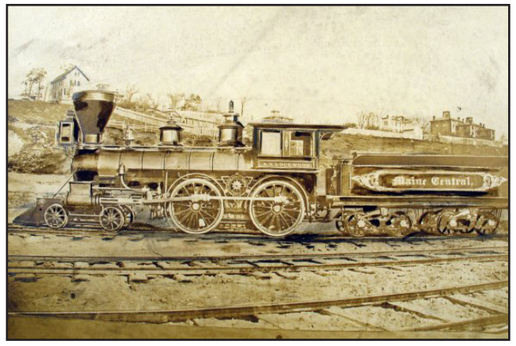
PRIMARY:

A: Machine Shop
B: Smith Shop
C: Foundry
E: Car Shop
F: Blacksmith Shop
G: Boiler Shop
H: Foundry Expansion
I: Office Building
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
L: Car Shop

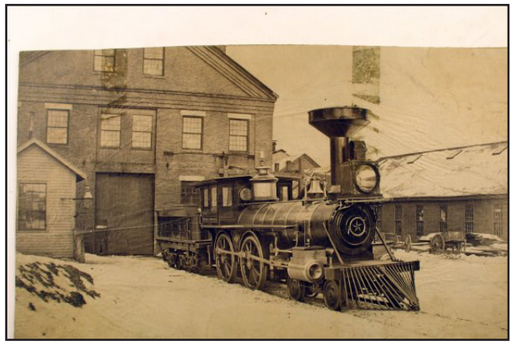
SECONDARY:

a: Stable
b: Babbitt Shop
c: Air Furnace & Core Shop
d: Scratch House





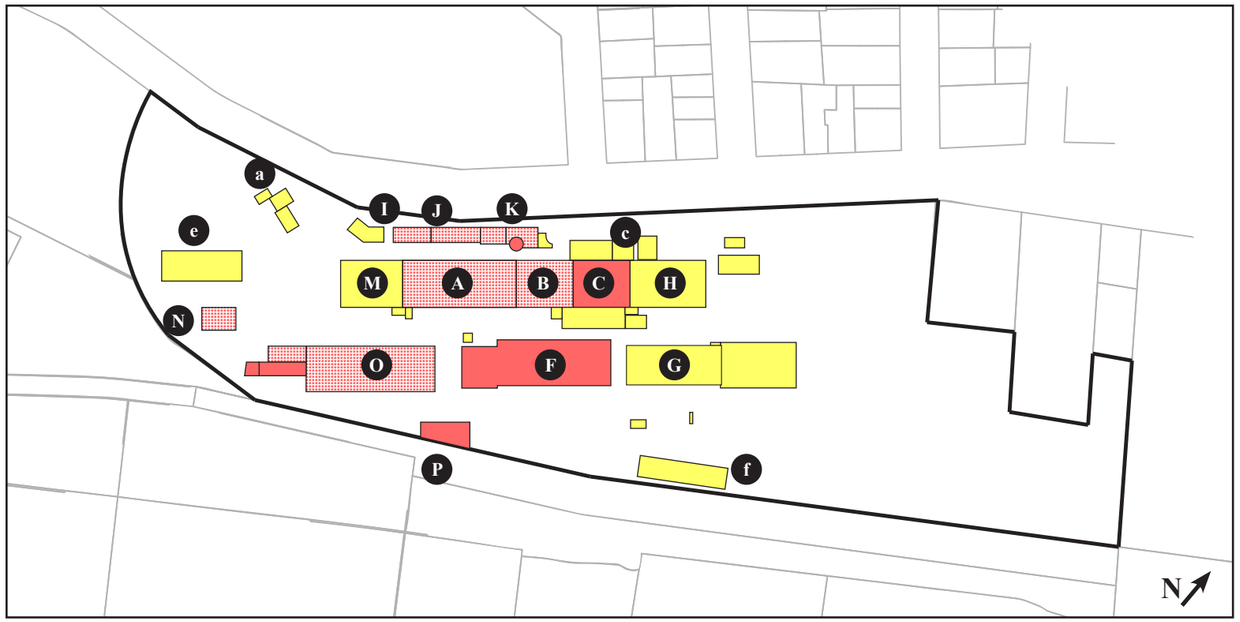
Portland Company locomotive. Courtesy of the Maine Historical Society.



Locomotive south of the Machine Shop. Courtesy of the Maine Historical Society.

Locomotive with office building at rear. Courtesy of the Maine Historical Society.

View of the Portland Company yard from the north. Courtesy of the Maine Historical Society.



The Portland Company 1880

- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

PRIMARY:

A: Machine Shop
B: Smith Shop
C: Foundry
F: Blacksmith Shop
G: Boiler Shop
H: Foundry Expansion
I: Office Building
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
M: Erecting Shop
N: Paint Shop
O: Car Shop
P: Tin & Babbitt Shop

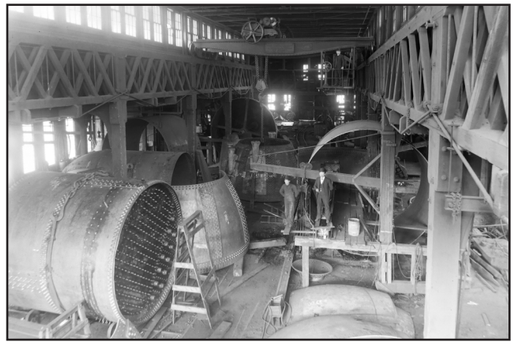
SECONDARY:

a: Stable
c: Air Furnace, Foundry Expansion & Core Shop
d: Scratch House
e: Storehouse
f: Sand Shed

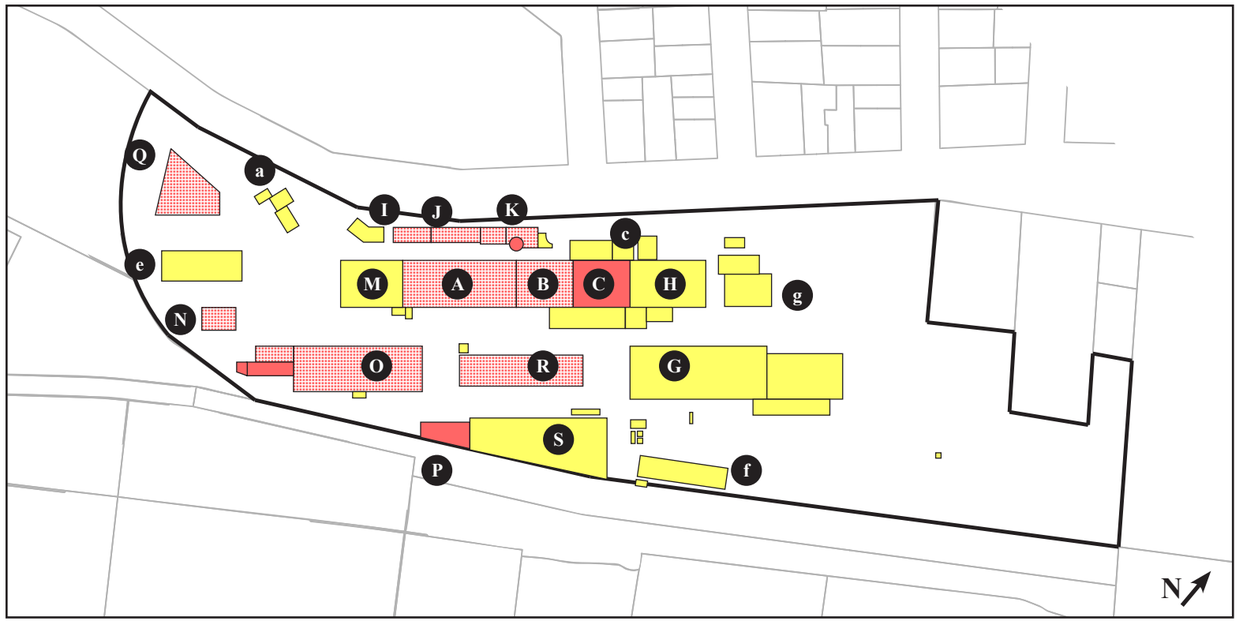
View of the Portland Company yard. Courtesy of the Maine Historical Society.

Portland Company works. Courtesy of the Maine Historical Society.

Interior of the machine shop. Courtesy of the Maine Historical Society.



Interior of the boiler shop. Courtesy of the Maine Historical Society.



The Portland Company 1890

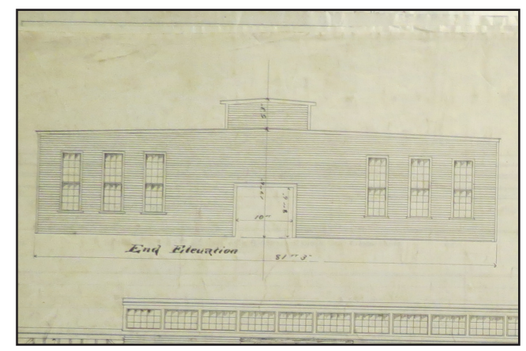
- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

PRIMARY:

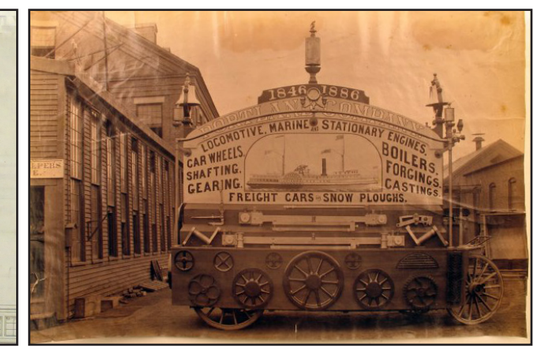
A: Machine Shop
B: Smith Shop
C: Foundry
F: Blacksmith Shop
G: Boiler Shop
H: Foundry Expansion
I: Office Building
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
M: Erecting Shop
N: Paint Shop
O: Car Shop
P: Tin & Babbitt Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
S: Blacksmith & Tank Shop

SECONDARY:

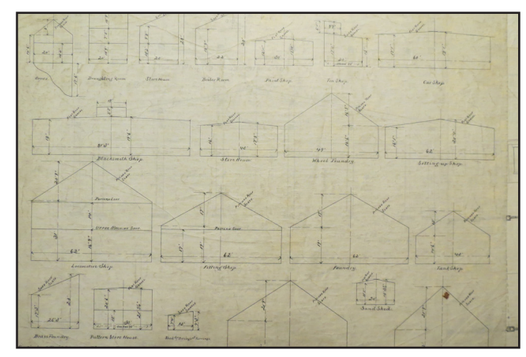
a: Stable
c: Air Furnace, Foundry Expansion & Core Shop
d: Scratch House
e: Storehouse
f: Sand Shed
g: Wheel Foundry



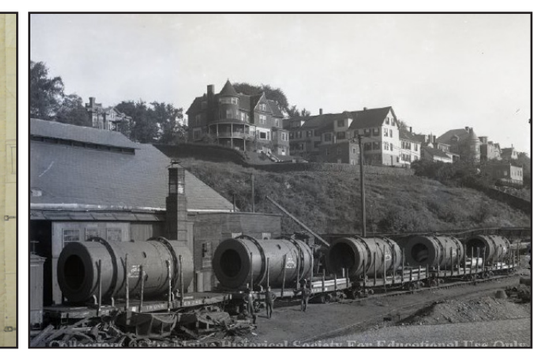
Drawing for new blacksmith and tin shop. Courtesy of the Maine Historical Society.



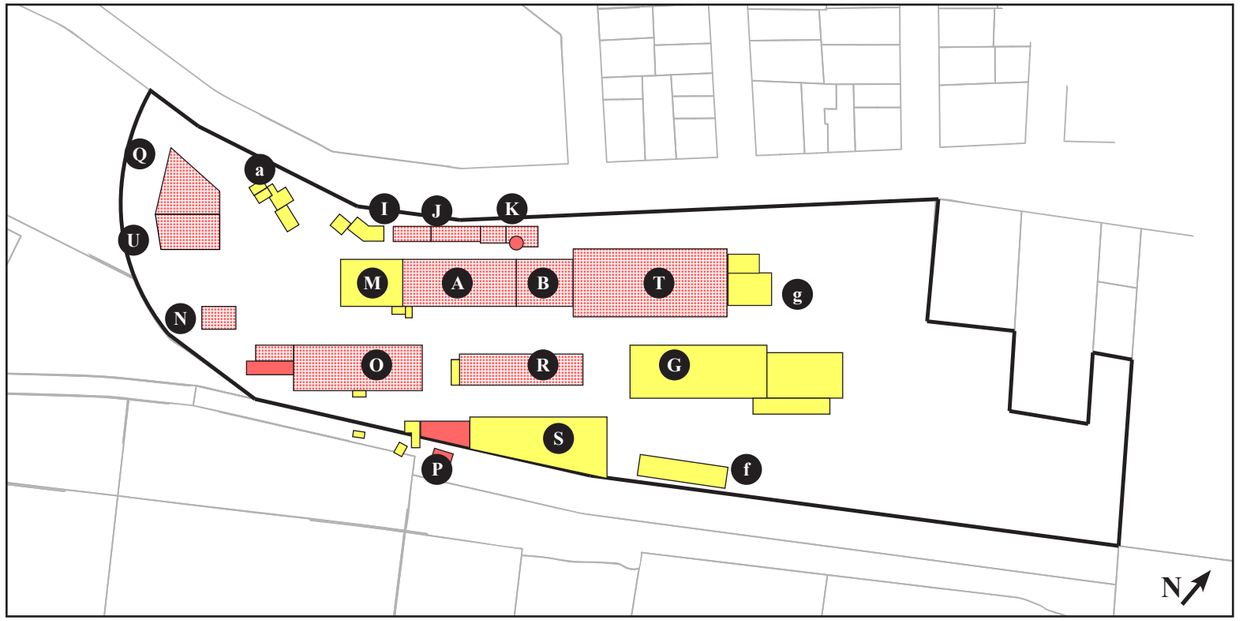
View from the Portland Company erecting shop. Courtesy of the Maine Historical Society.



Various Portland Company buildings in section. Courtesy of the Maine Historical Society.



North end of the Portland Company yard. Courtesy of the Maine Historical Society.



The Portland Company 1896

- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

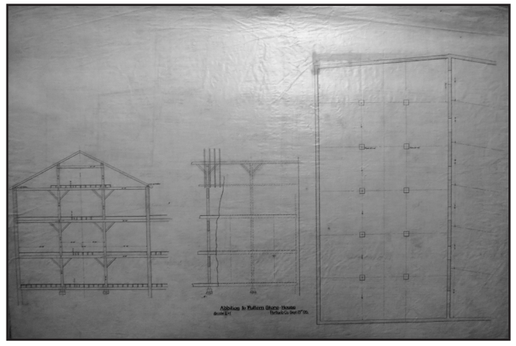
PRIMARY:

A: Machine Shop
B: Smith Shop
F: Blacksmith Shop
G: Boiler Shop
I: Office Building
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
M: Erecting Shop
N: Paint Shop
O: Car Shop
P: Tin & Babbitt Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
S: Blacksmith & Tank Shop
T: Foundry
U: Pattern Storehouse Addition

SECONDARY:

a: Stable
d: Scratch House
f: Sand Shed
g: Wheel Foundry

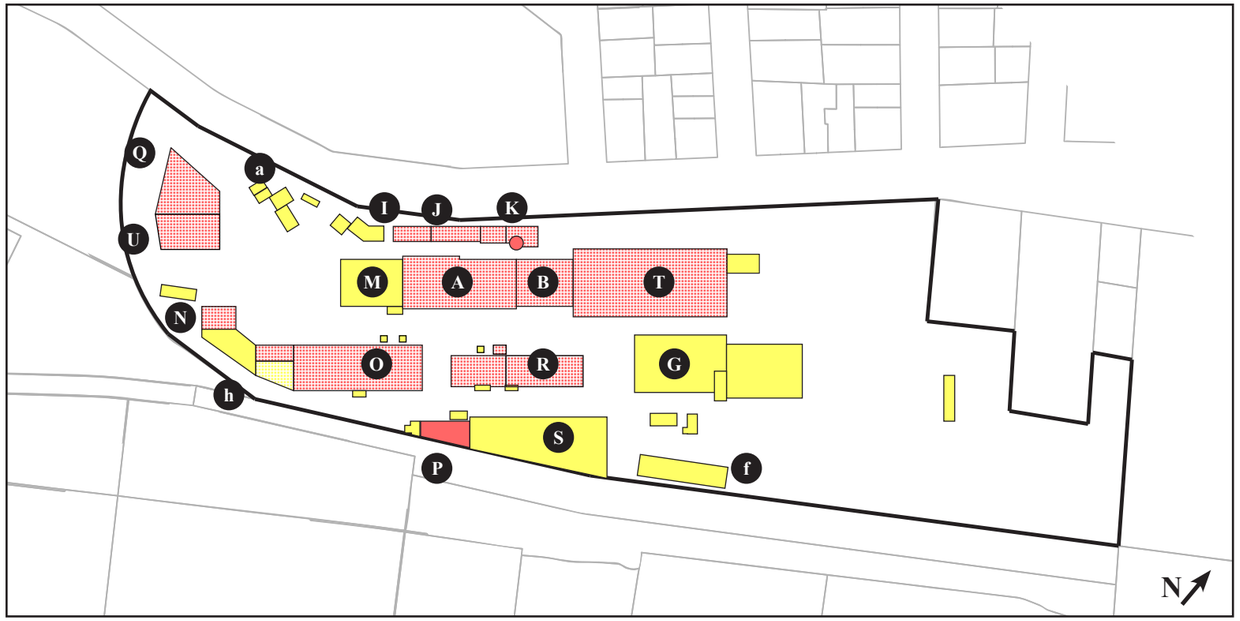
Courtesy of the Maine Historical Society.



Drawings for the Pattern Storehouse addition. Courtesy of the Maine Historical Society.

View of the Portland Company entry yard. Courtesy of the Maine Historical Society.

View of the Portland Company works. Courtesy of the Maine Historical Society.



The Portland Company 1909

- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

PRIMARY:

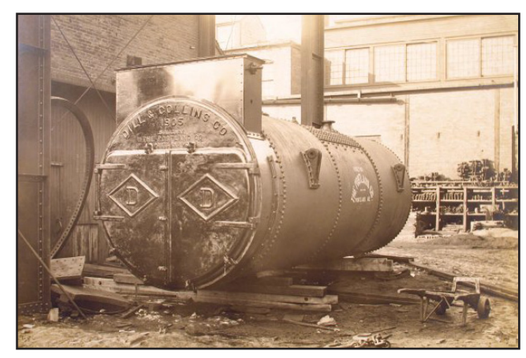
A: Machine Shop
B: Smith Shop
F: Blacksmith Shop
G: Boiler Shop
I: Office Building
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
M: Erecting Shop
N: Paint Shop
O: Car Shop
P: Tin & Babbitt Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
S: Blacksmith & Tank Shop
T: Foundry
U: Pattern Storehouse Addition

SECONDARY:

a: Stable
d: Scratch House
f: Sand Shed
h: Lumber Sheds

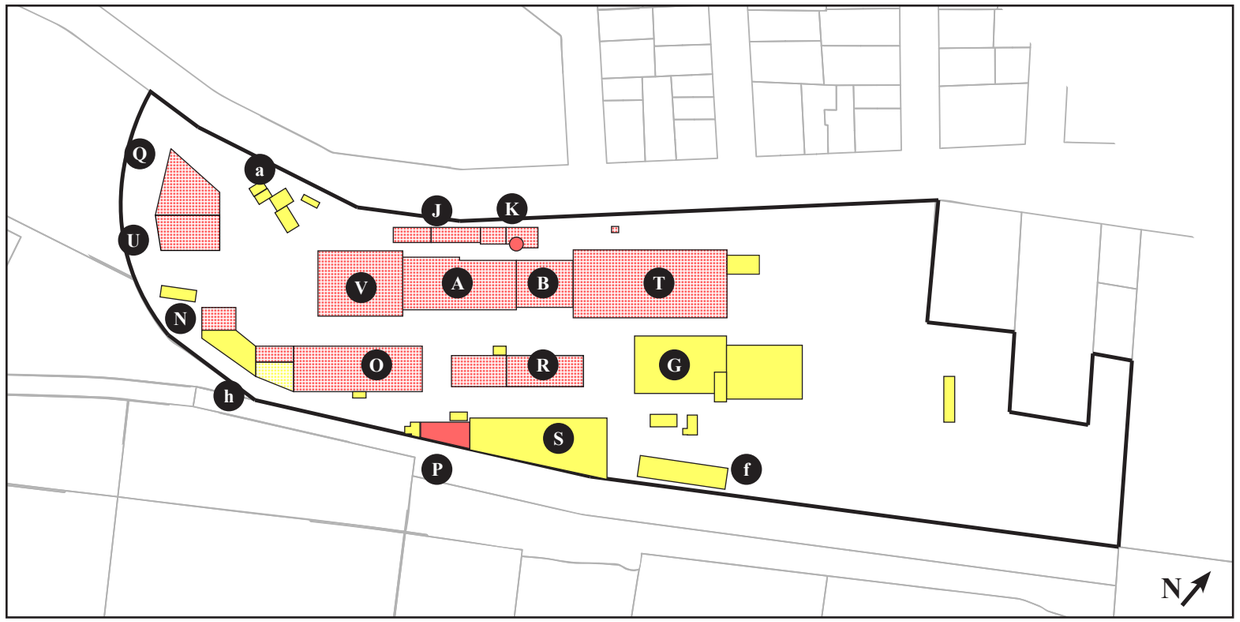
Interior view on the third floor of the machine shop. Courtesy of the Maine Historical Society.

Knox automobile at the Portland Company. Courtesy of the Maine Historical Society.



Large boiler outside the tank shop. Courtesy of the Maine Historical Society.

Knox automobile at the Portland Company. Courtesy of the Maine Historical Society.



The Portland Company 1918

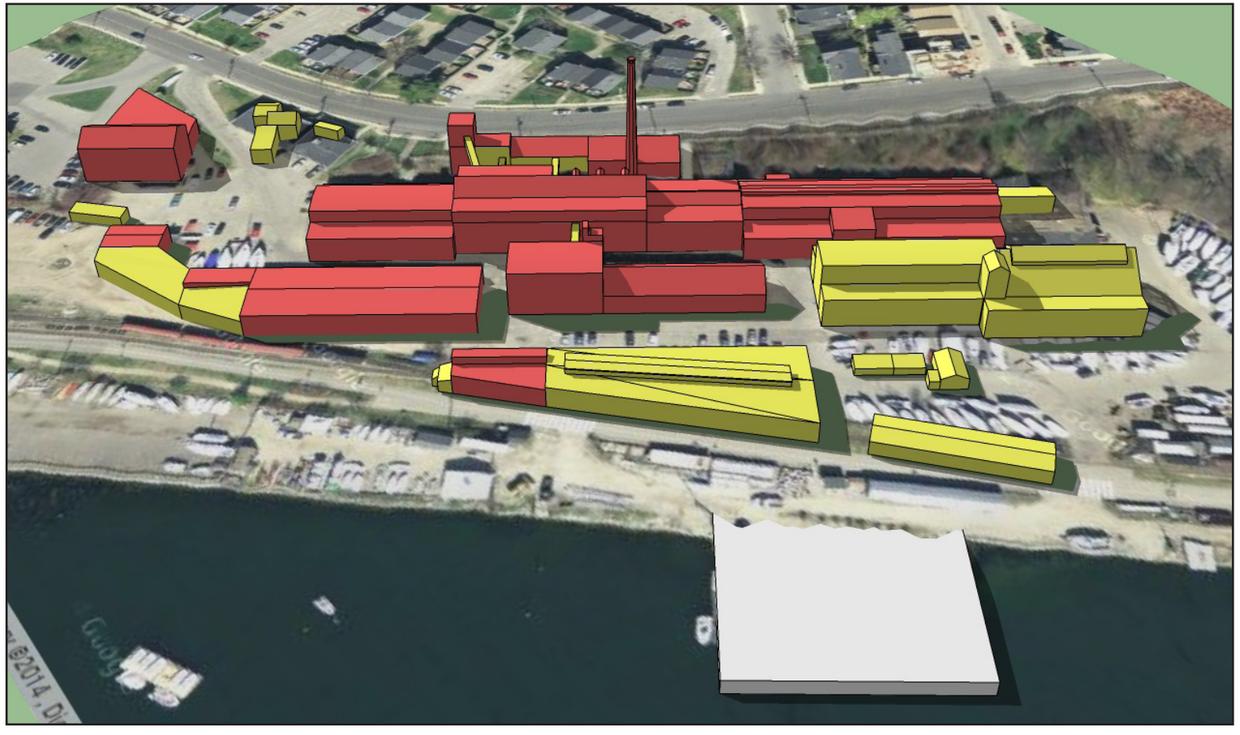
- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

PRIMARY:

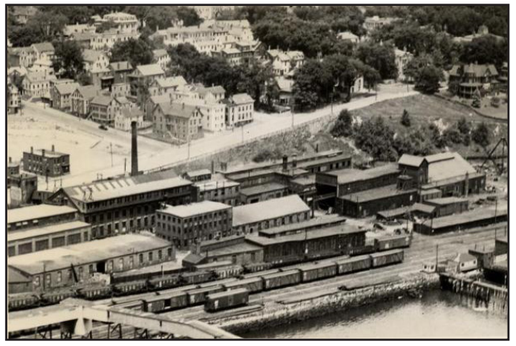
A: Machine Shop
B: Smith Shop
F: Blacksmith Shop
G: Boiler Shop
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
N: Paint Shop
O: Car Shop
P: Tin & Babbitt Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
S: Blacksmith & Tank Shop
T: Foundry
U: Pattern Storehouse Addition
V: Erecting Shop

SECONDARY:

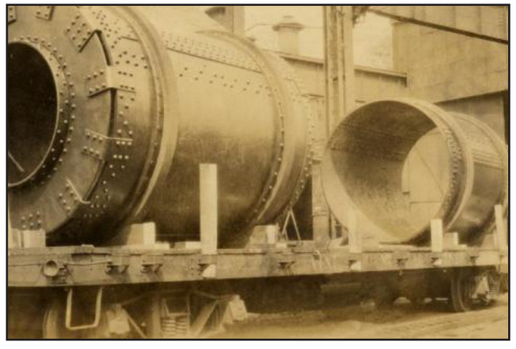
a: Stable
f: Sand Shed
h: Lumber Sheds



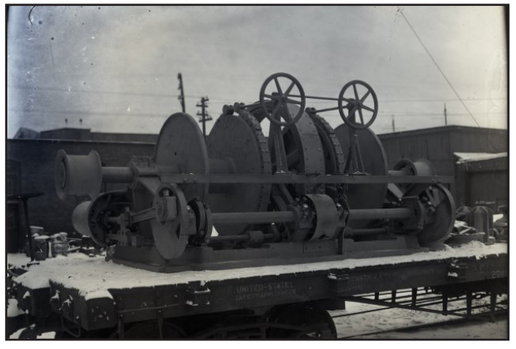
Aerial of the Portland Company. Courtesy of the Maine Historical Society.



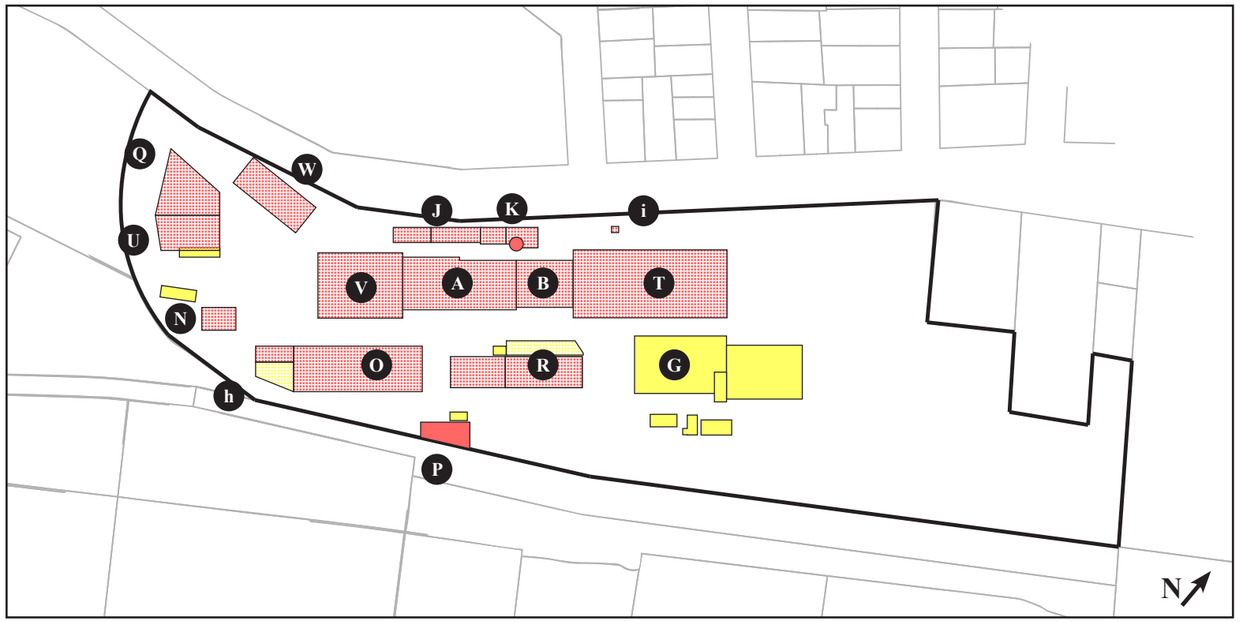
Aerial of the Portland Company. Courtesy of the Maine Historical Society.



Large debarking drums. Courtesy of the Maine Historical Society.



Courtesy of the Maine Historical Society.



The Portland Company
1951

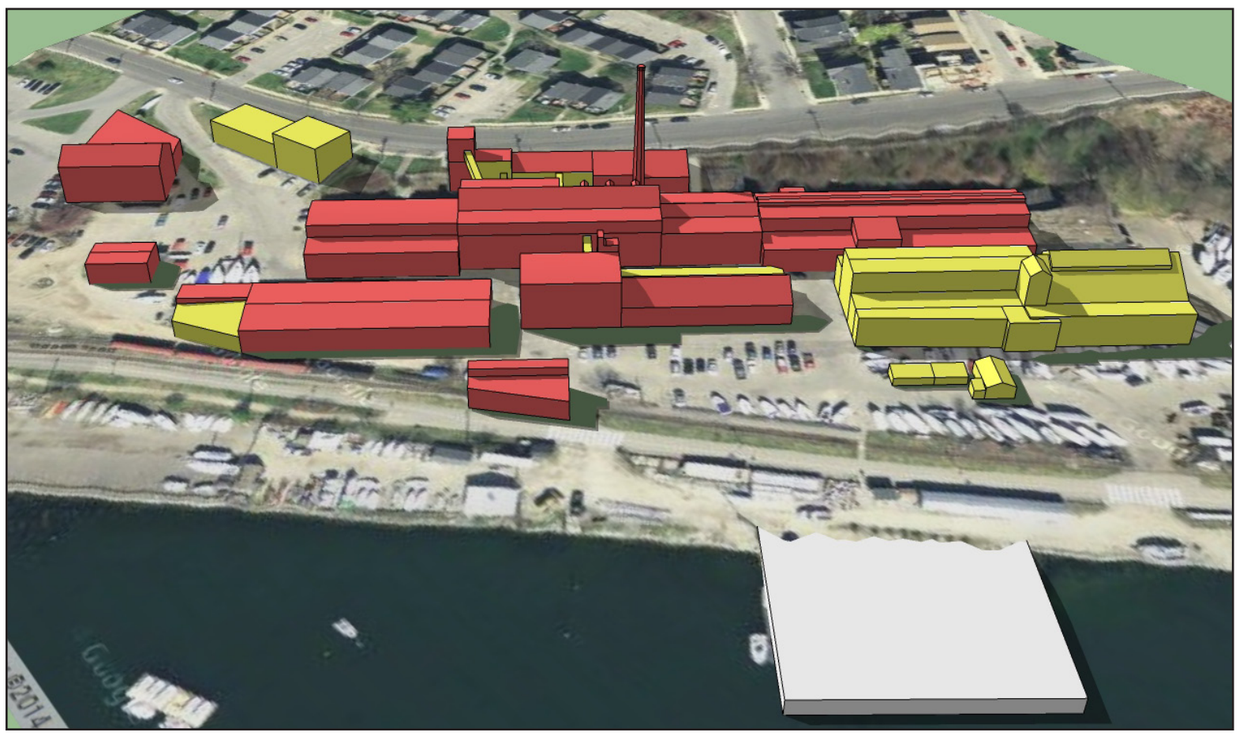
- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

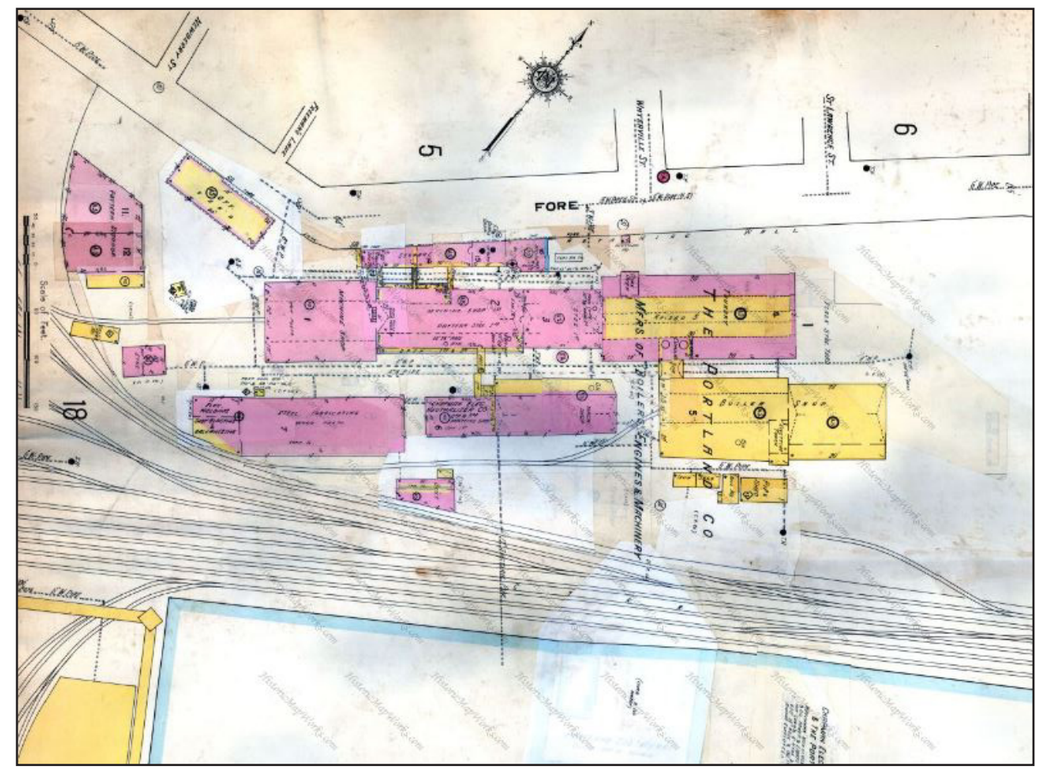
PRIMARY:

A: Machine Shop
B: Smith Shop
F: Blacksmith Shop
G: Boiler Shop
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
N: Paint Shop
O: Car Shop
P: Tin & Babbitt Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
T: Foundry
U: Pattern Storehouse Addition
V: Erecting Shop
W: Office Building

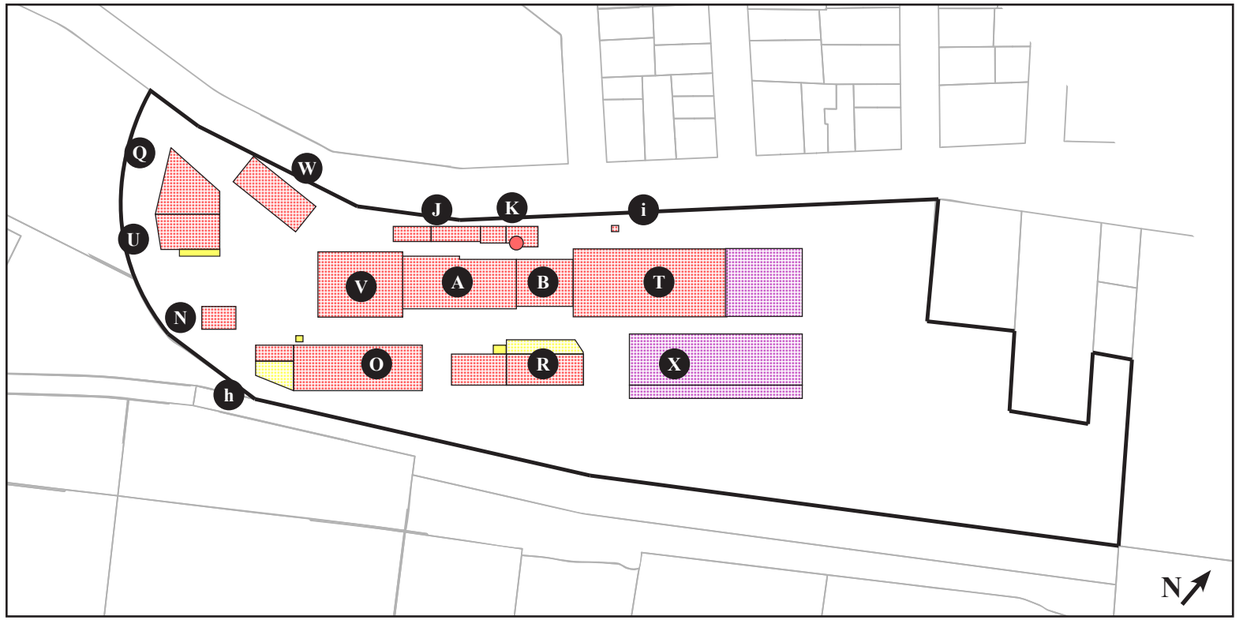
SECONDARY:

h: Lumber Sheds
i: Acetylene House





1951 Sanborn Map for the Portland Company.

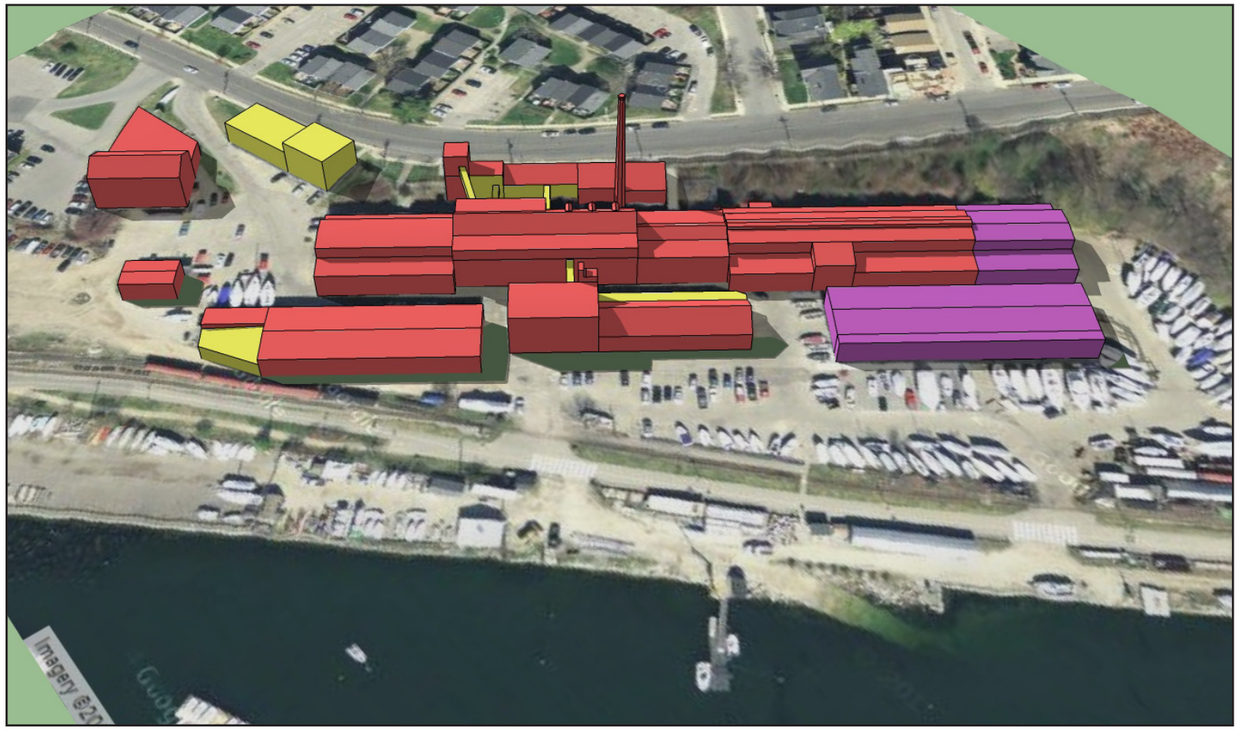


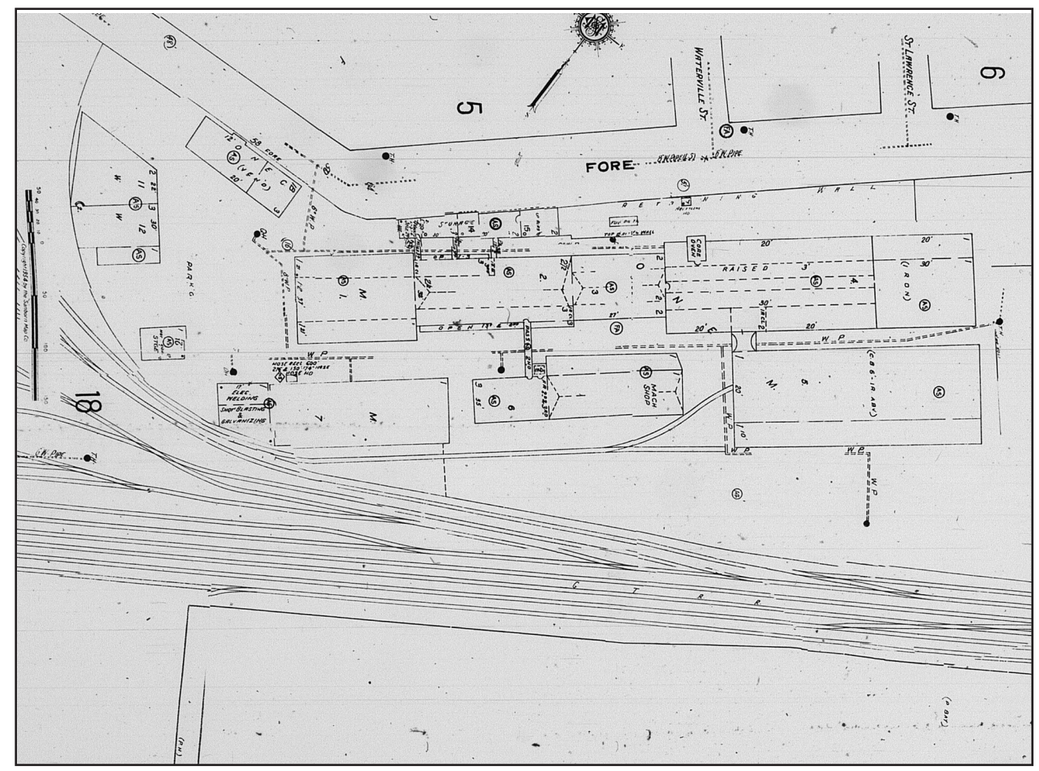
The Portland Company
1986

- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

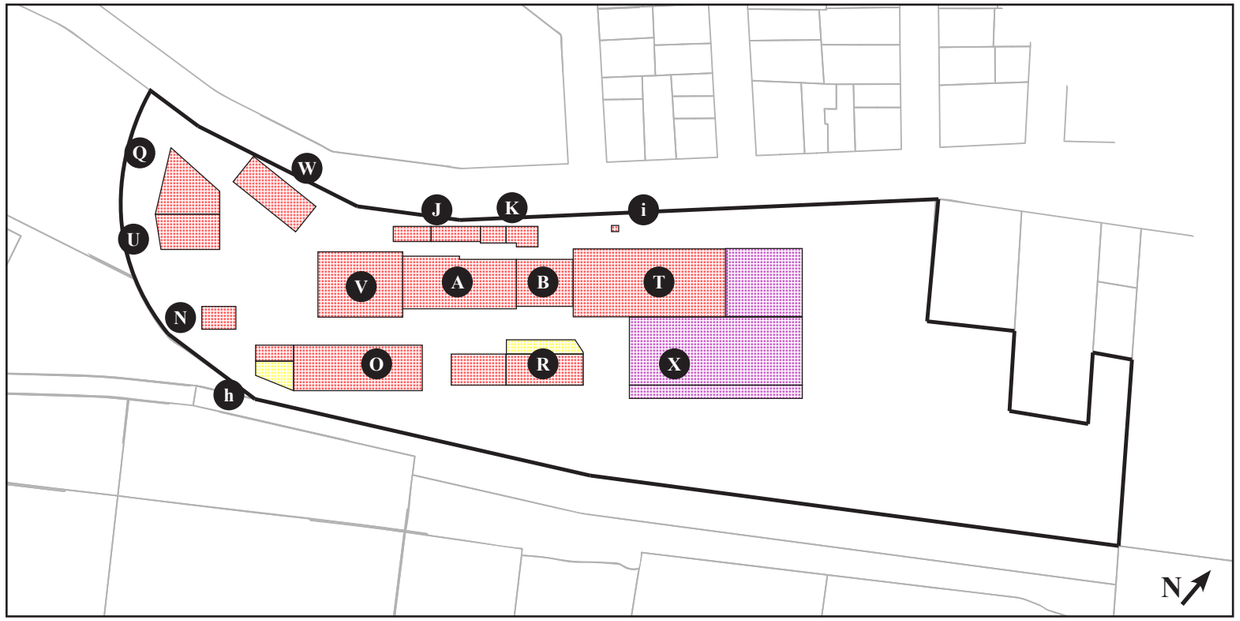
PRIMARY:
A: Machine Shop
B: Smith Shop
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
N: Paint Shop
O: Car Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
T: Foundry
U: Pattern Storehouse Addition
V: Erecting Shop
W: Office Building
X: Modern Construction

SECONDARY:
h: Lumber Sheds
i: Acetylene House





1986 Sanborn Map for the Portland Company.



The Portland Company 2014

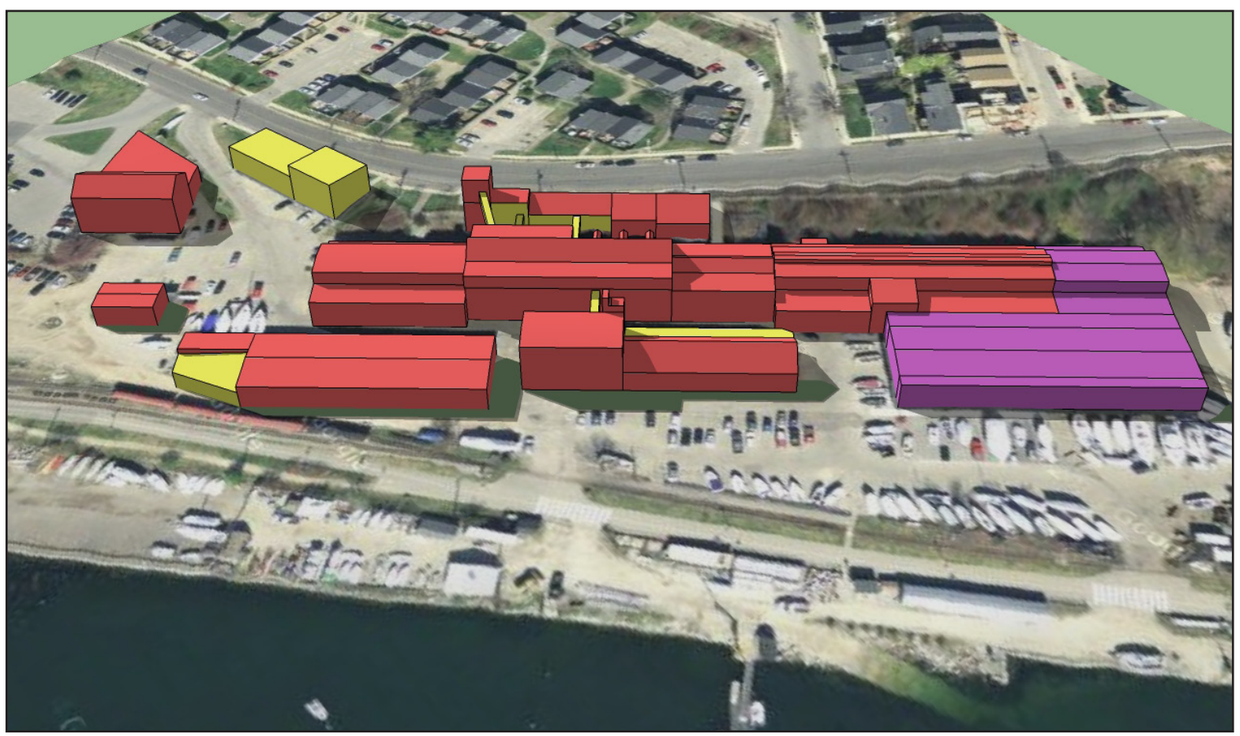
- Masonry
- Wood
- Metal
- Extant Masonry
- Extant Wood
- Extant Metal

PRIMARY:

A: Machine Shop
B: Smith Shop
J: Drafting Room & Storehouse
K: Boiler House & Brass Foundry
N: Paint Shop
O: Car Shop
Q: Pattern Storehouse
R: Blacksmith & Tank Shop
T: Foundry
U: Pattern Storehouse Addition
V: Erecting Shop
W: Office Building
X: Modern Construction

SECONDARY:

h: Lumber Sheds
i: Acetylene House

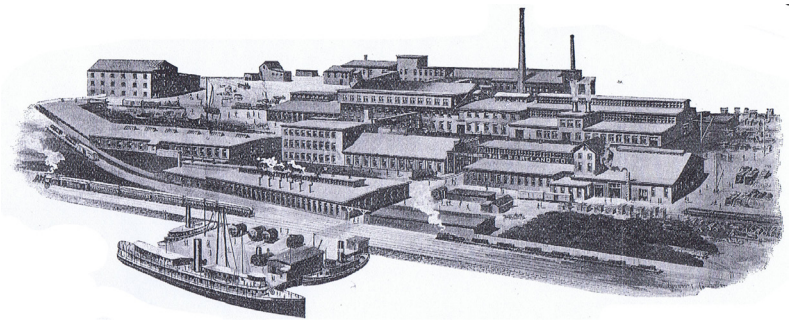


Current view north of the Portland Company.

View north in the alley at the west end of the complex.

View east between the car shop and electric company building.

View north between the machine shop and blacksmith and tank shops.



Section III:
Appendices

APPENDIX A: HISTORY OF THE ESTABLISHMENT OF THE PORTLAND COMPANY

The Portland Company was established in conjunction with construction of the Atlantic & St. Lawrence Railroad which was built to connect Portland to Montreal. John A. Poor, the individual most responsible for Portland's successful bid over Boston to become Montreal's winter port via rail, was a Director of the Atlantic & St. Lawrence Railroad and became the first President of the Portland Company.[1] Other Atlantic & St. Lawrence Directors were also stockholders in the Portland Company, including Portland's wealthiest individual John Bundy Brown, who would become President of the company in 1864; Congressman and later Senator and U. S. Secretary of the Treasury William P. Fessenden; and Captain George Turner, who was given a seat on the railroad's Board between the regular annual Director's elections shortly after selling property to the Portland Company for their works. In October 1846, the Directors of the Atlantic & St. Lawrence Railroad contracted with established Philadelphia locomotive builder Septimus Norris to produce locomotives, cars, wheels, rail, and other necessary castings for the construction and operation of the line with the stipulation that these be manufactured in Portland. Septimus Norris was one of eight brothers who were pioneers in the development and fabrication of steam locomotives in the U. S. No facilities existed in Portland to undertake this contract and Norris partnered with several prominent Portland residents, including John A. Poor, as the "Portland Company" in 1846, to undertake this work. The partners appear to have purchased a charter that had been granted by the Maine legislature for the Portland Iron Manufacturing Company in 1845, five days after the charter for the Atlantic & St. Lawrence Railroad was granted. In August 1846, the legislature approved an act changing the name of the corporation to the Portland Company and increasing the allowed capital of the company from fifty-thousand dollars to two-hundred-and-fifty thousand dollars. The act specified that the Portland Company would manufacture locomotive engines, railroad cars, machinery and implements of all kinds, which had not been mentioned in the original charter.[2]

The first meeting of the Directors of the Portland Company was held on November 11, 1846, at the Exchange Street office of Attorney John A. Poor. John Fox was chosen chairman, and A. W. H. Clapp, Secretary. Other Directors present included Septimus Norris, James C. Churchill, and George Warren. John A. Poor was elected President, Woodbury Storer elected Treasurer, Septimus Norris was elected Chief Engineer, and Horace Felton Superintendent. Horace Felton was an experienced superintendent from the Norris locomotive works in Philadelphia. All of the directors except Norris and Felton were Portland residents. At this first meeting, the Chief Engineer and Superintendent were requested to report as soon "as may be" what buildings would be required and also engines and tools for the company. Norris submitted a list of tools "to be purchased of Norris & Brothers Locomotive Builders, Philadelphia", totaling $13,500 which were "required to commence our business." These were part of a longer list included all tools, machines, and equipment needed to set up fully operational shops, with a total cost of $46,955. Additionally, Norris submitted a list of ten men to fill the positions of Foreman, Draftsman, Foreman Finisher, Foreman Foundry, Foreman Pattern Shop, Clerk, Time Keeper, Foreman Boiler Shop, Foreman Putting Shop, and Foreman Smith. All these men, "who understand fully the whole detail of this particular branch of mechanics," apparently having worked at the Norris shops in PA. Also at this meeting, Directors Fox, Warren, Churchill, and Clapp were appointed to a committee to "negotiate with Capt. George Turner and other individuals in relation to a site for the necessary works of the Company." Turner owned land, mud flats, and a wharf along Fore Street at the base of Munjoy Hill. Later the same day, the committee reported that Capt. Turner wanted $8,500 for his property.[3]

Five days later the committee had a verbal agreement with Turner to sell a portion of his land below Fore Street for $4,750 with his consent to move the line of Fore Street and place water reservoirs for the works

1 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890

2 Records of the Portland Company and records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

3 Records of the Portland Company, Maine Historical Society.

on land owned by Turner across the street. The Board approved the agreement and Turner signed it within several days. On the same day, the company President was requested to "make application to the City Government for leave to erect stationary engines and whatever else may be necessarily connected with the Company Works and requiring such licenses," and Directors Fox, Churchill, and Clapp to, "be a Committee on that part of this Board to confer with the President and Directors of the Atlantic & St. Lawrence Railroad Company on the subject of the location of the works of the Portland Company, with power to negotiate with said Railroad Company, or any committee thereof, touching their right of way, in front of or upon the land of the Portland Company: and all questions that may arise requiring the mutual and concurring action of this Board and said Rail Road Company, prior to the erection of the works of this Company, with a view to such mutual and reciprocal arrangements as may be found advantageous to both parties." In 1846, the legislature had granted the railroad the right to claim by eminent domain, "so much of the lands, flats, and other real estate … lying within the City of Portland, and adjoining the navigable waters of Portland harbor," (essentially within the area bounded by India Street, Fore Street to the point where the street is closest to the harbor, then southeast to the navigation channel of the Fore River and back to India Street) as required for a railroad terminus at Portland including a depot, wharves, docks, etc. The Turner property purchased by the Portland Company was a short distance east of the railroad's boundary with a lot retained by Turner between them. The fact that the railroad's eminent domain boundaries did not include the Portland Company property when established by the legislature suggests that space for an adjoining locomotive manufacturer may have been part of the railroad's plan from the outset. Much of the "property" of both companies was comprised of the mud flats and waters of Broad Cove. The Portland Company directors immediately undertook to plan and contract for a stone sea wall, filling, and grading their site to create sufficient level land for their works.[4]

By late December 1846, less than six weeks after the first meeting of the Board of Directors, tensions had appeared between the Portland Directors and Septimus Norris, brought to a head on December 21, when the Board voted not to pay an invoice for $138 drawn in the name of President Poor by Norris for drawings for buildings, locomotives, and cars because Norris had no authorization to do so and because Norris had failed to pay an assessment of $5.00 per share on the 1000 shares of company stock he controlled. Within a short time, the shares had been transferred back to the corporation and Norris was fired as Chief Engineer. There is no documentation that the company purchased the recommended tools and machinery from Norris Locomotive Works of Philadelphia before the ouster of Septimus Norris. Eventually, Norris would settle with the company, receiving $400 to renounce any claims on the company while allowing them the non-exclusive use of all the patents he controlled for the manufacture of railroad equipment, which he had previously assigned to the company. Horace Felton was also fired briefly but apparently determined he had a better future with the Portland Company than Norris Locomotive Works. Shortly after letting him go, the Board appointed him General Superintendent and he was primarily responsible for making the works operational during the following year and a half.[5]

A seriously complicating factor in the removal of Septimus Norris was his contract with the Atlantic & St. Lawrence Railroad to produce locomotives and other equipment for that company. Norris attempted to retain the contract, offering to lease of buy property from the Portland Company on which to erect shops, but ultimately the contract was canceled by the railroad and the work assigned to the Portland Company. Negotiating the complex legal and practical issues involved with the Norris contract appears to have been helped by John A. Poor's presence on both Boards. It is clear that the Directors of the railroad were determined to have a manufacturing plant for locomotives and other railroad equipment in Portland and it isn't surprising that they worked to insure it would happen under local control once Norris proved unable to fulfil his obligations as a stockholder in the Portland Company. Further close cooperation between the companies was required in the building of the shops and establishment of a rail connection to them, as well as construction of a wharf for the Portland Company on the harbor side of the railroad's trestle from Fish

4 Records of the Portland Company and records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

5 Records of the Portland Company, Maine Historical Society.

Point to the depot at India Street. Eventually the Portland Company would expand, filling all the water between their first sea wall and the railroad, which would fill around its trestle and build a stone sea wall along the harbor edge.[6]

Beginning in April 1847, the foundry, smith shop, and machine shop, were constructed of brick using plans by Felton. The company contracted with Thomas Cummings as Master Carpenter at $2.50 per day and Lorenzo D. Mason as Master Mason or Bricklayer at $2.00 per day. Both were "encouraged to employ carpenters and masons who are stockholders in the company at the same rates as other mechanics." A cargo of stone then in the harbor was purchased for the buildings from Mr. Littlefield. The stone was used for stone for foundations, underpinning, and window caps. John Soule of Freeport supplied 175,000 bricks at $5.25 per thousand delivered and Dennison & Kelsey of Freeport supplied two kiln of bricks (approx. 250,000) at $5.00 per thousand delivered, "to be hard burnt and merchantable." The foundry was 75' x 62', smith shop 75' x 62', and machine shop 150' x 62' with slate roofs. Fenton was authorized to contract for tools and machinery up to $8,000 and President Poor contracted with Hinckley & Egery of Bangor for a stationary engine with two boilers 20' long by 40" diameter to power the machinery of the plant. It was to be installed and operational by August 1. The President and General Supervisor also began to look for a pattern maker and foreman to hire while the shops were under construction. Two additional lots were purchased from Capt. George Turner in November 1847, one to the east of the first lot purchased for $1,550 and one to the west for $1,350. The sea wall was extended and a wooden car shop was built on the west lot. The boundaries were apparently not clear as the car shop was built partially on Atlantic & St. Lawrence Railroad land west of the new lot. The railroad sold a piece of property to the company so the car shop was entirely on their own land. The railroad would sell additional land for further expansion of the complex in the early twentieth century. The company's shops began operation in October 1847, with the first locomotive, the "Augusta," completed in July 1848. The Augusta was built for the Portland, Saco & Portsmouth Railroad, not the Atlantic & St. Lawrence Railroad. The first locomotive for that line, the "Montreal," was completed in September 1848. The Portland Company would manufacture a total of 628 locomotives between 1848 and 1909 in addition to hundreds of marine and industrial boilers and numerous other products.[7]

6 Records of the Portland Company and records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

7 Records of the Portland Company, Maine Historical Society.

APPENDIX B: ADDITIONAL INFORMATION ON JOHN A. POOR

John Alfred Poor was born in Andover, Maine, to Dr. Silvanus and Mary Merrill Poor in January 1808. He spent part of his boyhood with an uncle in Bangor where he attended school at an academy. In 1827, he began the study of law in Bangor. He was admitted to the bar on his 24th birthday and opened a practice in Old Town. In 1833, he returned to Bangor and married Elizabeth Adams Hill, going into partnership with his uncle, also a lawyer. Upon the retirement of his uncle, Poor and his brother, Henry Varnum Poor, also a lawyer, established a partnership. John A. Poor practiced law in Bangor for fourteen years before moving to Portland to pursue other interests, principally railroads.[1]

Poor had been present in Boston in April 1834 when the first steam locomotive ran in New England. He later wrote of that experience: "It gave me such a shock that my hair seemed to start from the roots rather than to stand on end; and as I reflected in after years, the locomotive engine grew into a greatness in mind that left all other created things far behind it as marvels and wonders." In a speech given in Bangor in 1869, Poor described how he came to become the leading proponent of railroad building in Maine:

> From 1830, onward, I watched with eager curiosity the development of the railway, its mysterious workings and marvelous power; and I sighed and longed for the introduction of railroads into Maine. I saw how the railroad, wherever introduced, attracted capital and industry. As early as 1835, I perceived that the tide of immigration into Maine, from other parts of New England gradually diminished, and finally was checked completely by the growth of manufactures. I could not help seeing that a time of emigration from Maine was rolling on; for in 1843, on a visit to my native town with less than seven hundred people, eighty young persons had been drawn from it to the workshops and factories of Massachusetts. I felt irresistibly impelled to an effort to resist if possible this state of things. I tried in 1843, as a citizen of Bangor, to move in a plan for a railway east, toward St. John and Halifax, but the time had not come, and I threw my energies into the project of a line from Portland to Montreal, as the great section to begin upon.[2]

In 1844, Poor wrote a letter to the *Portland Advertiser* outlining his plan for a rail line from Portland to Montreal. His biographer states, "His letter created a profound sensation in Portland … compared to 'an alarm bell in the night struck by the hand of a stranger.'" A short time later, Poor relocated to Portland and began organizing the effort to secure a charter from the legislature for the railroad. John A. Poor's role in the creation of the line from Portland to Montreal is well documented – from his speaking tours through Maine and Quebec, promoting the plan, to his frantic journey from Portland to Montreal by sleigh in a blizzard to head off efforts by Boston to secure the proposed line for their city, and subsequent his efforts to get the railroad financed, built, and equipped.[3] Shortly after the line was completed to Montreal, it was leased to the Grand Trunk Railroad, which operated it until the 1980s.[4]

In 1846, a committee of Directors of the Atlantic & St. Lawrence Railroad, which included Poor, negotiated an agreement with the railroads connecting Portland to Portsmouth and Boston which would allow the transfer of passengers and freight between the lines without unnecessary delay or cost. According to Poor's biography, "The idea itself originated with Mr. Poor, who thus early recognized the impolicy of placing any restriction upon railway transit. To carry it out, he suggested the building of a new street, extending across a part of the city from the station of the Atlantic and St. Lawrence Railway to that of the Boston roads, on

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1 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890

2 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890

3 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890

4 Records of the Atltantic & St. Lawrence Railroad, Maine Historical Society.

which a railway track should be laid."[5] This would be built several years later and be named Commercial Street. The effect of Poor's railroad related developments on Portland and Maine cannot be over stated. On a state-wide level, Poor's efforts greatly increased international trade with both Canada and Europe, provided the state with direct trans-Atlantic passenger ship service, and facilitated the immigration of thousands of French-Canadian families to work in the mills made possible by the improved transportation network.

Poor was also President of the Portland Gas Light Company, incorporated in 1849, which began to supply gas for domestic and street lighting in 1850. In 1849, he purchased the *American Railway Journal* and made his brother, Henry Varnum Poor manager and editor. H. V. Poor later owned the publication and expanded into compiling statistical information on the financing and operation of railroads in the U. S., establishing the foundation of the Standard and Poor's financial services company. In 1851, he was elected President of the York and Cumberland (later Portland and Rochester) Railroad and conceived of the route of that line over the mud flats of Back Cove in Portland, to connect with the Atlantic & St. Lawrence near that line's Back Cove Bridge. Kennebec Street and a portion of the Bayside Trail follow this right of way today. Poor established *The State of Maine* newspaper in Portland in 1853 and was its owner and editor until it merged with the *Daily Advertiser* in 1859. The newspaper was devoted to the advocacy of the development of the state and particularly, his own scheme for building the European and North American Railway. In the late 1860s and early 1870s, he was President of the Portland, Rutland, Oswego, and Chicago Railway, a never-built line that was to have replaced the Grand Trunk Railroad in his transcontinental plan, after that railroad declined to become involved in the plan.[6]

The European and North American Railway was John A. Poor's great dream, of which the Atlantic & St. Lawrence Railroad was to be merely a part. He wanted to create a railroad line that would run from Halifax, Nova Scotia, through New Brunswick and into Maine at Calais, then run to Bangor and on to Auburn, where it would connect with the Atlantic and St. Lawrence line to Montreal. From Montreal, Poor envisioned a line that would run to the Great Lakes and ultimately to the West Coast, serving both the United States and Canada. His vision was for this grand trunk line to connect with trans-Atlantic steam ships at Halifax, providing the shortest possible route from "British America" (the U.S. and Canada) to England and Europe and from the West Coast to Asia. In 1869, he wrote, "For more than thirty years I have contemplated as a certainty the completion of a line of railway across the continent of North America, at its widest part, as the means of securing the shortest possible transit of passengers, mails, and valuable merchandise between the centers of Europe and Asia." His great concept ran into competition from another plan for a railroad from the Canadian Maritime Provinces to Montreal that stayed entirely within Canada, and resistance from his Atlantic & St. Lawrence partners in Portland, who saw no advantage to the plan, fearing a line from Halifax would make Portland redundant. Poor believed there would be enough business for both. His advocacy for the European & North American Railroad scheme would lead to his failing to be reelected to the Atlantic and St. Lawrence Board of Directors in 1849 and to his disassociation with the Portland Company Board in 1851. Portions of the E. & N. A. Railway in New Brunswick were built between 1851 and 1869, ending at the U. S. Border at St. Croix, N. B. The American European & North American, chartered in 1850, was built from Bangor to Vanceboro, opposite St. Croix, between 1868 and 1871. U.S. President Ulysses S. Grant and Canadian Governor General Lord Lisgar attended the ceremony to open the boundary bridge crossing the St. Croix River and connecting the two parts of the E. & N. A. R. R. in 1871. From Bangor southward, The Penobscot & Kennebec and Androscoggin & Kennebec railroads (later merged at the Maine Central) provided a link to Portland. Poor was still working on his westward dream, via the proposed Portland, Rutland, Oswego, and Chicago Railway when he died, six weeks before the opening of the European & North American bridge over the St. Croix.[7]

5 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890. 49, 50.

6 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890

7 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New Eng-*

Poor spent much of the 1860s in Washington, D. C., advocating and lobbying for his international railroad scheme as well as other projects related to Maine. Among other things, he was the principal proponent for the construction of Fort Popham at the mouth of the Kennebec River during the Civil War. When much of Portland was destroyed in the Great Fire of 1866, Poor undertook to raise funds for the relief of the residents of the city in Washington, where he was residing at the time.[8]

For many years, Poor was an active supporter of the Maine Historical Society, which had accepted him as a member in 1846 (membership of the organization was then limited to 100 persons). Poor devoted much of his leisure time to researching and writing about the early history of New England. In 1859, he read his first paper, "English Colonization in America" to both the Maine Historical Society and the New York Historical Society. Upon his death, the Society held a special meeting and passed a series of resolutions, "expressing a sense of deep obligation to Mr. Poor for his great services in the department of history, as well as in behalf of the material interests of the state, and declaring that he is entitled to be considered a public benefactor, and to be held in grateful remembrance by his fellow-citizens."[9]

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land, Life and Writings of John Alfred Poor, 1890.

8 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890.

9 Baxter, James P. "Reminiscences of a Great Enterprise," 1890. Maine Historical Society.

Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890.

APPENDIX C: RAILROADS FOR WHICH THE PORTLAND COMPANY PRODUCED LOCOMOTIVES

Alabama & Chattanooga RR
Androscoggin & Kennebec RR
Annapolis & Elk Ridge RR
Aroostook Valley RR
Atlantic & St. Lawrence RR
Bangor & Piscataquis RR
Bangor, Oldtown, & Milford RR
Bartlett & Albany RR
Black Rock and Salisbury Beach RR
Boston & Maine RR
Bridgton & Saco River RR
Brockville & Ottawa RR
Calais & Baring RR
Canadian Pacific RR
Central Mexicano RR
Chicago, Alton, & St. Louis RR
Complete Combustion Boiler Co.
Dominion of Canada RR
E. M. Boynton Bicycle Railway
Eastern RR
European & North American RR
Fredericton Branch RR
Galveston, Houston & Henderson RR
Grand Trunk RR
Hanover Branch RR
Inter-Colonial RR
John Wood Co.
Kennebec & Portland RR
Kennebec Central RR
Kilkenny Lumber Co.
Lake Shore & Michigan RR
Lexington & Danville RR
Logansport, Peoria & Burlington RR
Mad River & Lake Erie RR
Maine Central RR
McKean & Buffalo RR
Midland RR
Milwaukee & Mississippi RR
Milwaukee & St. Paul RR
Milwaukee, Lake Shore & Western RR
New Brunswick & Canada RR
New York & Boston RR
New York City & Northern RR
Northern Pacific RR
Nova Scotia RR
Ogdensburg & Lake Champlain RR
Ontario, Simcoe & Lake Huron RR
Panama RR
Penobscot & Kennebec RR
Peoria & Pekin Union RR
Peoria, Pekin and Jacksonville RR
Phillips & Rangeley RR
Port Hope, Lindsay, & Beaverton RR
Portland & Kennebec RR
Portland & Ogdensburg RR
Portland & Rochester RR
Portland Saco & Portsmouth RR
Quebec Central RR
Quebec, Montreal, Ottawa & Occidental RR
Richmond & Danville RR
Rumford Falls & Buckfield RR
Rutland & Washington RR
Sandy River RR
Sawyer River RR
Scioto Valley RR
Spartenburg & Union RR
St Lawrence & Atlantic RR
St. Francis & Megantic International RR
St. Johnsbury & Lake Champlain RR
St. Lawrence & Ottawa RR
St. Stephens Branch RR
Steel Co. of Canada RR
Toledo, Peoria & Burlington RR
Toledo, Peoria & Warsaw RR
U. S. Government
Utica, Ithaca & Elmira RR
Vale Coal Co. RR
Western Counties RR
Whitby & Port Perry RR
Whiteby, Port Perry & Lindsay RR
Windsor & Annapolis RR
Wiscasset & Quebec RR
Wood & Black Co.
Worcester & Nashua RR
York & Cumberland RR

APPENDIX D: TIMELINE OF DEVELOPMENT

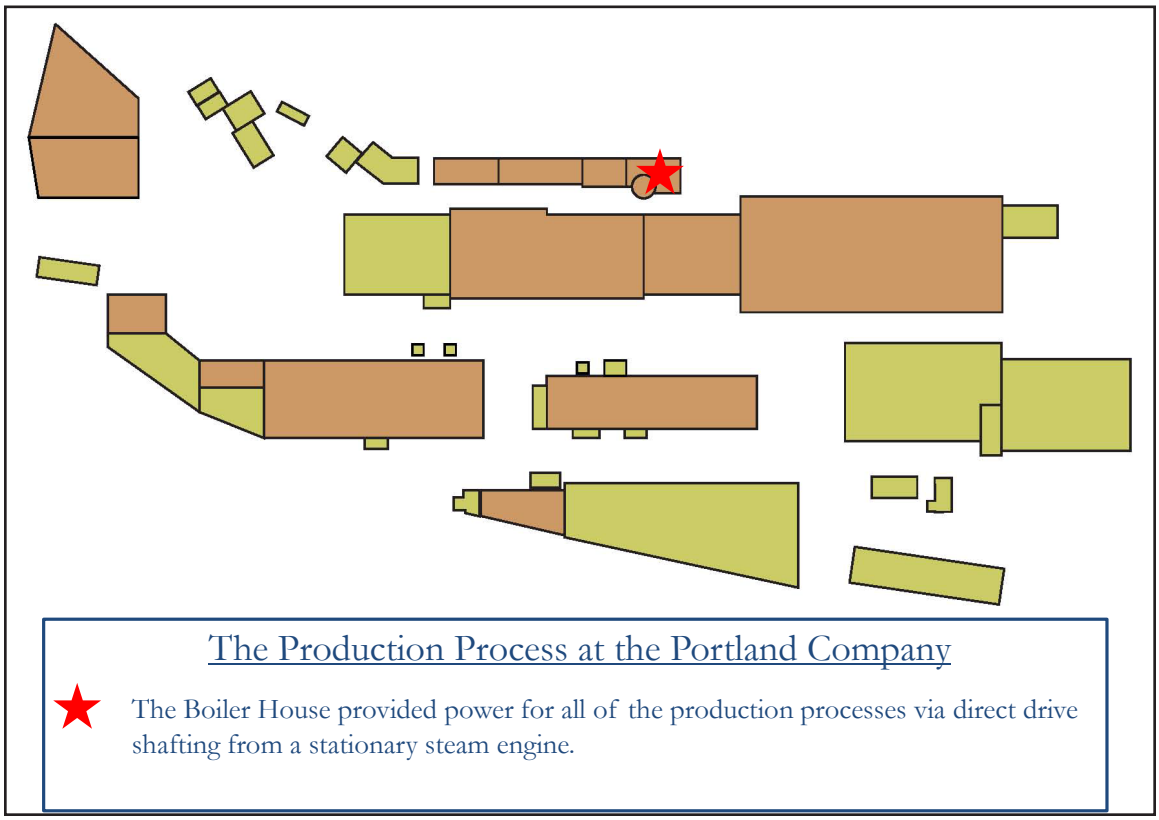
DATE	ITEM
1847	Construction of Machine Shop
1847	Construction of Smith Shop
1847	Construction of Foundry
1847 c.	Construction of Blacksmith Shop
1847 c.	Construction of Car Shop
1847-1858	Construction of Boiler House and 110' Chimney
1847-1858	Construction of Boiler Shop
1847-1858	Construction of Stable
1847-1858	Construction of Office Building
1848	Construction of Foundry Expansion
1858-1864	Large Addition to north end of Boiler Shop
1858-1864	Addition to east end of Stable
1858-1864	Construction of Drafting Room
1858-1864	Construction of Storehouse
1858-1864	Construction of new Boiler House
1858-1864	Addition of Core House to Foundry
1858-1864	Construction of Babbitt Shop at south end of lot
1858-1864	Construction of New Car Shop
1858-1864	Construction of Timekeeper Office
1858-1864	Construction of Scratch House north of Foundry
1862	Construction of Air Furnace east of Foundry
1864-1871	Small addition to southeast end of Blacksmith Shop
1864-1871	Replacement of Boiler House
1864-1871	Construction of Brass Foundry
1871-1880	Addition to west end of Stable
1871-1880	Removal of Timekeeper Office
1871-1880	Construction of Setting-Up Shop
1871-1880	Construction of Sand Shed
1871-1880	Construction of Flask House over Reservoir
1871-1880	Construction of Foundry Expansion
1871-1880	Construction of various additions to Foundry
1873	Destruction of Babbitt Shop by fire
1873	Destruction of New Car Shop by fire
1873	Construction of Car Shop with car shed at south end
1873	Construction of Tin and Babbitt Shop
1873	Construction of Wood Storehouse
1873 c.	Construction of Paint Shop
1880-1886	Three story tower addition to Boiler Shop
1880-1886	Air Furnace addition used for patterns

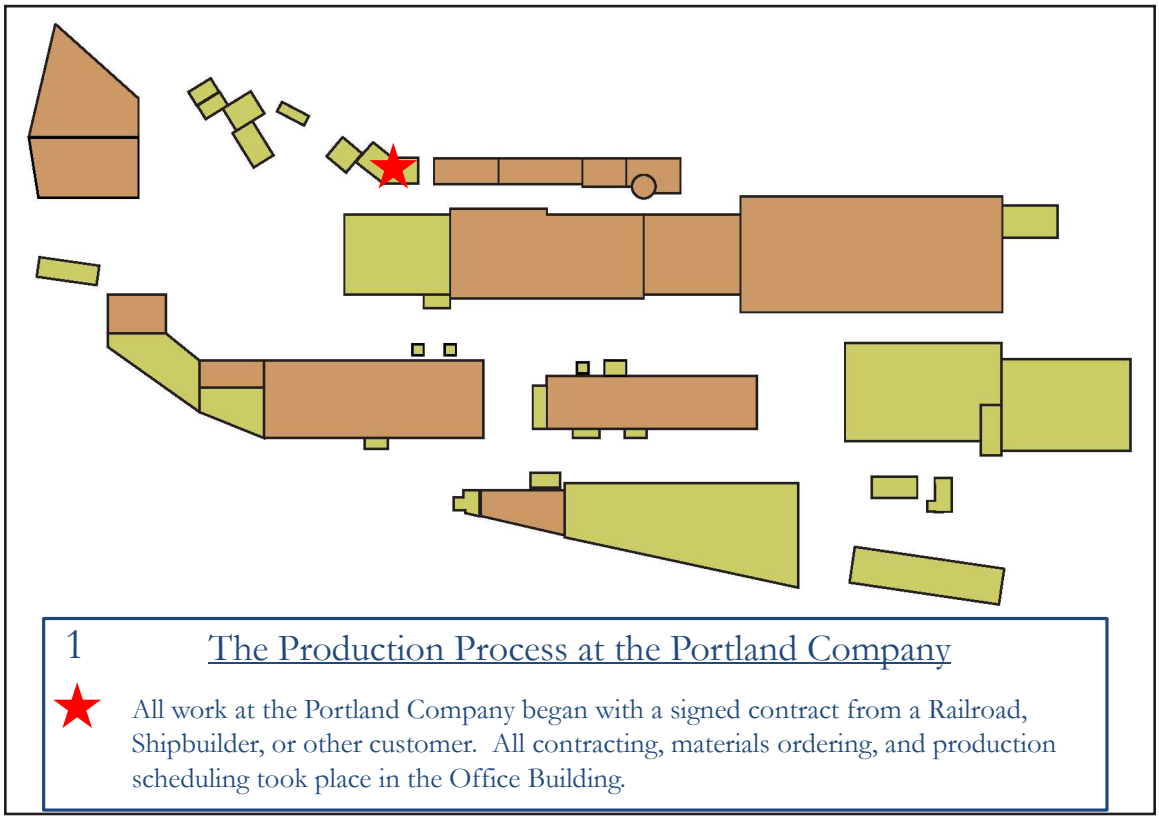
1881	Construction of Wheel Foundry
1882	Construction of Blacksmith and Tank Shop
1883-1884	Reconstruction of Blacksmith Shop
1885	Construction of Pattern Storehouse
1890	Reconstruction of south end of Boiler Shop
1891	Addition to Office Building
1894-1895	Removal of Core House
1894-1895	Removal of Air Furnace addition
1894-1895	Removal of Foundry Expansion
1894-1895	Removal of Wood Storehouse
1895	Construction of New Foundry
1895	Construction of Pattern Storehouse Addition
1896 c.	Second Floor added to Smith Shop
1896-1904	Small additions to east side of Office Building
1896-1904	Construction of three-story section of Blacksmith shop
1896-1904	Removal of Wheel Foundry
1896-1904	Construction of Coke Shed
1904	Construction of Lumber Shed
1904-1909	Brass Foundry used for Storage
1904-1909	Drafting Room used as Storage
1904-1909	Construction of Vault
1909 c.	Expansion of Machine Shop third floor
1909-1914	Removal of Office Building
1914-1924	Removal of Coke Shed
1914-1949	Removal of Stable
1918	Construction of Erecting Shop
1918 c.	Removal of Setting-Up Shop
1918 c.	Construction of Erecting Shop
1924-1949	Removal of Sand Shed
1924-1949	Removal of Blacksmith and Tank Shop
1932	Removal of south portion of Lumber Shed
1949-1951	Removal of Flask House
1949-1951	Construction of Office Building
1951-1980	Removal of 110’ Chimney
1951-1980	Removal of Boiler Shop
1951-1980	Construction of large addition at north end of Foundry
1980-1986	Removal of Tin and Babbitt Shop

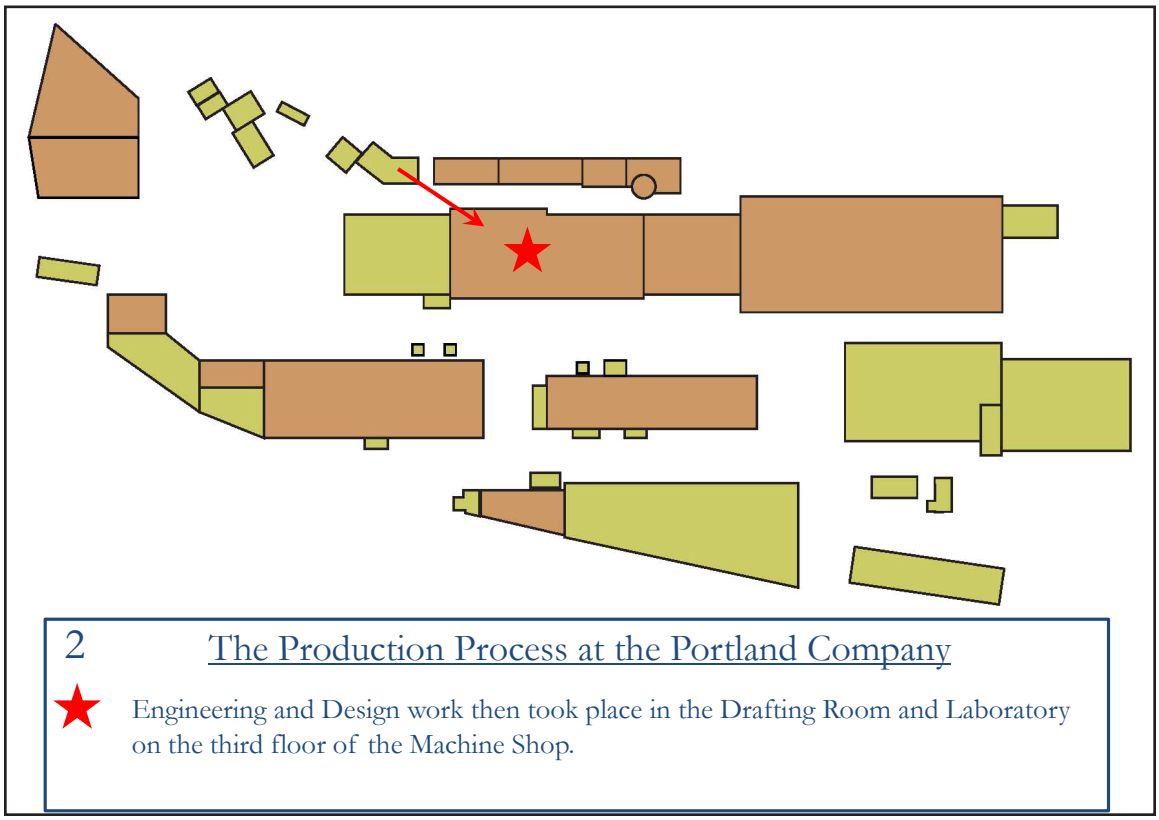
APPENDIX E: OTHER MANUFACTURERS OF LOCOMOTIVES

Year Locomotive Production Started	Company Name	Location	Pre-existing Company?	Extent of Facilities – Dates	Surviving Buildings? Dates?
1829	B&O Mt. Clare Shops	Baltimore, MD	No	Car Shops - 1829-30 Ironworks - 1850 Engine service shop and more car shops -1850s Foundry, blacksmith – post- Civil War Circ. Car shop – 1884 Loco., machine, & tender shops and saw mill – 1900-1920	Erecting shop destroyed by fire – 1961 Most remaining buildings demolished – 1976 Surviving: Passenger Car works – 1869-70 Circular Car Shop and Annex – 1884 Freight Car Repair Shop (ruin) – 1919 B&O Passenger Depot (not shop related) - 1851
1830	Canton Locomotive Works – Peter Cooper	Baltimore, MD	Est. 1828 to manuf. Rail for the B&O RR.	1st loco. Built of scavenged parts, including rifle barrels for boiler tubes. No loco shops built.	No surviving buildings
1831	West Point Foundry	West Point, NY	Est. 1817 to manuf. armaments	Best Fried of Charleston built for the S. Carolina RR	Closed 1911, site now a state park with limited ruins of the manufacturing buildings.
1832	Wm. Norris – Norris Locomotive Works	Philadelphia, PA	Est. 1832 as American Steam Carriage Co.	First loco built in small shop with power from adjacent wheelwright shop. Used Pheonix Foundry for castings	Full set of shops by 1857. Closed 1866. Buildings demolished 1896.
1832	Mattias Baldwin -Baldwin Locomotive Works	Philadelphia, PA	1825 machine shop to manufacture bookbinding machinery and textile printing cylinders	Model loco. For Peale Museum in 1831. First real loco, 1832, using outside foundry	Original site abandoned in 1928 for a new plant in Eddystone, PA. All buildings at first plant demolished 1937.
1834-35	Lowell Machine Shops	Lowell, MA	Est. 1814 (Boston Manuf. Co.) for manuf. Of textile machinery. Moved to Lowell 1824.	Extensive shops for textile machinery production. Locos made in Locks and Canal Shop, 1834-1861	Closed 1928. Site now a parking lot.
1834	Mill Dam Foundry	Boston	Est. 1832	Built first loco. in New England, no others	Buildings in use by other companies by 1838. Current state unknown.
c. 1835	Matteawam Company	New York	Est. 1814. To produce machinery for cotton and sugar mills, etc. Foundry by 1834.	Built two locos c. 1835 for Hudson River RR.	No information found.
1836	Eastwick & Harrison	Philadelphia, PA	Est. 1835 as as Garrett & Eastwick. Former watchmaker, making stat. steam engines	First loco, 1838, apparently in a small shop using an outside foundry. Built a total of 17 locos.	Firm moved to Russia in 1843. No buildings appear to survive.
1837	Rogers Locomotive Works	Patterson, NJ	Est. 1831 to produce textile machinery	First loco 1837, also cast tires for Norris and Baldwin	Became one of the "big three" with Norris and Baldwin. Patterson Museum occupies the 1873 Erecting shop, all other buildings demolished.
1840	Hinckley	Boston, MA	Est. 1831 as small machine shop, later Boston Machine Works. Built 1st stationary steam engine in MA.	1st loco 1840, numerous name changes.	Closed 1889. Property and buildings bought by Boston Elevated RR Co., used one building for temp power plant and demolished remainder to clear site for new power plant. The Hinckley building appears not to survive in 2014.
1845	Boston & Providence RR Shops	MA/RI	B&P chartered 1831, const. started 1832, opened 1834.	1st loco 1845. Used Geo. Griggs Foundry	Railroad absorbed into Old Colony RR and then into New York, New Haven, and Hartford. Location of B&P shops undetermined.
1848	Portland Company	Portland, ME	Est. 1845 to build locomotives and other railroad equipment	Foundry, Machine Shop, and Blacksmith shop built 1847, car shop in 1848, later additions 1850s, 1880s, 1890s, 1918.	2 of 3 pre-Civil War brick buildings are extant along with many other buildings from period of locomotive construction.

APPENDIX F: PRODUCTION

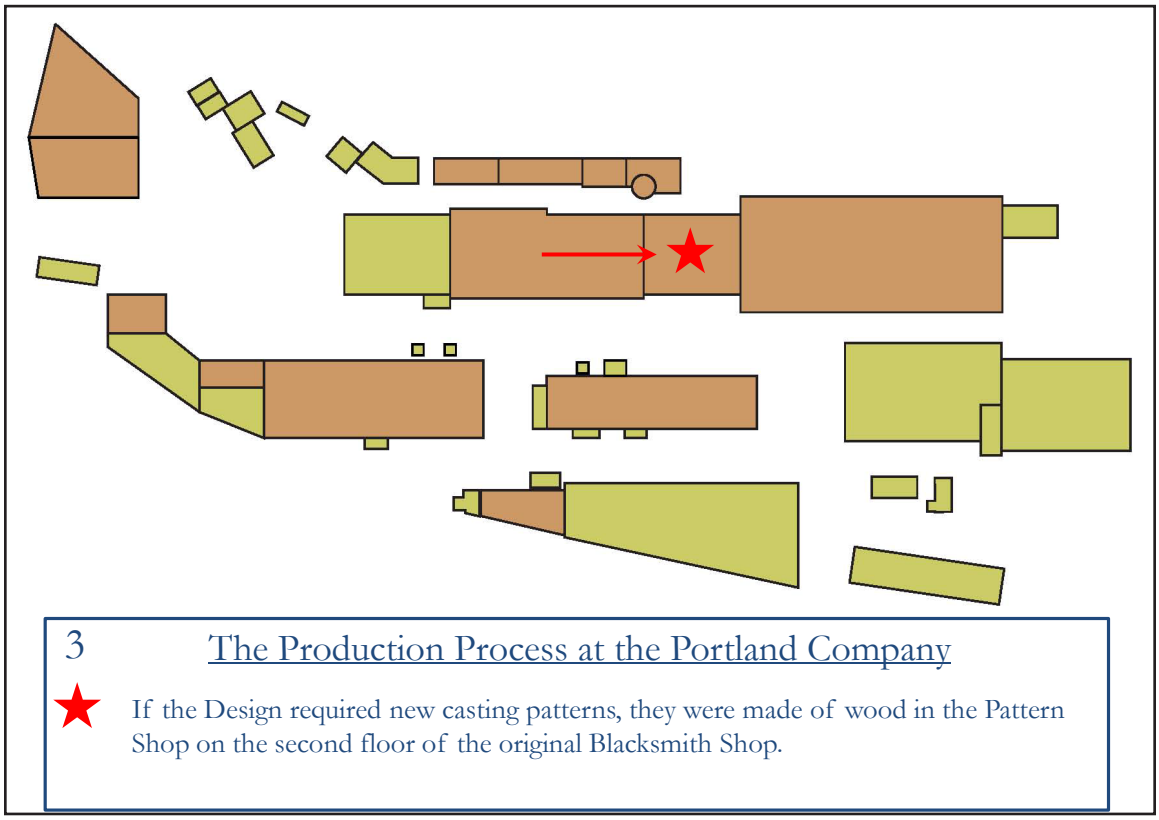






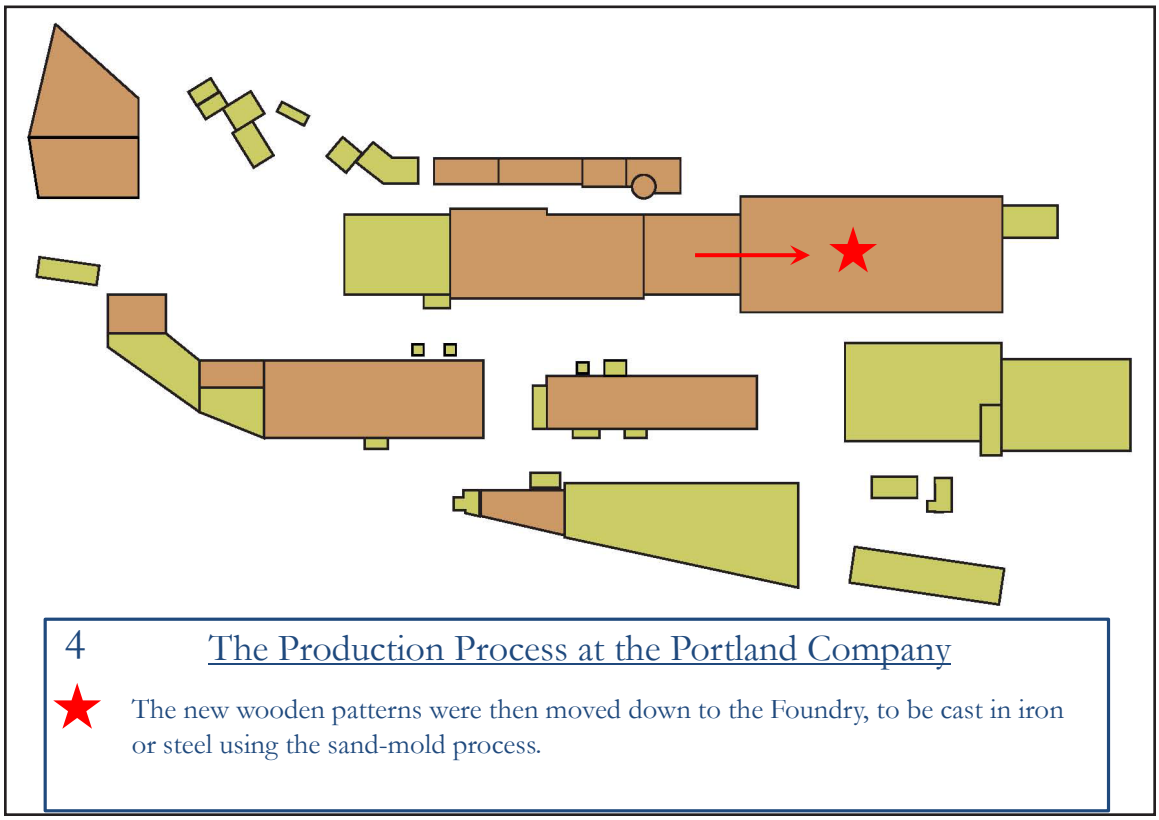
2 The Production Process at the Portland Company

★ Engineering and Design work then took place in the Drafting Room and Laboratory on the third floor of the Machine Shop.



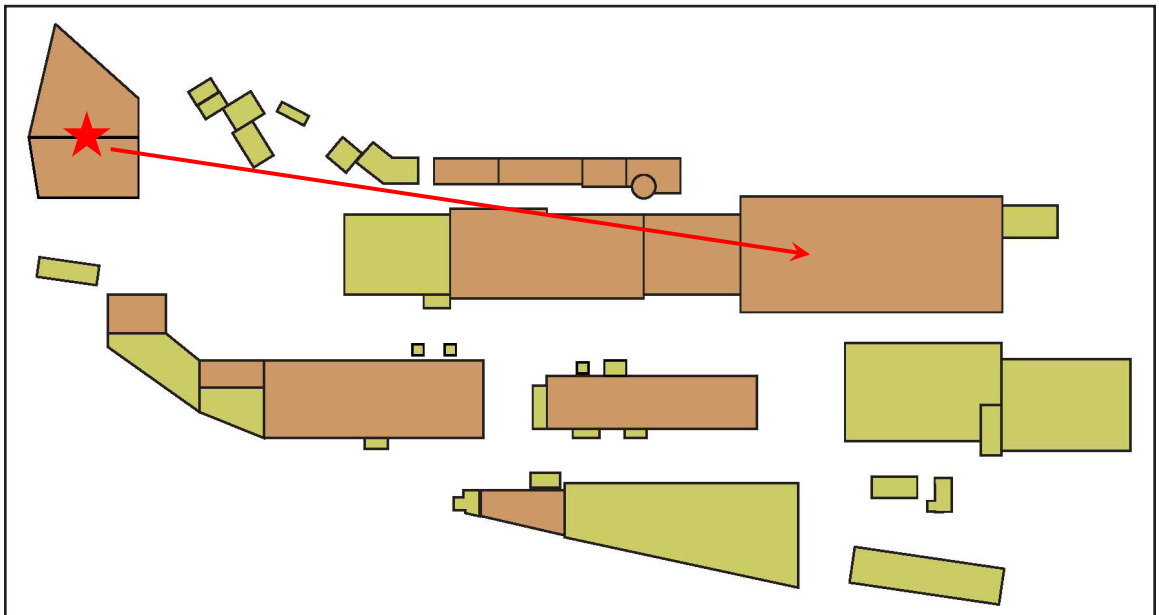
3 The Production Process at the Portland Company

★ If the Design required new casting patterns, they were made of wood in the Pattern Shop on the second floor of the original Blacksmith Shop.



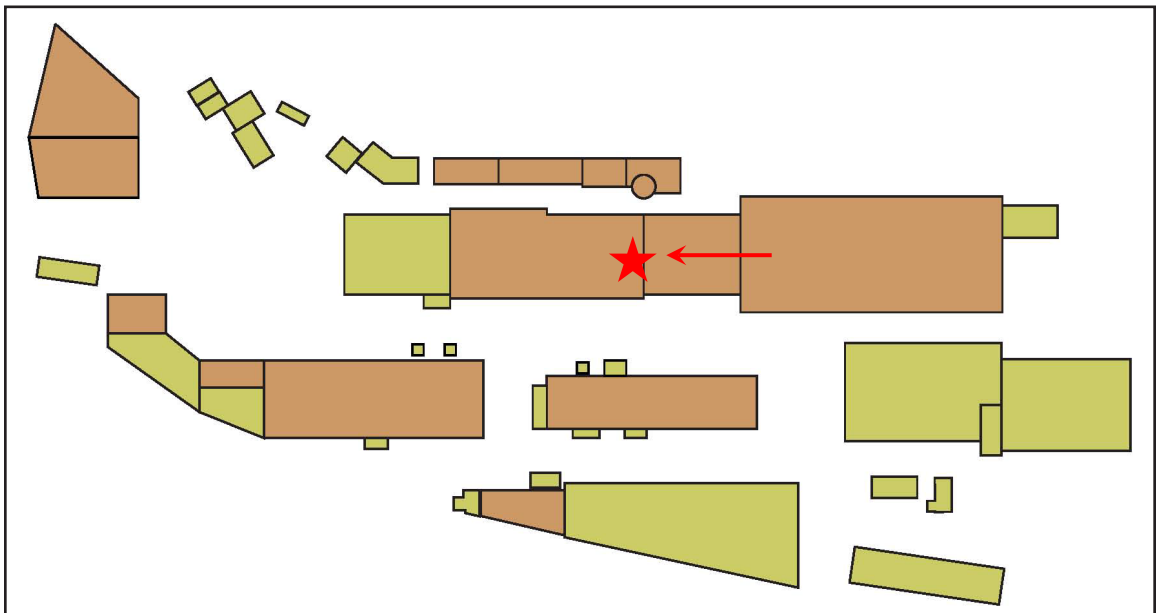
4 The Production Process at the Portland Company

★ The new wooden patterns were then moved down to the Foundry, to be cast in iron or steel using the sand-mold process.



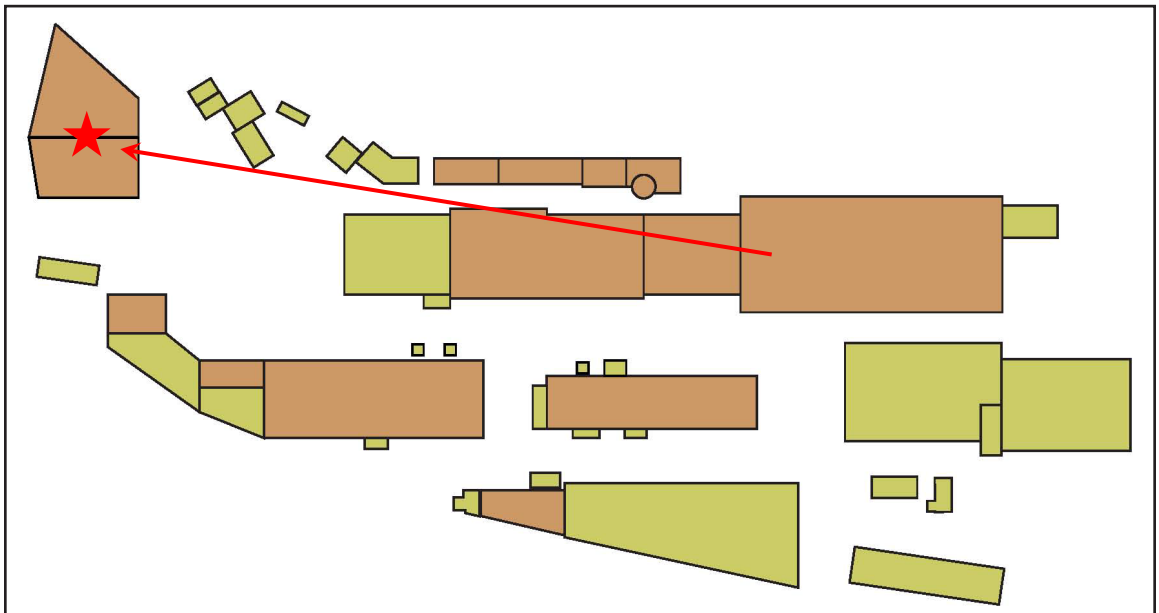
4 The Production Process at the Portland Company

★ If the patterns were being reused from a previous job, they would be moved from the Pattern Storehouse to the Foundry for casting.



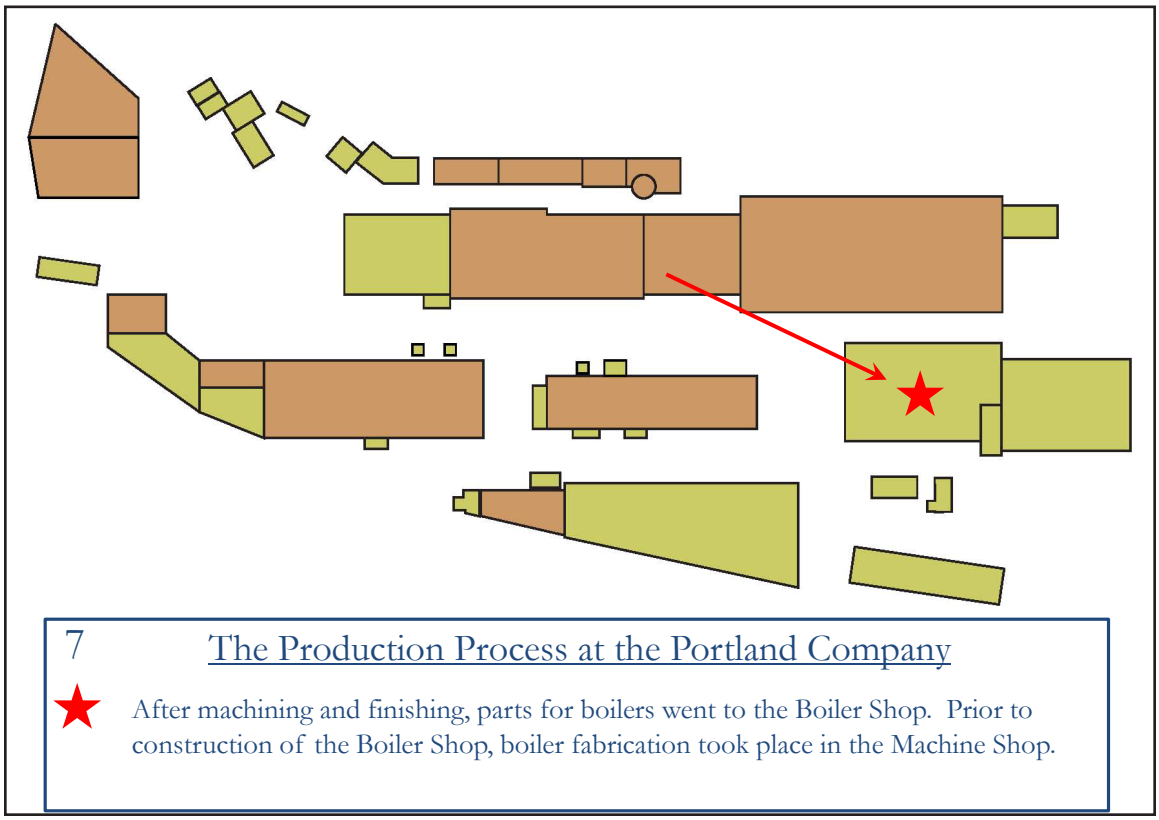
5 The Production Process at the Portland Company

★ Once cast and cooled, the manufactured parts moved to the Machine Shop for finishing on a variety of machines, including lathes, corers, drills, etc.



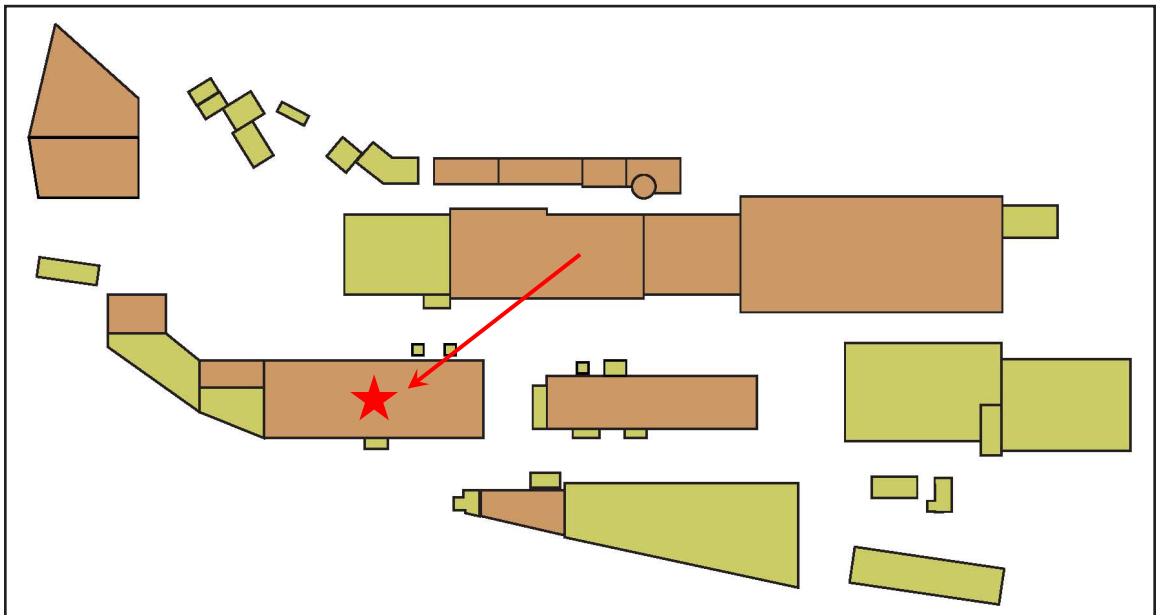
6 The Production Process at the Portland Company

★ After casting was completed, the wooden patterns were moved to the Pattern Storehouse for safe storage.



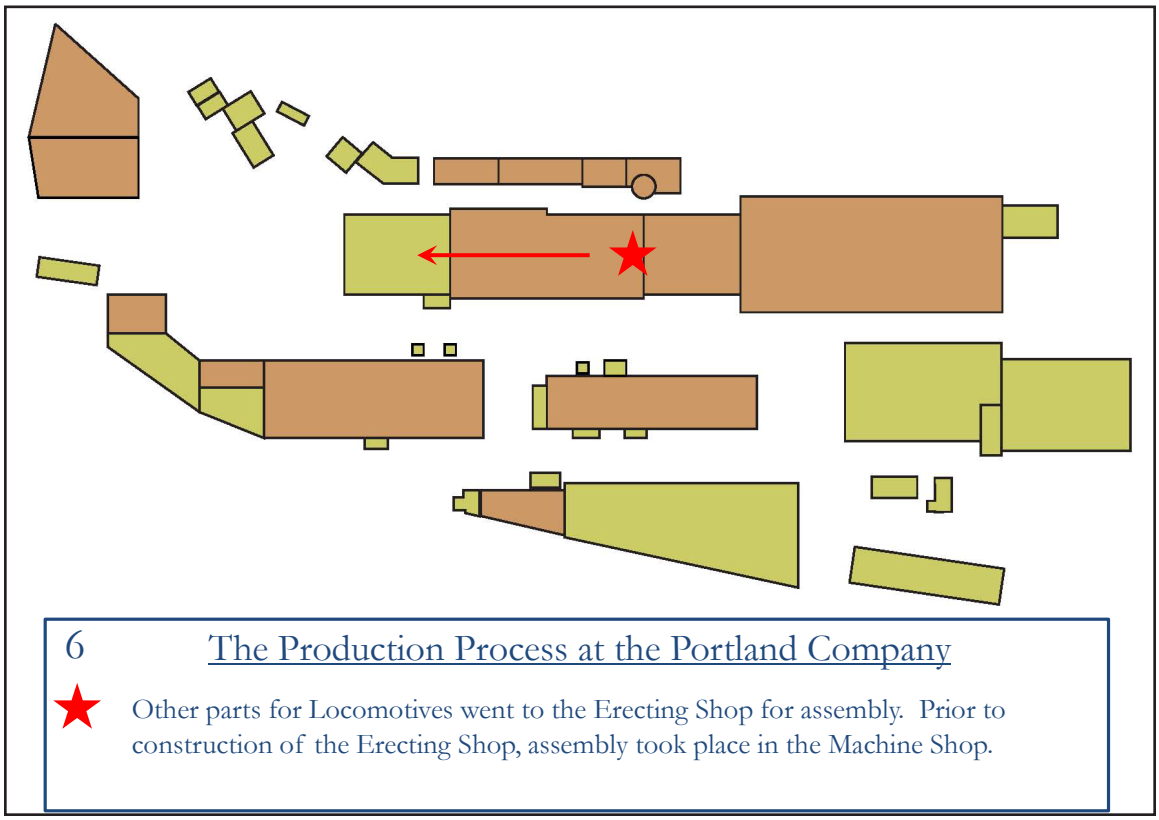
7 The Production Process at the Portland Company

★ After machining and finishing, parts for boilers went to the Boiler Shop. Prior to construction of the Boiler Shop, boiler fabrication took place in the Machine Shop.



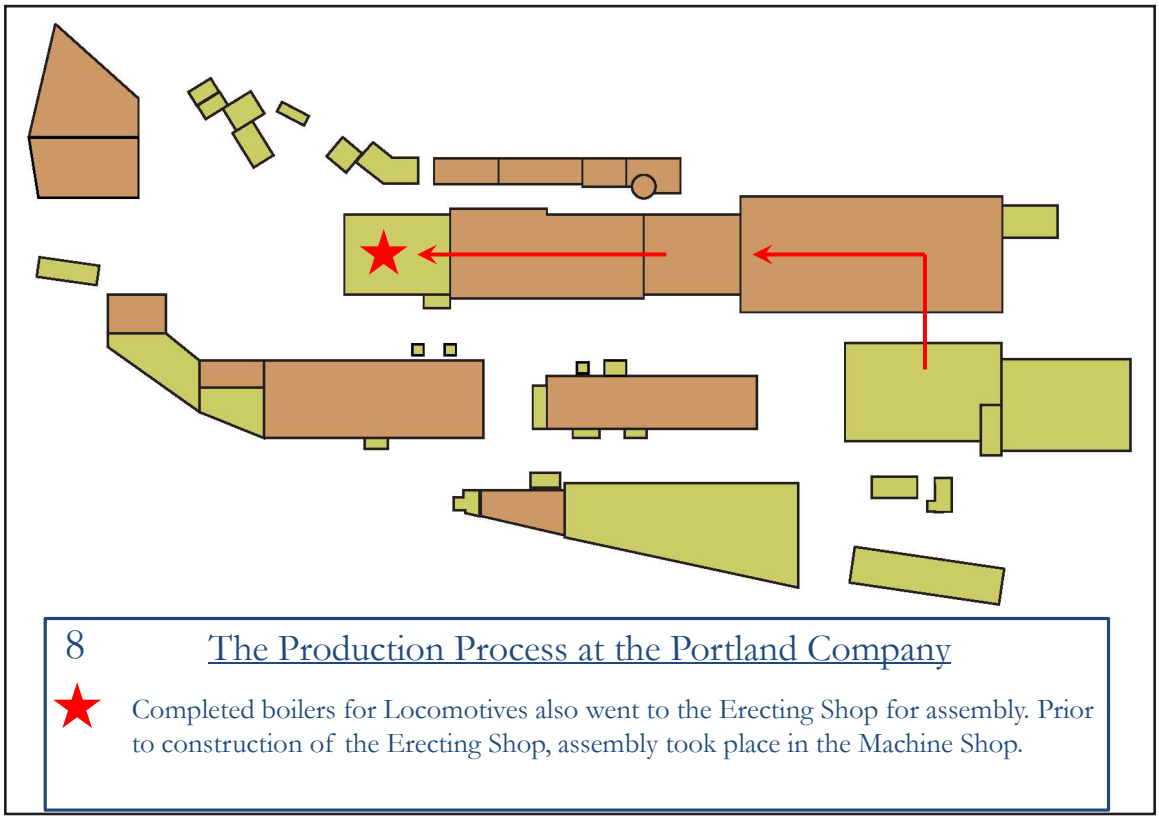
7 The Production Process at the Portland Company

★ After machining and finishing, parts for railroad cars went to the Car Shop.



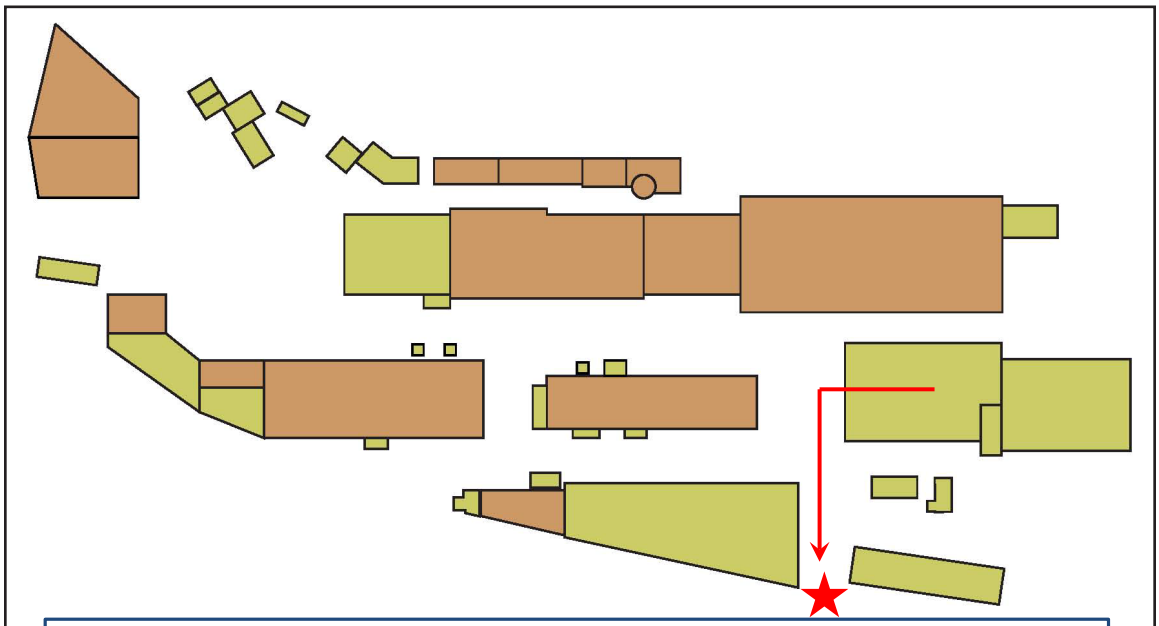
6 The Production Process at the Portland Company

★ Other parts for Locomotives went to the Erecting Shop for assembly. Prior to construction of the Erecting Shop, assembly took place in the Machine Shop.



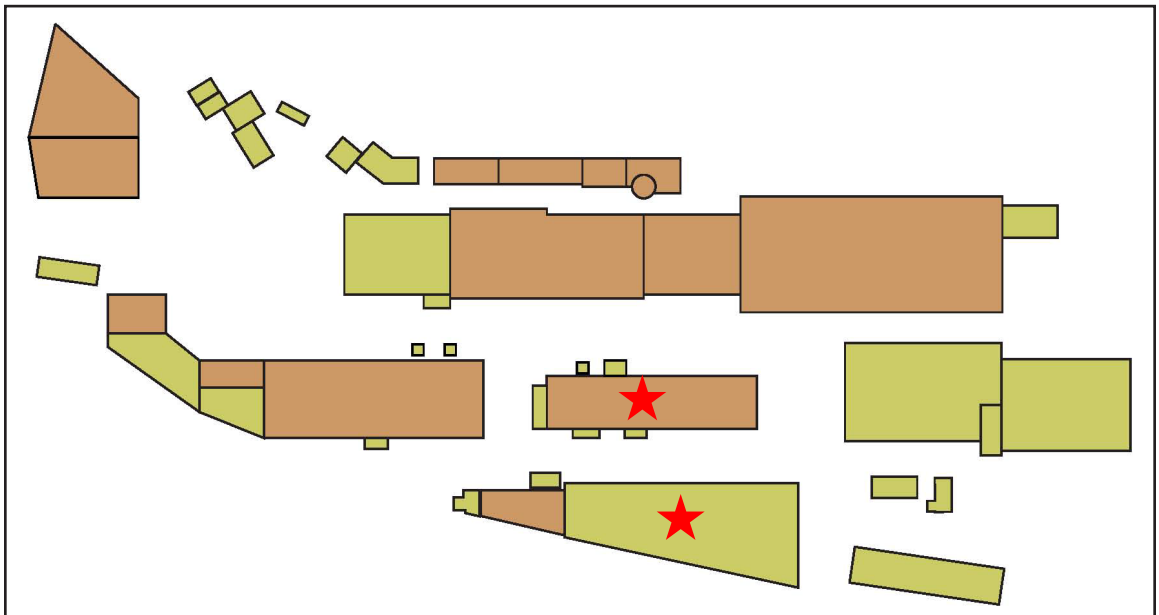
8 The Production Process at the Portland Company

★ Completed boilers for Locomotives also went to the Erecting Shop for assembly. Prior to construction of the Erecting Shop, assembly took place in the Machine Shop.



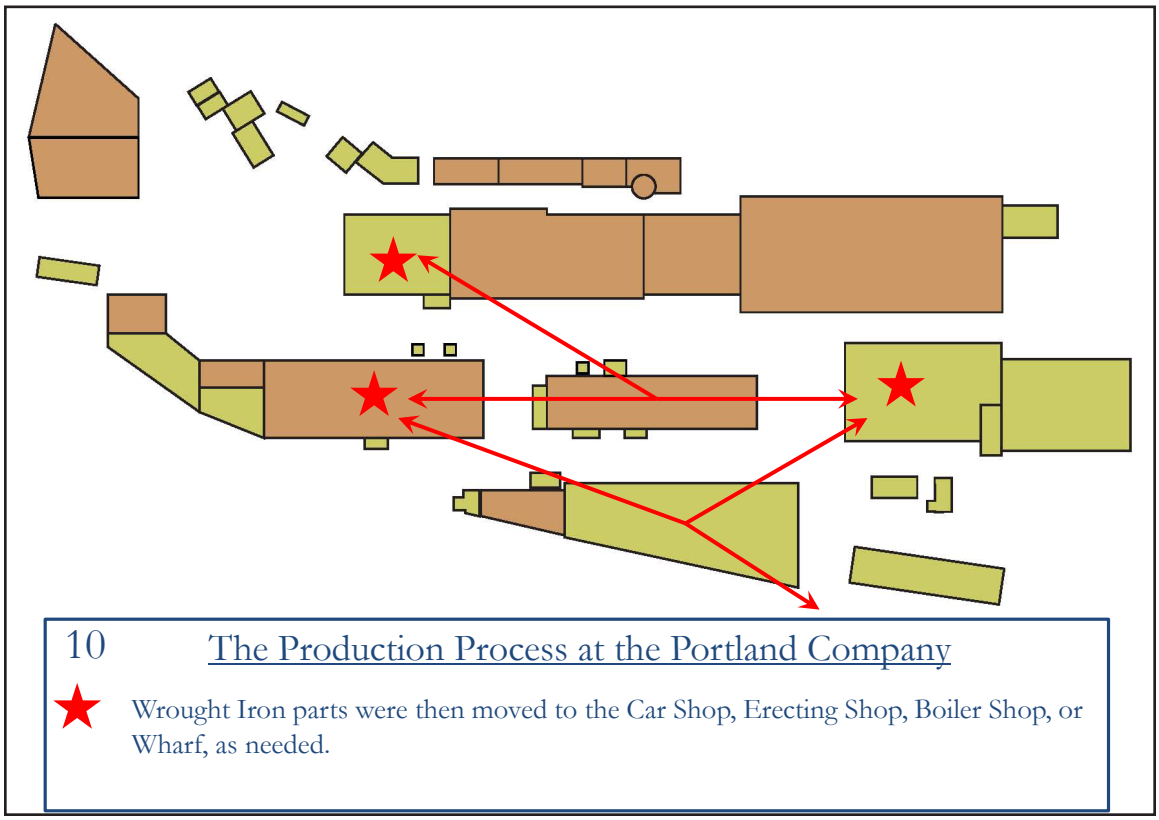
8 The Production Process at the Portland Company

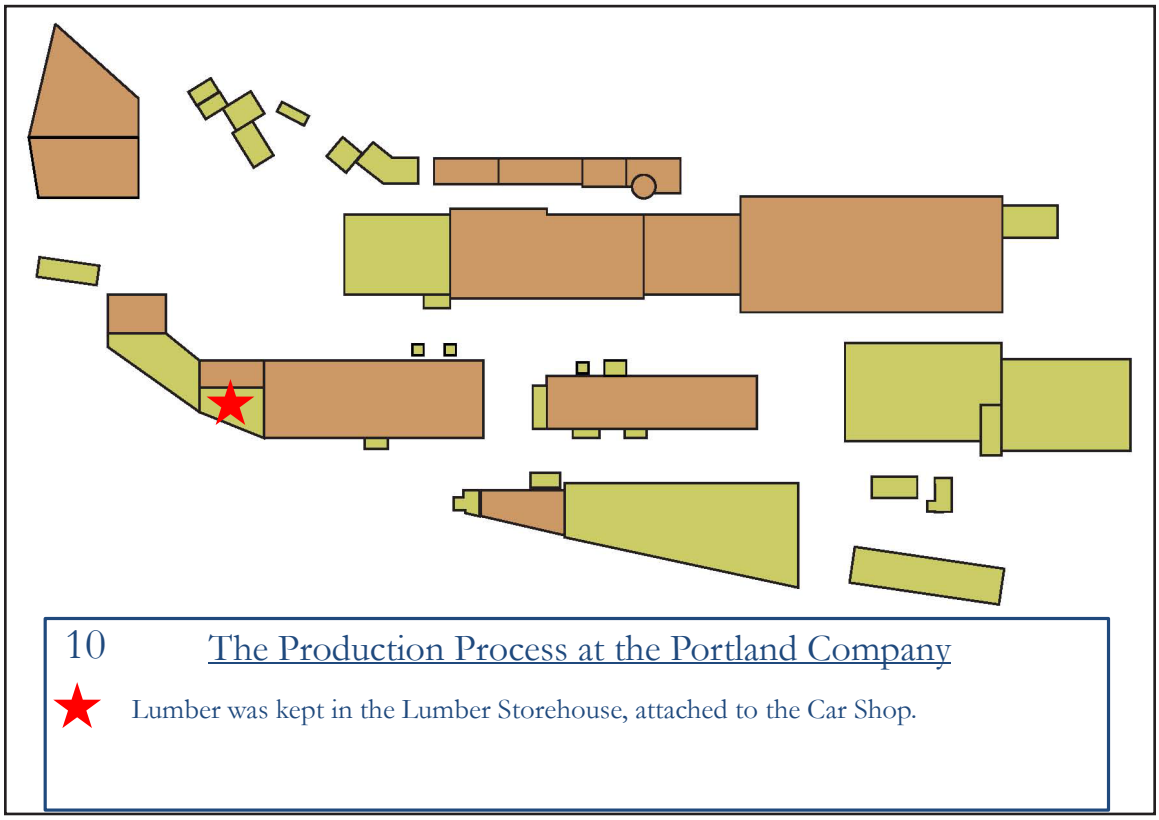
★ Completed boilers for Ships went to the Wharf for installation or transfer to the company shipyard on Spring Point.

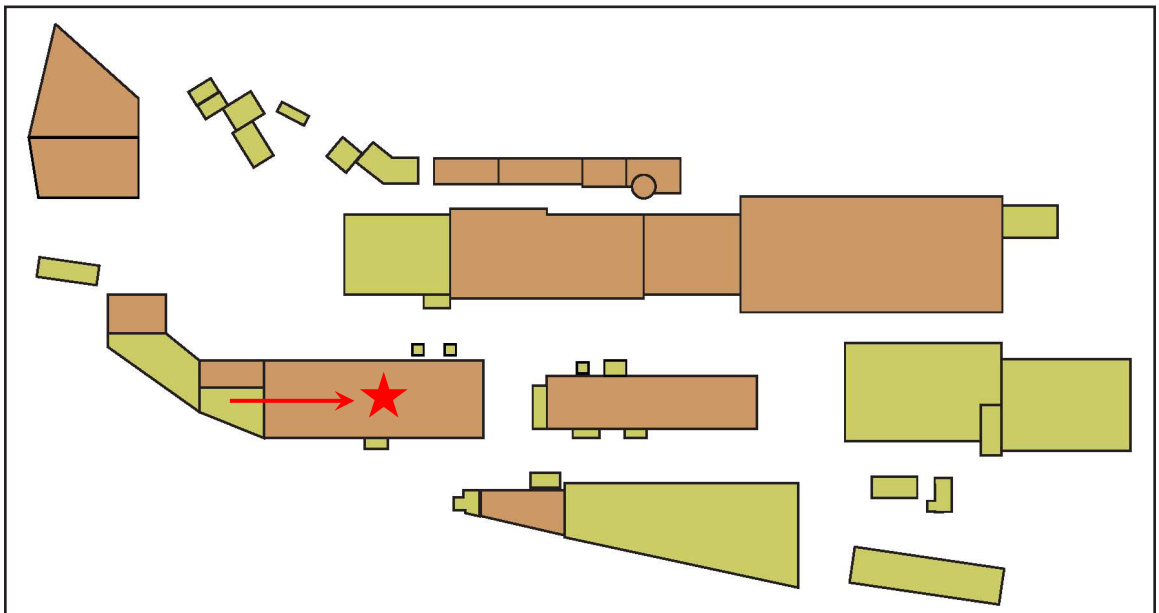


9 The Production Process at the Portland Company

★ Wrought Iron parts were made in one of the Blacksmith Shops.

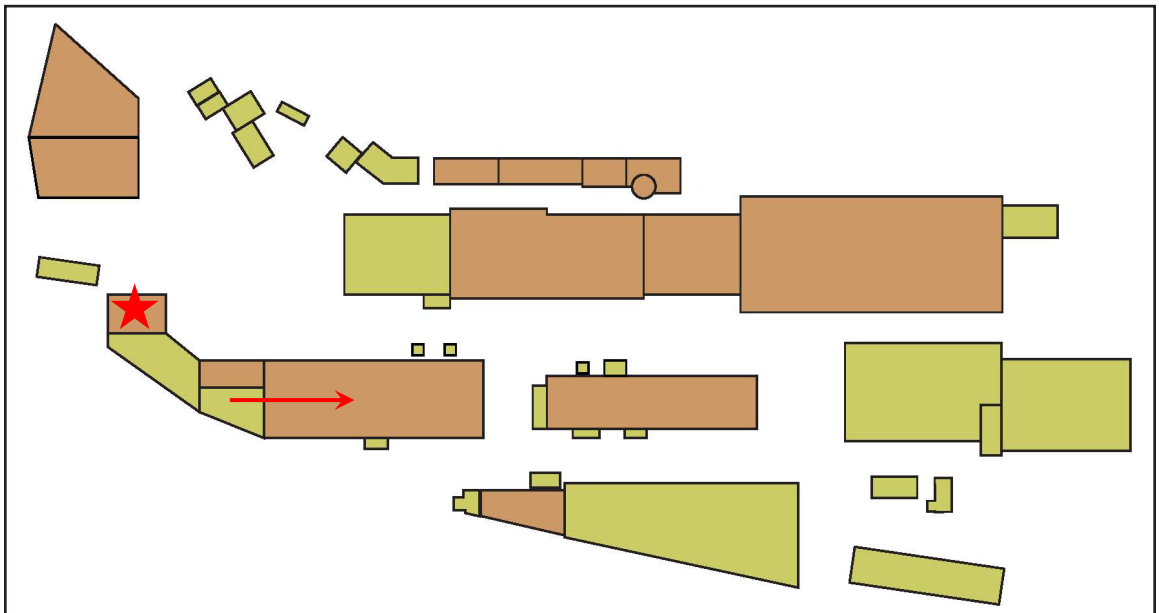

10
The Production Process at the Portland Company
Wrought Iron parts were then moved to the Car Shop, Erecting Shop, Boiler Shop, or Wharf, as needed.


10
The Production Process at the Portland Company
Lumber was kept in the Lumber Storehouse, attached to the Car Shop.



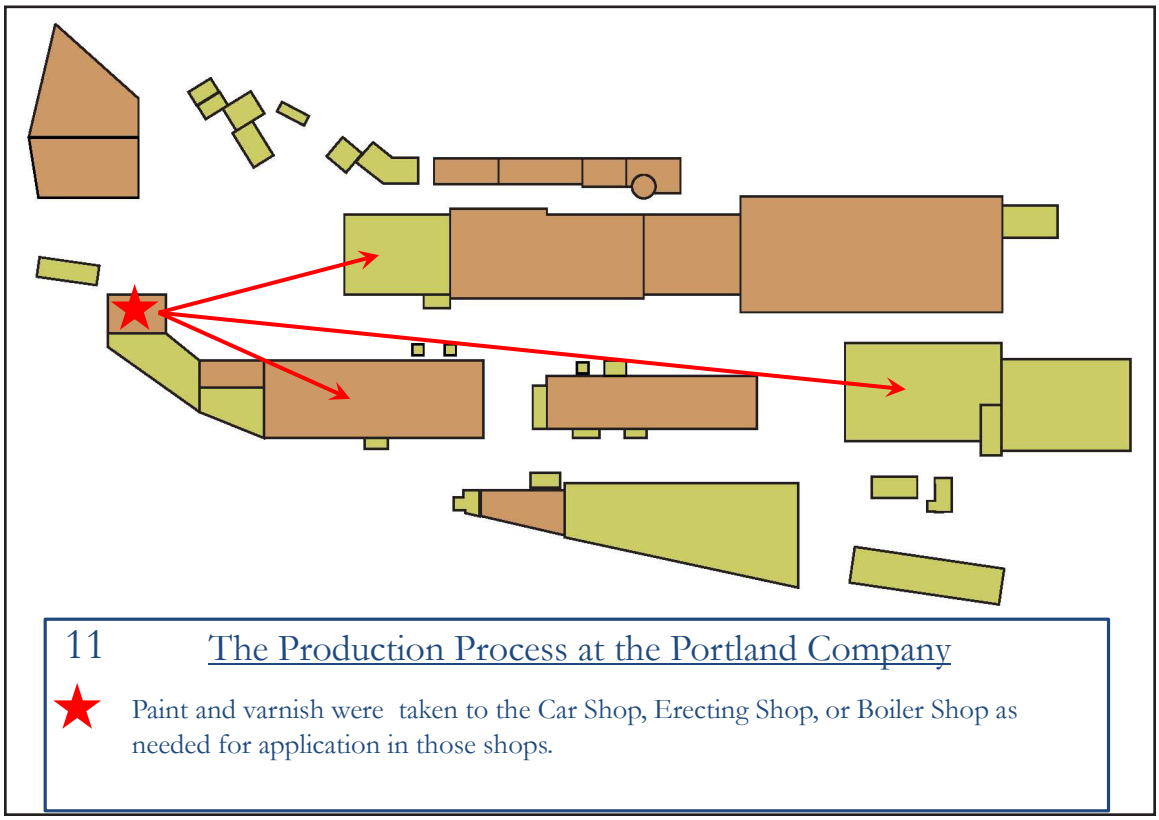
10 The Production Process at the Portland Company

★ Lumber was moved into the Car Shop to be used in the construction of railroad cars, locomotive cabs, and other carpentry work done in this building.



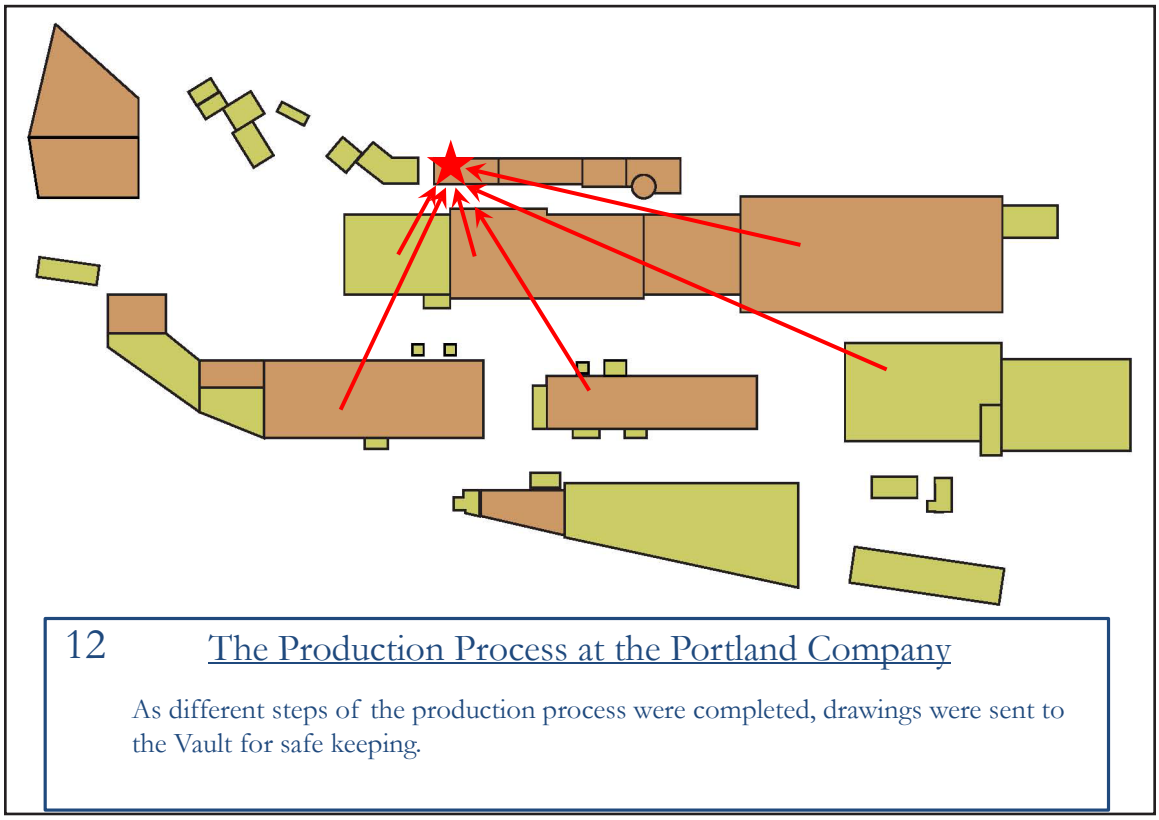
11 The Production Process at the Portland Company

★ Paint and varnish were stored in the Paint Storehouse.



11 The Production Process at the Portland Company

★ Paint and varnish were taken to the Car Shop, Erecting Shop, or Boiler Shop as needed for application in those shops.



12 The Production Process at the Portland Company

As different steps of the production process were completed, drawings were sent to the Vault for safe keeping.

APPENDIX G: NATIONAL REGISTER OF HISTORIC PLACES CRITERIA FOR EVALUATION OF SIGNIFICANCE AND INTEGRITY AS APPLIED TO THE PORTLAND COMPANY (National Register Bulletin Number 15)

For a property to qualify for the National Register it must meet one of the National Register Criteria for Evaluation by:

- Being associated with an important historic context *and*
- Retaining historic integrity of those features necessary to convey it significance.

The significance of a historic property can be judged and explained only when it is evaluated within its historic context. Historic contexts are historical patterns that can be identified through consideration of the history of the property and the history of the surrounding area. Historic contexts are found at a variety of geographical levels or scales.

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- That are associated with events that have made a significant contribution to the broad patterns of our history (Criterion A); or
- That are associated with the lives of persons significant in our past (Criterion B); or
- That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or
- That have yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

The Portland Company complex is associated with important historic contexts at the National, State and Local levels as delineated in the historic context summary paragraphs below, and retains historic integrity of those features necessary to convey its significance at the National, State and Local levels.

National Level of Significance

National Register Criterion A: Industry (1847 - 1865)

The Portland Company complex is associated with events that have made a significant contribution to the broad patterns of our history at the national level as a rare surviving example of a pre-Civil War foundry, machine shop, and car shop complex built for the manufacture of railroad equipment in 1847. It appears to have been the first such self-contained complex in the nation built specifically for that purpose, with all of the necessary shops and a foundry on a single site. It also contains the oldest surviving railroad shop buildings in the nation. Locomotives, gunships, and cannon were manufacured here for the Union forces during the Civil War.

State Level of Significance

National Register Criterion A: Industry (1847 – 1982)

The Portland Company complex is associated with events that have made a significant contribution to the broad patterns of our history in the area of industry within the city of Portland, Maine. In addition

to the national industrial significance of the Portland Company as the first complete locomotive works built in the United States and a rare surviving pre-Civil War railroad equipment manufacturing plan, the Portland Company played a significant role in the development of many important industries in Maine. These include the paper-making industry, textile industry, canning industry, commercial fishing, and many smaller industries.

National Register Criterion A: Transportation (1847 – 1945)

The Portland Company is associated with events that have made a significant contribution to the broad patterns of our history for its critical role in the development of Maine railroads, including the state's iconic two-foot gauge lines, and also built boilers, marine engines, and other equipment for steam ships, including the famed "Portland." The company was created as an adjunct to the Atlantic & St. Lawrence Railroad shortly after that line was chartered to run from Portland to Montreal. The principal proponent of the Atlantic & St. Lawrence Railroad, John A. Poor, was the first president of the Portland Company as well as a director of the railroad company.

National Register Criterion B: Association with John A. Poor (1847 – 1851)

The Portland Company complex includes the most important surviving buildings associated with John A. Poor (1808-1871), a person significant to the past of the state of Maine. John A. Poor was significant to the past of Maine in numerous areas, but particularly in the areas of transportation and industry. Like the Atlantic & St. Lawrence Railroad, the Portland Company was part of a plan devised by Bangor Attorney John A. Poor to make Portland the winter port for eastern Canada during the months in which the St. Lawrence River was frozen. Starting in 1844, Poor actively promoted his vision for the continent's first international railroad and attracted others to help make it a reality in the 1840s and '50s. Construction of the 250 mile long railroad, estimated to cost ten million dollars, began on July 4, 1846 and the line to Montreal was completed in July 1853. As a director of the Atlantic & St. Lawrence Railroad and President of the Portland Company, Poor was instrumental in ensuring that a locomotive manufacturing plant would be built in Portland.[1]

While Poor's success in creating the Atlantic & St. Lawrence Railroad was perhaps his most significant achievement, none of the associated buildings or structures built in Portland during the period of his activity with the railroad survive. Only one Atlantic & St. Lawrence Railroad building from the same period has been identified elsewhere in Maine, a small wooden freight house built in Gilead in 1851 and moved to Auburn after 1968. The few other surviving buildings on the line date from after 1853, when the Grand Trunk Railroad leased the entire Atlantic & St. Lawrence line.[2] The original buildings of the Portland Company are the most significant surviving buildings associated with John A. Poor, who was President of the company during the period of their construction. The Portland Company Board of Director's meeting minutes from 1847 document that he had a direct role in acquiring materials for their construction and served with General Superintendent Horace Felton as the Building Committee.

Local Level of Significance

National Register Criterion A: Industry (1847 – 1982)

The Portland Company is also significant for industry at the local level, as the largest business in the city in the mid-nineteenth century and only intact nineteenth and early twentieth century industrial complex in the city of Portland. Virtually all evidence of Portland's nineteenth century industrial history has been lost with

1 Records of the Portland Company and records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.
Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890
2 Mohney, Kirk F. *Along the Rails, a Survey of Maine's Historic Railroad Buildings*. 2000.

the exception of the Portland Company complex. Thirty-three manufacturing plants can be identified in the 1876 Bird's Eye View of Portland. Of the thirty-three, which include Portland Stove Foundry, J. B. Brown & Son's Sugar Refinery, Forest City Sugar Refining Company, Eagle Sugar Refining Company, Portland Packing Company, and Portland Stoneware Company, only three complexes survive to any extent in 2014. Two of these have only a single surviving building, one from the Star Match Factory on West Commercial Street and one from the original Burnham & Morrill Cannery complex on Franklin Street. Only the Portland Company complex remains largely intact 138 years later. In 1924 Portland had 60 sizable companies engaged in industrial production of various sorts, occupying more than 85 buildings. Of these individual buildings, fewer than a dozen survive outside the Portland Company. Six companies had large complexes of buildings, including the E. T. Burrowes Company, Thomas Laughlin Company, and Southworth Machine Company.[3] Fragmentary remains of some of these complexes, such as the early twentieth century Thomas Laughlin Company foundry building on Hampshire Street now used by Shipyard Brewery, only hint at the history of these sites where hundreds of Portland residents made their livings over many decades.

Criterion A: Community Planning and Development (1847 – 1853)

The Portland Company is associated with events that have made a significant contribution to the broad patterns of our history in the area of community planning and development. It is associated with and/or responsible for several significant planning and development initiatives within the city of Portland. As part of John A. Poor's vision for creating a modern international port at Portland, he conceived of a wide new street along the waterfront which would contain railroad tracks to connect the Atlantic & St. Lawrence R. R. on the east end of the city to the Portland, Saco & Portsmouth R. R. on the west end while providing both railroads access to the numerous wharves between their terminals. The narrow original waterfront street, Fore Street, followed the natural landform, snaking along the shore around Clay and Broad coves. The new street would be built by filling between the existing wharves below Fore Street, far enough out into the harbor to allow the construction of large new warehouse buildings along the land side of the street. Broad Cove would be filled for construction of the Atlantic & St. Lawrence Railroad terminal and for the Portland Company works and Clay Cove would be filled for the street and new buildings. The Portland Company site alone is seven acres, the majority of it made by filling the mud flats and cove. This project was undertaken cooperatively by the two railroads and the city of Portland, with the railroads paying the cost of filling between the wharves and the City paying wharf owners for the value of their properties seized through eminent domain. The mile-long and one hundred foot wide street would be named Commercial Street.[4]

This project was the largest urban planning initiative undertaken in the city of Portland in the nineteenth century and was transformative in its effects. Before arrival of the Atlantic & St. Lawrence Railroad and Portland Company with the related construction of Commercial Street, Portland had a waterfront infrastructure left over from the eighteenth century that was inefficient and ill suited to the age of steam.

National Register Criterion C: Architecture (1847 – 1951)

The buildings of the Portland Company complex embody the distinctive characteristics of a type, period, or method of construction, specifically several types of industrial buildings built between 1847 and 1920. The Portland Company buildings from the 1840s and 1850s are the only industrial buildings of that period remaining in the city of Portland. The buildings of the complex retain a high degree of architectural integrity to the period of Portland Company production (1847 – 1982). While much of the machinery of the complex has been removed, evidence of industrial uses can be found throughout the buildings, such as overhead shafting for operating machinery, and wood and iron cranes attached to support columns.

3 Compiled from the City of Portland 1924 Tax Records.

4 Poor, Laura Elizabeth, John A. Poor. *The First International Railway and the Colonization of New England, Life and Writings of John Alfred Poor*, 1890.
Records of the Atlantic & St. Lawrence Railroad, Maine Historical Society.

Overhead traveling cranes remain in the Foundry and Erecting Shop.

The various buildings of the complex contain examples of a wide variety of building construction engineering techniques employed to increase the strength or functionality of the buildings. These include a number of wood and metal roof truss systems; large floor areas hung from wooden roof truss systems; brick barrel vaulting; cast concrete and steel beam vaulting; cantilevered shed dormers; and single and double trussed girders used to increase the load carrying capacity of upper floors without obstructing the lower floors with posts. The earliest buildings are of load- bearing masonry wall construction with internal timber framing and later buildings utilize steel framing systems. The 1895 Foundry uses an unusual integrated steel column and brick exterior wall system. This was a comparatively early use of structural steel in Maine and represents a transitional phase in the construction technology as large buildings moved from load-bearing masonry walls to steel skeleton framing.

APPENDIX H: TREMONT PRESERVATION SERVICES BUILDING DESCRIPTIONS WITH ADDITIONAL INFORMATION

SITE OVERVIEW

The former Portland Company site encompasses a 9-acre parcel at 58 Fore Street, situated on filled land along the eastern waterfront of Portland, Maine, bordering the Fore River to the east. The Portland Company site is located at the northern end of a long stretch of industrial and commercial buildings that line the Portland waterfront. The property directly to the south was formerly the Grand Trunk Railway Company site but the historic buildings of the rail company were replaced by modern industrial structures by subsequent owners. To the northeast of the Portland Company site are six residential buildings (from the late 19th and early 20th centuries), a modern apartment building, and the 68-acre Fort Allen Park and Eastern Promenade beyond. The Munjoy Hill neighborhood, largely developed in the 19th century, lies to the northwest of the Portland Company site, where the land slopes sharply upward from the waterfront and to the south by the Casco River. A section of the 2.1 mile Eastern Promenade Walking Trail and a set of railroad tracks run through the property near the water's edge.

The property comprises a complex that includes 13 historic buildings and one large modern building on a paved lot with minimal vegetation (except for a cluster of trees at the northeast corner). There are also about a dozen scattered smaller sheds and outbuildings that all appear to post-date the 1980s. The historic buildings on the site range in age from about 1845 to 1950, as described below.

Additional information:

Dates for the extant buildings range from 1847 to the late-20th century.

BUILDING DESCRIPTIONS

Building 1 - Erecting Building

Construction Date: 1914 (according to Portland 1924 tax assessment)

Description: Rectangular in plan, Building 1 measures roughly 80 feet by 113 feet and joins the south elevation of Building 2, leaving exposed elevations facing west, south and east. It is a single-story building with a taller central bay lit by a roof monitor. The building is constructed of red brick and has little in the way of architectural ornamentation aside from corbeling around the window bays. Brick piers separate the elevations into large window bays that hold the original tripartite multi-pane steel windows. Window openings include concrete sills. The brick roof monitor retains the original multi-pane steel sash running along the entire west and east sides (Photos 7 & 8). The principal elevation (south) features a tall central entry bay that is divided into two asymmetrical openings by a vertical steel beam; each bay holds a modern overhead metal door (Photo 2). Historic photos show that this opening was originally only about half the height it is currently and it was topped by a large panel of windows. A pedestrian entry just west of center holds a modern door as well. In addition to the installation of replacement doors, alterations include infilling of two window bays at the east elevation (Photo 3). The interior is a single open space with utilitarian finishes, including exposed brick walls and exposed steel framing.

Uses: Building 1 was constructed as the Erecting Shop to replace an earlier one-story wood building from the 1870s that was used for the same purpose. By 1949 Building 1 was used as a machine shop.

Additional Information:

Drawings in the collection of the Maine Historical Society date the Erecting Shop to 1918.

Building 2 - Machine Shop

Construction Date: c. 1845

Description: Building 2 is rectangular in plan and measures roughly 150 feet by 62 feet. It joins Building 2 to the south and Building 3 to the north, leaving fully exposed elevations on the east and west sides. The south elevation was fully exposed until about 1875 when a single-story wood frame building was constructed, to be replaced by the existing Building 1 around 1914. Only the brick gables are visible at the north and south elevations today. The 2 *1/2* story brick Building 2 was designed in the Greek Revival style, with pedimented gables, tall compound cornices, and symmetrical fenestration, all hallmarks of the style. The building is enclosed by a gabled roof to which were added two wide overhanging she-d dormers, one along the entire east side and another along the southern half of the west side (added between 1896 and 1909 - Photo 1). The roofline is defined by a tall compound brick cornice. The exposed side elevations (east and west) feature regularly spaced window openings with rough-cut granite sills and lintels and double-hung wood windows in a *25/25* configuration at the first floor and *15/15* at the second floor. The existing sashes appear to be a mix of original and replacements. Enclosed bridges from the late 19th and early 20th centuries connect the second floor of Building 2 to neighboring structures (Photos 1 & 4). The interior is divided into three levels and is typical of mill construction of the mid-19th century, with exposed brick walls and exposed wood framing. There have been a number of partitions added to the interior over the years.

Uses: Building 2 is the earliest surviving structure of the Portland Company complex. Built as the original machine shop. When originally constructed the south elevation was exposed and a rail spur ran from the mill yard directly into the building through a tall opening at the center of the south elevation. Prior to the 1890s there was also an office at the attic level. The attic level was later used for pattern storage.

Additional Information:

The Machine Shop was built in 1847 with projecting shed dormers added to the attic story by architect Frederick A. Tompson in 1904. This alteration created a new company drafting room and the laboratory of William H. Chapman, the Portland Company's electrical engineer.

Building 3 - Machine Shop

Construction Date: Constructed in two phases. The first floor appears to have been part of the earliest construction in the mill yard, in the late 1840s or early 1850s. The second floor was added in 1895 (according to map research).

Description: Building 3 is rectangular in plan and measures roughly 80 feet by 62 feet. It joins Building 2 to the south and Building 4 to the north, so that only the east and west elevations are fully exposed. Both the first and second floors are constructed of red brick that is consistent in color, although the two floors were built at different times (Photo 1). The first floor is the earliest construction and features detailing similar to that of Building 2, including a tall compound brick cornice, rough-cut granite window sills and lintels (flat heads), and double-hung wood windows. Most windows at the first floor appear to be original and have a 25/25 pane configuration, except three windows at the east elevation, which have an unusual 35/15 configuration. Several window openings at the first floor of the west elevation have been infilled with brick. The east elevation features a wide double doorway at its south end (holding replacement doors: Photos 1 & 2).

The second story was built in the 1890s and is typical of late 19th century construction, with its segmental arched windows with brick heads. Window openings hold what appear to be the original wood double-

hung sashes, in an 8/8 pane configuration. The second floor is enclosed by a pitched roof on which has been placed a temporary storage enclosure. The roofline is defined by simple wood fascia boards. A loading bay with glazed infill, that does not appear to be original but has been in place since at least the early 20th century, is located at the south end of the east elevation (Photo 2). A relatively recent bridge joins the second floor of Building 3 at the west elevation to the neighboring Building 16 (Photo 4).

The utilitarian interior of the building is divided into two levels and is typical of 19th century mill construction, with exposed brick walls an exposed wood framing.

Uses: Building 3 was used as a machine shop into the early 20th century. By 1924 it was set up as a carpentry shop and by mid-20th century was storage space.

Additional Information:

This section of the Machine Shop was built in 1847 as a one story blacksmith shop. When the second story was added, c. 1895, the original wood and wrought iron Queen Post Truss roof system was left in place and the floor hung from it with iron rods and double-strut trussed girders. The added wall height essentially creates full-length shed dormers on each side of the original roof and a double-pitched roof with the original gable peak remaining above the much shallower pitch of the shed dormers on either side. Because both ends of the building abut other buildings, this unusual roof form is not visible from the ground. A monitor, probably dating from the original construction, extends along the center portion of the ridge.

Building 4 – Foundry

Construction Date: 1895 (according to map research)

Description: Building 4 is the largest of the historic buildings in the complex, with a long rectangular plan measuring roughly 203 feet by 87 feet. The building was originally fully exposed at three elevations (north, west, and east). Today it joins Building 3 to the south and is surrounded on its north and east sides by modern structures. Constructed of brick, Building 4 is a single-story structure with three central raised bays, creating a two-tiered monitor along the center of the roof and a tall open span on the interior. Two large vents protruded from the roof at the east side of the building; they are no longer extant but the two-story brick section of the building along the east wall toward the south end marks their location; window openings in this two-story block were infilled with brick (visible in Photo 1). A brick ell off the south end of the west elevation was originally the location of the core oven for the foundry (Photo 7). Although this building has been altered considerably on the exterior, the west elevation remains largely intact, with paired segmental arched windows with brick heads and a simple box cornice defining the roofline (Photo 5). Windows hold original *16/16* wood double-hung sashes. The lower level walls are reinforced with what appears to be vertical steel strapping. Walls of the raised monitor have been inconsistently covered with modern materials and siding so that few windows are visible, especially along the east side (Photo 8). The long band of multi-pane windows can still be seen along the west side of the monitor (historic sashes remain but are in poor condition). A large loading bay at the south end of the east elevation holds a modern garage door. The adjacent window was modified to hold a pedestrian door (visible in Photo 1). The interior is a large open utilitarian space with exposed brick walls and exposed framing.

Uses: Building 4 was historically used as the main foundry for the Portland Company. This use did not change throughout the company's occupancy.

Additional Information:

The Foundry utilizes an unusual transitional construction system in its exterior walls. The riveted steel

roof trusses were erected on posts formed of back-to-back U channel steel with spacers between them to allow the roof truss gusset plate to be riveted in place between the two U channels at the top. Once the roof system was erected, the spaces between the posts were filled with brick laid up in common bond and engaging with the posts by extending into the recess of the U channel. Above the tops of the posts, the brick wall encased and engaged the steel trusses to the eaves. It appears that once the brick was in place, the roof trusses were supported primarily by the brick walls, not by the steel posts.

Building 6 - Blacksmith/Tank Shop; Machine Shop

Construction Dates: northern half - c. 1850; southern half - c. 1900

Description: The freestanding Building 6 was constructed in two distinct rectangular sections. The northern portion was the earliest and measures roughly 120 feet by 41 feet, while the southern section measures approximately 70 feet by 41 feet. The north block is a one-story brick structure enclosed by a gable roof (Photo 2). The construction is consistent with the earliest buildings on the site and it was likely built in the late 1840s. Regularly spaced window openings line the east elevation, while the west elevation is covered by a one-story addition that was built between 1914 and 1949 (today covered by recent siding - Photo 9). Original window openings have rough-cut granite sills and lintels and hold original wood double-hung sashes in a 20/20 pane configuration. Window bays are separated by shallow brick piers. A simple brick fascia defines the roofline. The gabled north elevation features a large central entryway holding a modern overhead door (Photo 4). A diamond-shaped window (now blocked) is located above the central doorway. Brick piers with simple corbeled capitals flank the lower level at the north elevation. The interior of the northern block is divided into large utilitarian spaces with exposed brick walls and exposed framing.

The southern portion of the building was constructed around 1900 and is a three-story brick block with evenly spaced segmental arched window openings (Photo 5). Otherwise, architectural ornamentation is limited to a corbelled brick cornice. There are a number of the original wood double-hung windows remaining (12/12 at the first floor, 8/12 at the second floor, and 8/8 at the third floor. Many of the windows at the second floor were replaced with 1/1 windows. Most of the first floor windows have the lower half of the sash blocked. The west elevation includes a tall tower (original to the south block) with modern siding and added exterior stairs that lead up to the third floor of the south block (Photo 8). An enclosed bridge (that appears to be an original feature - was there by 1906) extends from the second floor of the west elevation to Building 2 (Photo 7). The interior is divided into floor levels and spaces are utilitarian, with exposed brick walls and exposed framing.

Uses: The earlier northern portion was built at a “black smith and tank” shop according to historic maps. When the southern section was erected around 1900, the building shifted to use as a machine shop. By 1949 the southern portion was occupied by Chapman Electric Neutralizer Company, who had an office on the first floor and machine shops above (here until at least 1980). It appears that the northern portion of the building continued in use as a machine shop for the Portland Company.

Additional Information:

Drawings in the collection of the Maine Historical Society show the plans for the one-story tank shop, drawn in 1883. The three-story section of the building was constructed between 1896 and 1904 according to map research.

Building 7 - Carpentry-& Woodworking Shop

Construction Date: c. 1870, with c. 1900 addition

Description: Building 7 is a freestanding one-story brick building. It appears that it was originally constructed with a rectangular main block (170 feet by 60 feet) and a small brick ell off the southwest corner (roughly 50-feet by 21 feet). A small one-story wood-frame addition was constructed off the south end of the main block around 1900 (Photo 5). The building was constructed with evenly-spaced windows with segmental arched brick heads and rough-cut granite sills. Although many windows have been blocked with plywood, original sashes with a 20/20 pane configuration remain in a number of openings. There are several original segmental arched doorways as well, including a large loading door on the east elevation (Photo 4). Only one of the doorways (north elevation-west end) appears to hold the original double doors. Fenestration on Building 7 has been substantially altered over the years. A number of windows have been infilled with brick or partially blocked, while another on the west elevation was infilled and a pedestrian door was created (Photo 7). Several wide loading doors with steel lintels were added, at both the west and .east elevations (Photos 3 & 7). A modern temporary storage shed was erected near the northeast corner of the building but it is freestanding (Photo 3).

Uses: The building was constructed for use as the carpentry and woodworking shop. By 1896 the main block was a "car shop" and also held the woodworking department. The woodworking shop remained as late as 1909, at which time the building also functioned as a garage and auto repair shop. By 1949 the space had been given over to steel fabrication (continued into the 1980s). Historic maps indicate that the rear ell was originally used for "printing and erecting," and later for "printing." By 1909 it was used for pattern storage. The wood-frame addition just east of the ell was added around 1900 along with a second wood addition further to the south that connected Building 7 to Building 10. The two wood additions were used for storage. The southern addition was removed by 1949, by which time the ell and the northernmost addition were occupied by an electric welding shop (remained into the 1980s).

Additional Information:

The car shop was constructed c. 1873 following a large fire that destroyed many buildings at the southeast corner of the complex. Drawings in the collection of Maine Historical Society include plans for the addition (former lumber shed) dating to 1904.

Building 10 - Paint Shop

Construction Date: c. 1885

Description: Building 10 is a small single-story brick building measuring roughly 46 feet by 30 feet. This freestanding rectangular structure has a shallow pitched roof and little in the way of architectural ornamentation, aside from segmental arched window opening with brick heads and rough-cut granite sills. Window openings along the east elevation have been infilled with brick (Photo 2), while those at the west and north elevations are blocked with plywood. It appears that the original wood double-hung windows (in *12/12* pane configuration) remain beneath the plywood (Photo 4). The principal elevation (north) is dominated by a large loading bay that may have been an added feature (Photo 1), although it was in place as early as 1924 (now infilled with modern materials). Secondary access to the building is currently provided by means of an added doorway on the west elevation - holding a modern flush door (Photo 4). The interior has been finished with modern materials.

Uses: When first constructed around 1885 the building was used as a paint shop. By 1909 auto painting was undertaken here. In the mid-20th century it served as a storage shed (into the 1980s).

Additional Information:

Additional research shows the Paint Shop to have been constructed c. 1873, following the fire at the

southeast corner of the complex.

Building 11 - Pattern Storehouse

Construction Date: c. 1885

Description: Building 11 is a two-story brick building with an irregular footprint, a quadrilateral measuring 30 feet along the north wall, 85 feet along the east wall, 90 feet along the south wall and 89 feet along the northwest wall. It joins Building 12 to the east and is constructed into the side of a hill so that an areaway runs along the northwest wall to expose the lower level windows. Typical of many of the buildings in the complex from the late 19th century, Building 11 is enclosed by a shallow pitched roof and has little architectural ornamentation, aside from segmental arched window openings with brick heads. Unlike most of the other buildings, window here have wood sills and 16-pane wood sashes that appear to be casements (Photo 3). The principal elevation (north) features a large loading bay that is now infilled with two recent doorways (Photo 1). A third doorway is located just to the west (a doorway in this location appears in historic images). A secondary entry was added to the northwest elevation in a former window location, together with a wood pedestrian bridge (Photo 3). The interior is divided into two floors and has been updated somewhat with the addition of carpeting, suspended panel ceilings, and a small number of recent partitions. The brick walls and wood framing remain exposed on the interior.

Uses: Building 11 was used as a pattern warehouse throughout the occupation by the Portland Company.

Building 12 - Pattern Storehouse

Construction Date: Map research indicates that Building 12 was constructed in 1895.

Description: Rectangular in plan, Building 12 measures roughly 40 feet by 80 feet and joins Building 11 to the west. Building 12 is constructed of red brick and, like the other late 19th century buildings in the complex, has little in the way of architectural ornamentation, aside from segmental arched window openings with brick heads. One notable difference from other buildings of the period is that Building 12 has a gable roof (rather than a low-pitched roof), a treatment more typical of the early to mid-19th century buildings of the Portland Company. The rooflines are trimmed with simple unadorned rake boards. While many of the evenly-spaced window opening (with wood sills) are now blocked with plywood, a number retain the original 16-pane wood sashes that appear to function as casements (Photo 3). The principal elevation (north) has two large loading bays with steel lintels (likely original, as they appear in historic photos) flanking an added (post 1988) central brick entry enclosure (Photo 1). The south elevation features a sign painted directly onto the brick wall reading "PORTLAND CO." (appears in early images of the building - Photo 3). The interior is divided into three principal floors, which remain utilitarian spaces with exposed brick walls, wood plank flooring, and exposed wood framing.

Uses: Building 12 was used as a pattern storage warehouse throughout occupancy by the

Portland Company.

Additional Information:

The Pattern Storehouse Addition was constructed in 1895, according to drawings in the collection of the Maine Historical Society. At one time, a one-story shed addition was constructed along the east elevation, but it has since been removed.

Building 14 - Drafting Room/Storage

Construction Date: c.1875

Description: Building 14 is rectangular in plan and has two distinct sections, both of which appear to have been built about the same time. The northern section is two stories tall and measures roughly 85 feet by 20 feet (Photo 2), while the southern portion is three stories and measures approximately 30 feet by 20 feet (Photo 1). The building includes a combination of brick and wood-frame construction. The south elevation was originally exposed but now joins Building 24. The north wall abuts Building 15. Building 14 is built up against a retaining wall so that only the upper level, a simple paneled brick wall, is visible from Fore Street (west elevation - Photo 5). The east elevation is sided with clapboards and trimmed with flat wood stock. This facade has been substantially altered, with multiple changes in fenestration, inconsistent window and door replacement, and a small shed addition at the north end. Building 14 is joined to Building 2 by an enclosed walkway at the second floor (extant as early as 1886 - Photo 3). The interior has been altered extensively and finishes are largely modern.

Uses: The southern portion of Building 14 served as a drafting room until about 1895, while the northern portion was always used as a storage facility. By 1896 the southern end of the building was also used for storage and also held an office on the third floor. During the 20th century the building remained in use by the Portland Company as a storehouse.

Additional Information:

The Drafting Room and Storehouse were constructed sometime between 1858 and 1864 according to map research.

Building 15 & 16 - Boiler House/Brass Foundry

Construction Date: c.1850s (based on 1858 plan)

Description: Buildings 15 and 16 appear to have been constructed together and may have been part of the earliest construction on the site (likely late 1840s or early 1850s). Building 15 has been so heavily altered that it is impossible to know for certain what its original appearance may have been. It has a rectangular plan measuring roughly 35 feet by 20 feet and is built up against a stone retaining wall that runs along the Fore Street (west) side of the building. This one story brick building abuts Building 14 to the south and Building 16 to the north. All that remains evident of the historic east elevation (the only exposed elevation) are several wide brick piers between which has been added infill of various types (all in poor condition - Photo 2). The piers are decorated by string courses with corbels and dentils (Photo 3). The same detailing also appears along the cornice line and carries over across the face of Building 16. The rafters of both buildings are currently exposed but appear to have originally been covered by simple fascia boards.

Building 16 is a bit more intact than Building 15 but has also been altered. It is a one-story rectangular brick structure measuring roughly 41 feet by 27 feet. The north elevation abuts a concrete retaining wall, leaving only the east elevation exposed. There were originally four large window openings along the east elevation, trimmed with rough-cut granite sills and lintels; two still retain the original *16/16* wood double-hung sashes (Photo 4). The two southernmost windows were modified when a large loading bay with a steel lintel was installed (now infilled with added materials). Where Building 15 joins Building 16 are the remnants of a brick smoke stack (the base of it is still visible - Photo 5). (No access to interior due to dangerous conditions.)

Uses: Research indicates that Buildings 15 and 16 were constructed as the boiler house for the complex. A brick building appears in this location as early as 1858 and the design details, window in particular with their flat granite heads, are consistent with the earliest construction in the complex. The boilers were held

in what is today Building 15. It is likely that the mill quickly outgrew this relatively small boiler house; by 1886 a much larger boiler building had been constructed elsewhere on the site (no longer extant) and Building 16 was being used as a brass foundry; there were boilers still located in Building 15. This use continued until at least 1924 but had ceased by 1949. The buildings were later used by the Portland Company for storage.

Additional Information:

Based on maps and plans of the complex, it appears the Boiler house was constructed between 1858 and 1864; the Brass Foundry was constructed between 1864 and 1871. The 1858 plan of the complex (in the collection of the Maine Historical Society) shows a brick building in this general location, though doesn't appear to be the existing buildings. Research into the 1886 Sanborn Map of the Portland Company do not show an alternative Boiler House as previously determined. A Boiler Shop is present in the northeast quadrant of the complex.

Building 24 - Vault Storage

Construction Date: between 1896 and 1909

Description: Building 24 is a four-story utilitarian brick structure with minimal fenestration. It is built into a hill and thus has three exposed floors at the west and south elevations and four at the east (Photo 1). It is joined to Building 14 to the north and linked to Building 2 by an older enclosed bridge at the third floor (from c. 1900) and a more recent open bridge sheltered by an awning at the second floor (visible in Photo 1); the latter leads to an entry on the east elevation in the former location of a window. Many of the original windows have been infilled with brick, particularly at the second floor. The few historic window openings that remain (one at the south elevation and three at the east elevation) have segmental arched brick heads and rough-cut granite sills. One at the west elevation was converted to a doorway (second floor) and now holds a flush metal door. Also at the west elevation, an original loading door with historic glazed wood double doors survives at the fourth floor (Photo 4). An entry was added at the second floor of the south elevation (prior to 1924) and today holds recent double doors (Photo 2). The south elevation also features a sign painted directly onto the brick - the existing sign replaced an earlier painted sign of the Portland Company. The north elevation is void of fenestration (Photo 3). The interior is utilitarian (exposed brick walls) with no notable architectural features.

Uses: Building 24 was constructed for vault storage and remained in that use during occupancy by the Portland Company.

Additional Information:

The construction of the Vault dates from between 1904 and 1909 as evidenced by historic maps. It appears that a floor was added before 1924, though it is unclear when or why the Vault was expanded.

Building 30 – Office

Construction Date: 1950

Description: Building 30 is a freestanding Modern office building with a rectangular plan measuring roughly 32 feet by 120 feet. Typical of the style, there is little in the way of ornamentation. The northern third of the building stands three stories, while the southern portion is only two stories (Photo 1). It is built into a hillside so that only the second and third floors are visible from Fore Street (west elevation - Photo 2). The building is enclosed by a shallow shed roof with deep overhanging eaves. It rises from a red brick base that steps up at irregular intervals into the second and third floors. The upper portion of the building

is sheathed with wide clapboard siding. Bands of asymmetrical windows light the second and third floors, while openings at the first level are more evenly-spaced single windows. All sashes were replaced in the 1970s when a major renovation was undertaken. A brick entry shelter was also added to the east elevation as part of the 1970s work. There are two simple entrances off the Fore Street (west) elevation, both holding what appear to be replacement doors. The more prominent of the two is recessed within and entry shelter (Photo 4). The interior was heavily renovated in the 1970s.

Uses: The building was constructed as offices for the Portland Company and has remained in use as office space.

Acetylene House

Construction Date: c. 1909

Description: A small brick Acetylene House measuring approximately 8 feet square is located atop the first tier of the retaining wall to the east of the Foundry's Coke Oven. With no roof, the acetylene house is nearly in ruins, including a severely rotted door frame on the east elevation. Access to the structure is limited by overgrowth of vegetation.

Uses: The Acetylene House was used as the source of acetylene for welding and metal work.

HISTORICAL CONTEXT

Overview

The Portland Company was founded in 1845 as the Portland Iron Manufacturing Company. The name was shortened almost immediately in 1846; its new name has endured since, although operations ceased in 1981. During its nearly 140 year history, the Portland Company manufactured (or outfitted) steam locomotives, passenger cars, vessels, fire engines, elevators, lamp posts, lighthouse segments, ornate architectural elements, manhole covers, and more.

The history of the Portland Company and its associated buildings represent 19th and 20th century national trends in manufacturing and transportation, Portland's position as a seaport and transportation center, and the impact of industrialization on Portland.

Additional Information:

The charter for the Portland Iron Manufacturing Company was granted to individuals not associated with the Portland Company, suggesting that the charter was purchased from the original grantees by John A. Poor and associates, who then requested that the legislature change the name to the Portland Company in 1846.

Portland - 17th Century Settlement and Growth as a Seaport

Portland is located on a peninsula in Casco Bay and is well-known for its advantageous deep water port, its hilly topography, and varied street pattern. Portland has a predominance of 19th century buildings, representing its prosperity as an industrial era seaport and transportation center.

The earliest settlers came to the peninsula by 1628 to fish, trap, and trade. By the mid-1700s, Portland (then known as the Neck and part of Falmouth) was experiencing the wealth and population growth that came with having the "best natural harbor on the eastern seaboard." Lumber was prolific and Portland's main commodity; it was processed and shipped to Boston, England, and the West Indies. Settlers clustered along Fore Street (then at the water's edge) and the base of King Street (renamed India Street).

A period of recovery and rapid growth followed the Civil War and the Neck separated from Falmouth to become Portland. Capitalizing on her natural resources -deep water port, lumber, and fish - Portland thrived during the late 1700s and into the early 1800s.

Additional Information:

The period of recovery and rapid growth followed the Revolutionary War, not the Civil War.

Early 19th Century: Development as a Transportation Center

Portland's population more than doubled between 1800 and 1820 to over 8,500, and by 1832, the population reached over 13,000. Commercial activity was centered along streets familiar today - Fore, Middle, Market, State - and along wharves in the general location they exist today. Homes were built along the base of Munjoy Hill and a new, fashionable neighborhood in the western part of the city.

Portland continued to exploit its abundance of lumber and fish and participated in the booming shipbuilding

and maritime trade industries. By the 1830s, Portland's harbor had the largest commercial fleet on the eastern seaboard. While shipbuilding was at its peak during this time, the U.S. canal system was exploding. A group of Portland businessmen took notice and in 1825 financed the Cumberland and Oxford Canal. Completed in 1830, the canal connected Portland to the Sebago Lake region and provided a new means to transport Maine timber. Moreover, Montreal used the canal system and the St. Lawrence River to transport agricultural products to Portland for export, except during the winter months when the river iced over.

Additional Information:

The Cumberland & Oxford Canal only reached Long Lake in Harrison, Maine, approximately 50 miles from Portland. Its termination was nearly 200 miles from Montreal and it was not used for transportation between Montreal and Portland.

Mid 19th Century: Industrialization, the Railroad, & the Founding of the Portland Company

Nineteenth century advances in transportation and industry, particularly the railroad, brought Portland her greatest growth and prosperity yet and by mid-century, precipitated businesses like the Portland Company. Portland's first railroad, the Portsmouth, Saco, & Portland Railroad, arrived in the city by 1842 and connected southern Maine with Boston. Soon after, in 1845, attorney and savvy businessman, John A. Poor, with engineer, Septimus Norris, founded the Portland Iron Manufacturing Company to produce locomotives for the growing railroads. Furthermore, through Poor's vision and determination, Portland won the bid, over Boston, for the much coveted Atlantic & St. Lawrence Railway terminal in 1847 (later taken over by the Grand Trunk). The Atlantic & St. Lawrence Railway connected Portland with Canada and the west, making Portland Canada's primary port in the northeast, even during the winter.

All three were located on the waterfront: the Portsmouth, Saco, & Portland Railroad terminus was located just southwest of the commercial center, at the base of State Street; the Atlantic & St. Lawrence Railway was located further east, at the base of India and Hancock Streets; and the Portland Iron Manufacturing Co. (by 1846 known simply as the Portland Company) was located on filled land at the base of Waterville Street and just across a small cove from the Atlantic & St. Lawrence Railway. Initially, there was no direct link by railroad between them. To connect the three properties, another stretch of the waterfront was filled, upon which railroad tracks and• Commercial Street were constructed; the project was completed by 1853. Now, well situated with a direct link to the railroad (which eventually included a network of six railroads and several steamship routes), a wharf on Casco Bay, and an indirect link to the canal system, the Portland Company was part of a thriving commercial and transportation network.

Additional Information:

As noted above, the Portland Iron Manufacturing Company was founded by individuals not connected with the Portland Company. John A. Poor and others appears to have purchased the charter for that company from the grantees and had the legislature change the name to the Portland Company in 1846.

The involvement of Septimus Norris in the Portland Company was very brief. The Portland Company Director's meeting minutes for 1846, located at the Maine Historical Society, show that Norris was only associated with the company for approximately 6 weeks in November and December of that year. There is no indication that the Portland Company purchased tools and machinery from the Norris Brothers Locomotive Builders in Philadelphia, as recommended by Norris, nor hired any of the ten men he recommended. Horace Fenton, who had come with Norris from Philadelphia, was retained as General Superintendent by the Portland Company directors after Norris was removed from the board. Following legal action, the

Portland Company paid Septimus Norris $400 for the non-exclusive use of patents he had transferred to the Portland Company during the six weeks he was a director.

Before Broad Cove was filled for the railroad yard between the Portland Company and the Atlantic and St. Lawrence RR depot at India Street, the railroad crossed the cove on a timber trestle, with a siding on another trestle to the Portland Company Works, providing a rail connection to the plant from the outset of operations in 1847.

The Portland Company: Mid-19th Century Manufacturing

The Portland Company was the only company in the U.S. founded for the sole purpose of manufacturing locomotives; others were originally machine shops, adapted for their new purpose. Its complex was a nearly self sufficient operation, able to produce almost every part needed in the manufacturing process. Their buildings evolved with their operations – as industrial and transportation innovation dictated, they redesigned their old shops and added new shops. The Portland Company complex included three buildings as early as 1851-a foundry, a counting room, and a "car house" (Building 2 -machine shop). By the century's end there were roughly two dozen buildings and sheds supporting their operations and the company was manufacturing a range of products, as follows.

Additional Information:

In 1847, a foundry, machine shop, and blacksmith shop were constructed of brick and a car shop built of wood. The original office, or "counting room" may have been an existing building on the site, as the director's records do not show any reference to its construction.

Locomotives. Fire Engines. Steamships

Locomotives
1848 - c.1900

The railroad brought economic vitality to Portland and served as the impetus for the founding of the Portland Company. The Portland Company's first locomotive, the Augusta, was completed in 1848 for the Portland, Saco, & Portsmouth Railroad. Over the next 60 years, 630 more steam locomotives (and hundreds of freight and passenger cars) were constructed for, among others, the Boston & Maine, Maine Central, Northern Pacific, Panama, Mexican Central, Sandy River, Wiscasset, and Quebec Railroads. The Portland Company also built locomotives for the U.S. Government during the Civil War.

Following the war, the railroad (and steamboats) served Maine's burgeoning tourism industry. As the wealthier looked to escape the heat of the cities, railroads and steamships connected cities with rustic coastal communities and inland areas like Rangeley Lakes. By 1872, 65 trains a day stopped in Portland. Six railroads eventually served the city; the Grand Trunk alone had direct lines to New Hampshire, Vermont, Montreal, and the West.

While railroad track gauge is of standard dimension nationwide today, up to six different dimensions were used until the 1870s. This meant that the Portland Company built locomotives and cars to fit varied width tracks.

Fire Engines
c.1860 - 1870s

The Portland Company manufactured the first of its horse drawn steam fire engines, the "Greyhound," in 1860. It was used by the Portland Company and the adjacent Grand Trunk Railway as well as being loaned to the City of Portland. The Portland Company subsequently produced at least seven steam engines for the Portland Fire Department. Several more steam fire engines were built during the 1860's and into the 1870s.

No event made the need for fire engines more evident than the fire that swept through Portland on July 4,1866. The fire burned the commercial center to the base of Munjoy Hill, stopping just short of the Portland Company but destroying 1500 buildings and leaving ten thousand homeless.

Steamships and Other Vessels
c.1860 - c.1920

The advent of steamboat transportation translated to additional business for the Portland Company. The Portland Company built over 350 steam engines and boilers for marine, as well as, industrial uses. They outfitted towboats, fishing vessels, yachts, dredges, freighters, fireboats, and ferries. Some of these vessels were built elsewhere and others were fully constructed at the Portland Company's boatyard across the harbor in South Portland. Once launched, the vessel would be towed to the Portland Company wharf to be outfitted. For example, the side-wheel passenger steamer, the "Bay State," was built in Bath, Maine, and then towed to Portland to be outfitted by the Portland Company in 1890.

The Portland Company: Late 19th/Early 20th Century Diversification

Portland's economy-and the Portland Company's portfolio-diversified as industrialization progressed. The Portland Company began manufacturing elevators, cast iron elements, and paper industry equipment, and for WWI, they produced brass shell casings. They even distributed automobiles and trucks, making good use of their existing large buildings, expansive property, and proximity to rail transportation.

Elevators
early 20th century

The Portland Company manufactured passenger and freight elevators, at first hydraulically powered and later electrically. Most elevator cars were built of solid oak with an iron and steel framework. The Portland Company manufactured three elevators for the Fidelity Trust building. One of them survives in the building today, now known as the Maine Bank and Trust Co. building on Congress St. The Portland Company also produced the elevators for the Portland City Hall.

Cast Iron
Late 1800s

During the 19th century, cast iron could be produced cheaply and in vast quantities. It could be cast in a variety of forms and painted different colors making it a desirable alternative to carved stone and wooden architectural elements. Cast iron production was prolific late in the century; whole streetscapes can be found dating from this period, lined with cast iron facades.

The Portland Company cast storefronts, man hole covers, parts for lighthouses (lanterns, lamp decks, spiral stairways, doors and sashes, walkways, railings, vents, spindles and markers, upper sections of light tower), lamp posts, ornate gates, and industrial boilers. They also operated a bronze and brass foundry.

Paper Industry
Late 1800s - 1900s

By the 1870s, Maine's lumber supply, namely desirable pine, was becoming depleted. Spruce and fir were plentiful, however, and ideal for the paper industry. Between 1880 and 1900 about 40 mills were built in Maine. Processing moved right to the source, creating small industrial centers in towns like Rumford, Millinocket, Berlin Mills, Sprague's Falls, and Westbrook.

The Portland Company manufactured equipment used in the paper industry including ,pulp digesters, boilers, tanks, steam accumulators, chippers and debarkers, vomit stacks, turbines, penstocks, water-control gates, and gate-hoisting equipment. Equipment, some of which measured as large as 15' in diameter, was transported by rail directly from the Portland Company to many of the mills.

The advent of electricity meant convenience and new challenges, like the heavy static charge that can be produced during the manufacturing process, causing problems in paper and textile mills. The remedy came in the form of an electric neutralizing machine, patented by electrical engineer, William Chapman, in 1908. The Chapman Corporation operated as a subsidiary of the Portland Company in Building 6 at the waterfront mill yard.

Automobile Sales
c1907 - c1914

The Portland Company served as Maine's exclusive distributor of the high-end Knox automobiles, trucks, firetrucks, and three-wheeled tractors which were manufactured in Springfield, Massachusetts. In 1910, they added the Brush, Cole, and Thomas automobile line to appeal to middle and lower income buyers. The Portland Company used their garage for auto and truck repairs, and snowplow fittings.

Brass Howitzer Shell Casings for the War
1917 – 1918

The onset of WWI prompted the need for further diversification and brought a brief respite to the regional decline in manufacturing. Tens of thousands of brass shell casings were produced by the Portland Company, packed in pairs, and shipped to another factory to be filled before being sent to the US Army between 1917 and 1918. Women replaced men, who were overseas serving in the military, in this, and other factories.

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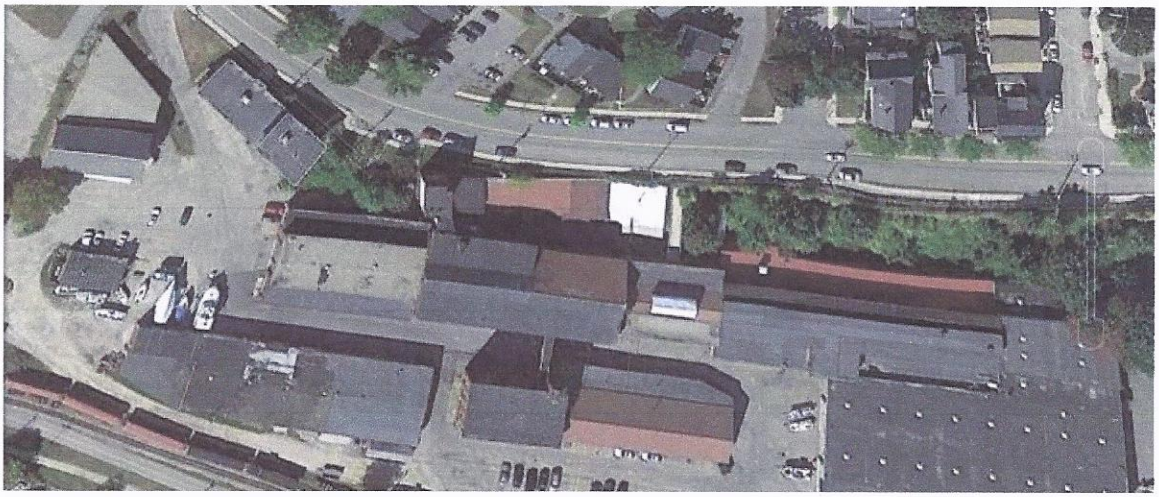
Att. 3

Portland Company Complex
General Building Condition Report

performed for
City of Portland, Maine Planning Department
389 Congress Street
Portland, ME 04101

MARCH 26, 2015
SUPERSEDES REPORT DATED MARCH 11, 2015



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APPENDIX A - RELATIVE STRUCTURAL CONDITION AND RELATIVE REHABILITATION COSTS

BECKER STRUCTURAL ENGINEERS AND RESURGENCE ENGINEERING AND PRESERVATION

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APPENDIX C - BIBLIOGRAPHY

- March 26 revisions include edits to Executive Summary, Introduction, Recommendations and Conclusion to reflect comments from March 18, 2015 meeting with City of Portland, Greater Portland Landmarks, and CPB2.
- March 26 revisions also include renumbering of Appendix A, Appendix B, and Appendix C. Appendix A edits further compare Becker Structural Engineers and Resurgence Engineering and Preservation rating systems.

1.0 EXECUTIVE SUMMARY

The individual structures within the Portland Company complex that were included in the project scope are in generally poor condition due to deferred maintenance and, in some cases, inherent but correctable lack of stability against lateral forces and snow loads. The severity of deterioration varies from building to building; it also varies within any given building. In some cases, significant deterioration is quite localized; in other cases, the overall structure is in a state of significant disrepair.

Buildings in poor condition do not necessarily warrant demolition. The fact that a number of the buildings within the Portland Company Complex continue to be occupied – some by large assemblies for special events and some by business tenants – attests to the fact that most of the buildings are still serviceable and are in salvageable condition.

In our opinion, it is possible to address the identified structural and building envelope conditions in ways that retain each building's historic character and that are feasible from a cost perspective. To do so, however, will require case-by-case assessment, creative design solutions, and the involvement of consultants and contractors experienced in historic building rehabilitation.

At this site, business and assembly occupancies can continue as long as structural conditions are monitored while the owners develop their plans for the site. Structure and building envelope rehabilitation will be expensive, but may still be cost-competitive with new construction of the same volume and footprint within the existing framework. Historic rehabilitation tax credits could likely make rehabilitation costs more competitive with new construction. Whether one is building anew or rehabilitating the existing buildings, quality materials, detailing, and craftsmanship must be employed to withstand the formidable climatic conditions that occur on the waterfront.

Structural work needs to be performed on the roof and floor structures to increase snow and live load capacity, and to increase lateral stability. Building envelope improvements are necessary to create viable rehabilitated shells that can ward off the elements for decades to come. Other masonry rehabilitation strategies will be required to provide the structural continuity between roof, wall and foundation of the buildings.

After the buildings were assessed by Resurgence Engineering and Preservation in late December 2014, snow loads took a toll on two buildings, causing localized roof truss failure and roof rafter failure in Buildings 4 and 7, respectively. Prior to scheduled public events, the current owners stabilized these deficiencies, and in the case of Building 4, corrected or mitigated them.

We concur with many of the primary findings of Becker Structural Engineers' report as to the current condition of the individual buildings. However, the simplified construction techniques that characterize Buildings 1 and 4, together with the repetitive nature of many of the required repairs, make possible a relatively straightforward rehabilitation project for those two structures. Buildings 2 and 3 are more complicated and careful assessment will be necessary to deal with their structural complexities.

The linear, connected nature of Buildings 1 through 4 also presents an opportunity to improve lateral stability of the buildings within contemporary code requirements while making other repairs. The simple,

modular nature of these long buildings allows for replication of the individual structural repair details. The exposed floor and roof structures provide easy access to make repairs. After additional structural inspection is completed, the limited hidden conditions lower the need to include large cost contingency factors for structural upgrades.

In summary, most of these exposed-frame industrial structures, with the exception of Buildings 2 and 3, are not that complicated when compared to many other historic commercial building rehabilitation projects undertaken in Portland and in Maine during the last quarter century.

In our opinion, three structures stand out as buildings presenting the greatest structural and building envelope challenges. The buildings in the most compromised condition include:

Building 7 (Car Shop)
Building 10 (Paint Shop) and
Building 11 (Pattern Storehouse).

We recommend that Building 11 remain unoccupied until the north (Fore Street) wall can be stabilized. The immediate safety concerns identified by Becker Structural Engineers at the wall between buildings 6A/6B, and of the overall condition of Building 10, are valid concerns and should be addressed as soon as possible, if they have not been already. Stabilizing the wall and roof framing between 6A and 6B can be performed as a stand-alone project prior to other rehabilitation of these buildings.

In any rehabilitation project, it is important to match existing buildings with compatible uses. Existing volumes, architectural complexity, and inherent structural limitations should all be considered to place proper occupancy types within any given building. Higher-risk occupancies (such as schools or other uses anticipating large assemblies) should be matched with buildings that can be strengthened to withstand increased structural loading factors with the least amount of structural intervention.

For purposes of this report we assume that the existing structures would be rehabilitated according to the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*. These Rehabilitation standards allow considerable leeway to perform less expensive repair or replacement, rather than strict – and more costly - restoration or conservation, of deteriorated structural framing elements, thereby making projects more economically feasible. The property's eligibility for the *National Register of Historic Places* also allows access to State and Federal Historic Preservation Tax credits, which can total up to 45% of qualified rehabilitation expenditures.

Building code advances in recent years have come to recognize that deficiencies in historic structures can be individually and specifically repaired, as opposed to replacing entire structural components. These advances can make structural rehabilitation easier and less expensive than comprehensive replacement.

2.0 INTRODUCTION

In November 2014, the City of Portland Planning Department solicited qualification submittals to provide a general building condition report for eight extant structures within the former Portland Company industrial complex at 58 Fore Street. Subsequently, the City increased the number of buildings to be studied to ten, adding Building 3 and Building 14. For each of the structures, the qualified team was asked to assess and provide a written report on the current conditions of the buildings' exterior envelope, structural systems(s) and potential for adaptive reuse, with a preliminary assessment of the relative expense to address current deficiencies in the building envelope and structural systems.

Alfred H. Hodson III, P.E. of Resurgence Engineering and Preservation, Inc. (RE&P) performed a structural evaluation of the Portland Company Complex. Richard Curtis, AIA performed additional building envelope assessment, and Ivan Myjer of Building and Monument Conservation performed masonry assessment. These three individuals completed the work required to inspect the identified buildings. The work scope did not include evaluation of any mechanical or electrical systems, accessibility issues, or life safety code requirements. Specific Buildings in the inspection scope include:

Building 1	Erecting Building	c.1918
Building 2	Machine Shop	c.1847
Building 3	Machine Shop	c.1847
Building 4	Foundry	c. 1895
Building 6B	Tank Shop	c. 1896-1904
Building 7	Car Shop	c. 1873,1904
Building 10	Paint Shop	c. 1873
Building 11	Pattern Storehouse	c. 1885
Building 14	Drafting Room and Storehouse	c. 1858-64
Building 15/16	Boiler House and Brass Foundry	c. 1858, 1864

Assessment of the majority of the buildings occurred on December 29 and 30, 2014. On subsequent return visits, Mr. Hodson and Mr. Curtis visited the site to confirm and discuss items following completion of a draft report, and Mr. Hodson assessed the remaining two buildings.

The intent of the evaluation and this report, for each building within the scope, is to:

a. Assess and provide a written report on the current condition of the building's individual exterior envelope, the current condition of the building's structural systems, and the building's potential for adaptive re-use.
b. Provide a preliminary budget of the relative expense to address current building envelope and structural system, including structural alterations and upgrades per IEBC 2009 requirements for a change of use, including the provisions included in Chapter 11 (Historic Structures), as well as upgrades to lateral force resisting systems and diaphragms for wind and seismic loads.
c. Review previous reports to understand past determinations of conditions, to compare them to current structural conditions. In particular, we reviewed a report prepared by Becker Structural Engineers (BSE) for the current property owners in March 2014, and worked both parallel and independent of their assessment to compare our findings with theirs;

Reporting Requirements in the Project Scope included:

d. Meet with the Planning Department and the city Historic Preservation Board to describe our findings *(not performed yet)*, and;
e. Submit a final report to City of Portland, Maine Planning Department.

Appendix A of this report provides tables and narrative explaining the rating systems used by Becker Structural Engineers and Resurgence Engineering and Preservation. Appendix B of this report provides photographs documenting the individual buildings and site. The report and appendices should be read in their entirety. Some photos shown in the appendices may indicate damage not specifically mentioned in the report. Appendix C includes a bibliography of sources used as part of this project.

Working within the same parameters as BSE did during their study, we did not consider building code requirements, egress, accessibility, flooding, ventilation, hazardous materials, fire safety and energy code. We did not perform invasive testing or formal structural analysis. We understand that more comprehensive structural and building envelope assessment, including invasive and nondestructive testing, is necessary to perform schematic design, understand building code requirements, and provide more refined cost opinions. Other conditions may exist beneath concealed surfaces that appeared sound or in areas that were not visible during the inspection. This is typical of any older building or complex of buildings facing potential rehabilitation.

For purposes of this report, the long axis of the Portland Company Complex faces north toward Fore Street, and south toward the waterfront. The west side faces the Hamilton Marine complex, and the east side faces the adjacent wooded hillside. This orientation is in keeping with the BSE and SCC reports.

Also for purposes of this report it is assumed that the existing structures would be rehabilitated according to the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*. These Rehabilitation standards allow considerable leeway to perform replacement, rather than strict restoration or conservation, of deteriorated structural framing elements, thereby making projects more economically feasible. (The property's eligibility for the National Register also allows for use of historic preservation tax credits. Preservation tax credits, which can total up to 45% of qualified expenditures, are intended to encourage investment in the rehabilitation of historic structures.)

We have not attended any presentations by Sutherland Conservation and Consulting or CPB2 Management, LLC, in order to retain objectivity in this study.

3.0 DOCUMENT REVIEW

3.1 Original Construction Documents

We were unable to review original construction documents of the Portland Company Complex. However, we understand some documents are available at Maine Historical Society. Any further assessment of the buildings should include review of these documents in order to compare specified materials with field conditions. This is important for any building rehabilitation project, in order to compare a designer's intent with what was constructed. Occasionally, archived drawings include notes made during construction to document specific construction changes and to provide insight into why those changes occurred.

3.2 Previous Studies and Historic Research

In accordance with the Request for Qualifications, we were provided access to two previous reports about the structural condition and history of the buildings in question, including the following:

- Evaluation of Existing Buildings at the Portland Company Property, March 28, 2014, by Becker Structural Engineers(BSE) Paul Becker, P.E., and Ethan Rhile, P.E.
- The Portland Company Historic Significance and Integrity; 2014, by Sutherland Conservation and Consulting (SCC), Scott T. Hanson, Amy Cole Ives, Matthew Corbett. We have not attended any of the presentations about the site that have been occurred since the report's publication.

We reviewed the BSE report to help understand their specific report format, narrative, and scope for purposes of defining our work scope. We worked both independently and in parallel with the BSE report. We reviewed the SCC report primarily to develop an understanding of the site's evolution and to gain an understanding of the relative age of the individual structures within the work scope.

We also performed a brief literature search to better understand some of the construction techniques used in several of the longer mill buildings. References reviewed included texts about late 19th and early 20th century construction design, materials, methods, and techniques. Appendix B lists a full bibliography of materials researched or reviewed for this report, including site surveys and maps available on the Maine Memory Network.

We viewed several historic maps online to view general conditions and layouts of the site, understanding that such maps included some artistic license and potential inaccuracies not found in formal survey maps or photographic images.

OBSERVATION, EVALUATION, RECOMMENDATIONS

4.0 General Observations and Evaluations

Site Considerations and Conditions:

The site surrounding the buildings in the work scope is an essentially flat, mostly paved site, with the exception of the north section of the site facing Fore Street. A steep drop from Fore Street to the ground level of the buildings rises from the west end of the site toward the east end, as Fore Street ascends Munjoy Hill toward the Eastern Promenade. This steeply-sloped topography has a direct impact upon Buildings 1 through 4 and Buildings 11 through 16 as stormwater runoff flows off the hillside toward these structures. The first floor of Building 11 sits below the exterior grade of the north wall of that structure. Buildings 14, 15 and 16 share a rubble stone masonry north wall that primarily serves as the Fore Street retaining wall.

The majority of the site surrounding the studied buildings is paved right up to the building perimeter walls. Perimeter site drainage around the buildings is likely not present or operational. We observed only a few catch basins near the buildings, but snowfall hampered a more comprehensive assessment.

At a site with buildings that predate sophisticated topographical surveys and largely available commercial photography, historic maps are often a key resource to determining site conditions. However, one must take into consideration any "artistic license" taken by the cartographer. An 1837 map by James Hall shows the site without any of the Portland Company structures. An 1851 map by H.F. Walling shows the ocean extending up to near the location of Buildings 6 and 7. The present-day Hamilton Marine site was a small cove. By 1857, the site is largely filled in, and several parallel rail tracks are shown extending eastward across the site along the present Eastern Promenade Trail and East Coast Greenway.

Beginnings of the Portland Company Complex indicated in an 1851 map by H.F. Walling. Note the cove area to the southwest of the complex, now filled in and occupied by Hamilton Marine and other structures.

Siting of the buildings with a generally east-west orientation creates shade on north-facing roof surfaces during the winter months. While south-facing roofs absorb sun and melt snow, north-facing roofs tend to keep snow longer, creating potential uneven snow loading conditions. Uneven snow loading is a cause of many winter roof failures, when the building is not able to sustain thrust loads created on the structure.

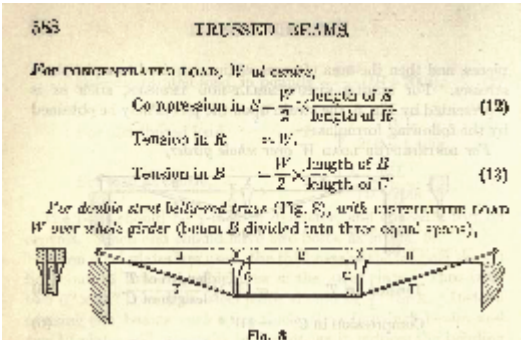
While the orientation would have minimal effect upon structures that generate their own heat, such as the Building 4 foundry, orientation would create more likely drift conditions on other buildings, as well as Building 4 since its closing as a foundry.

Structural Framing:

The structural framing of the different buildings provides insight into several generations of industrial construction. Heavy timber framing, cast iron hardware and loadbearing masonry walls support the oldest structures that date between 1847 and 1900. The heavy industrial truss construction in the timber-framed structures utilizes Queen Rod trusses (Queen Post trusses using two vertical iron rods to support the tie beam, instead of timber material) to create long, open spans in the work areas of Buildings 2, 3, and 6B. The shallow-pitched roofs of timber-framed Buildings 7, 10, and 11 used more standard post-and-beam techniques. Nineteenth-century builders already knew to use simpler, less efficient King Post trusses in smaller spans, such as in the roof of Building 14.

Queen Rod Truss in Building 6B (left); King Post Truss in Building 14 (right)

Building 2 and Building 3 utilize a 19th-century technique of suspending the second floor from the roof trusses to create more open space at that level. This technique has been observed in several buildings in Maine, and is a visual structural indicator of how the buildings have evolved over time as the Portland Company grew. Other structural features, such as the use of trussed girders (seen in Buildings 2 and 3) were commonly used to strengthen longer framing spans in accordance with formulas from handbooks.



583 TRUSSED BEAMS

For concentrated load, W at centre,

$$\text{Compression in } S = \frac{W}{2} \times \frac{\text{length of } S}{\text{length of } K} \quad (12)$$

$$\text{Tension in } K = W.$$

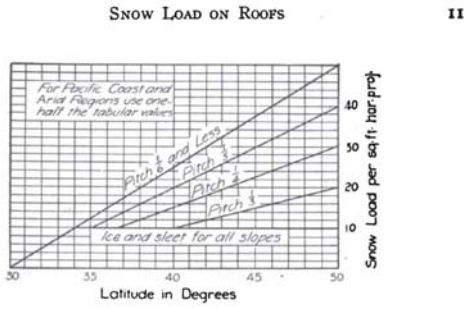
$$\text{Tension in } B = \frac{W}{2} \times \frac{\text{length of } B}{\text{length of } C} \quad (13)$$

For double strut belly-rod truss (Fig. 8), with concentrated load W over whole girder (beam B divided into three equal spans),

Fig. 8

Illustration of "Double Strut Belly Rod Truss" from Architects and Builders Pocket Book, 14th ed. 1905.

Construction techniques changed with the advent of more readily available wrought iron and later, steel, toward the end of the 19th century. The buildings examined in this project scope illustrate the overlapping technological use of iron or steel structural framing beginning with the 1895 replacement Foundry (Building 4) and the 1918 replacement Erecting Building (Building 1). Each of these buildings is an example of steel (or iron) mill building construction, featuring a wide center bay supporting a rail crane, and side bays for other work processes.



1895 Steel Mill Building Construction in Building 4 (left) and c.1904 snow loading diagram from Ketchum text. Snow loading diagram in this text is based upon latitude in degrees, and upon roof pitch.

Windows and Doors:

Overview:

Buildings 1-4 have a very large proportion of glazed openings to the wall surfaces, likely due to the desire for abundant natural light and ventilation opportunities in these industrial/manufacturing buildings. The windows in the walls and clerestories are important architectural components of the complex, and should be maintained or replicated. Almost all of the windows have single pane glass, and due to the high proportion of glazed openings, they afford very little in terms of energy conservation. While there are fewer original, existing windows in the remaining buildings, they too are important architectural components of the complex and of the individual structures. The conditions of the windows vary from fair to very poor, and will demand attention to make the buildings usable for new purposes.

The many sizes and functions of doors in the complex reflect the varied requirements for the different manufacturing processes. Unfortunately, many of the larger original doors have been replaced with more recent doors after the site's period of significance. Like the windows, remaining doors from the period of significance for the site are important architectural components, and should be maintained, if possible, or recreated in kind to meet Park Service standards.

Energy Conservation:

Overview:

Section 101.4.2 (Historic buildings) of the 2009 International Energy Conservation Code (IECC) specifically states that: *"Any building that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code."*

This could seem to imply that the buildings at the Portland Company complex are totally exempt from any requirements for insulation, heating system performance and electricity use. However, the Commentary on the IECC makes it clear that if any additions, alterations or renovations are undertaken that are not

classified as “historic” they should comply with Section 101.4.3 (Additions, alterations, renovations or repairs). This section requires that additions, alterations, renovations or repairs conform to the new construction requirements of the IECC. It further requires that additions, alterations, renovations or repairs not overload existing building systems.

What this all means for the Portland Company complex is that there are portions of the building envelope that may be affected by these provisions. For example, in the discussion on exemptions to the requirements, Section 101.4.3 requires that during reroofing activities, roofs without insulation where the sheathing is exposed during reroofing shall be insulated either above or below the sheathing.

Most of the buildings in the complex have no insulation at the walls or roofs. If reroofing is undertaken, it would be rational and more code compliant to add insulation to the roofs. By installing insulation on top of the roof decks, the existing framing could remain exposed on the interior. The requirement for roof insulation in Table 502.2(1) for insulation above the deck is R20, which could be achieved with about 3” of rigid insulation, which should not seriously alter the historic appearance of the exterior.

All of the buildings have solid brick exterior walls, with the brick exposed both inside and out. Insulation of these walls could only be accomplished by covering up the brick on the interior, which may or may not be desired, depending on the final uses. Section 101.4.3 does not require that mass exterior walls such as those in this property be insulated.

Brick Masonry Construction:

The brick masonry at the Portland Company is typical of 19th and early 20th-century construction. The masonry is unreinforced multi-wythe brick construction primarily bonded by lime-rich mortar. As masonry construction changed in the early 20th century, stronger mortar mixes using Portland cement became a preferred construction material. Cement-rich mortar bonds the bricks in Building 1, the most recent structure. Cement-rich mortar is less flexible than lime-rich mortar. This property may have contributed to the cracking visible at the masonry piers in Building 1.

Loadbearing masonry supports most of the structures within the complex. However, the brick masonry in Building 4 serves only to enclose the structural steel frame that supports the roof.

All of the buildings suffer the effects of long-deferred maintenance. Roofs, gutters, flashings, downspouts and brick mortar joints generally require rehabilitation.

At all of the buildings suffer from deterioration of the brick masonry caused by rising damp related to poor site drainage and hardscape. The hardscape, in particular, often directs water towards the masonry rather than away from it, and traps water running down the building walls in the joint between the pavement and the foundation. Opening the pavement joints along the buildings may help the soil ventilate, if used in conjunction with gutters, downspouts, and catch basins in strategic locations.

4.1 Building 1 – Erecting Building, 1918

Building 1 – Erecting Shop, west Elevation

Structure and Building Envelope Description:

- 9,400 square foot footprint, single story with high center bay and clerestory (Photo #1.1)
- Five interior bays with an additional smaller bay near Building 2 west wall (Photo #1.2)
- Unreinforced multi-wythe brick masonry perimeter bearing walls on three sides
- A shared end wall with the older Building 2 brick masonry end wall
- Flat Warren steel roof trusses and steel I-beam purlins with wood board sheathing at high roof
- Flush-framed steel I-beam roof beams and purlins with wood board roof sheathing at low roofs
- Interior steel columns that support both the high bay and the low bay framing, typical of steel mill building construction
- Extensive steel-framed window glazing on west, north, and south walls
- Ballasted rolled asphalt (high roof) membrane roofing (low roofs)

Observations and Evaluation:

- Upper roof surfacing consists of ballasted rolled asphalt, in good to fair condition (Photo #1.3). On lower roofs, a membrane surface covers the roof. We could not determine if it was insulated, or to what extent. Insulation would likely be required on the roofs, especially if there is a goal to retain the visible structure inside the building.
- Roof framing consists of steel trusses and intermediate beams at the clerestory (Photo #1.4). The beams and trusses will need to be analyzed for snow load capacity, and the decking above the beams will need to be replaced at deteriorated areas. The existing board sheathing is a combination of edge bead and edge-and-center bead. We were not able to measure the sheathing thickness. The sheathing does not provide an adequate diaphragm to transfer lateral loads, and it likely does not have sufficient nailing to resist code-required wind uplift forces.
- At the high/low roof intersection, the steel columns are offset, effectively placing an eccentric load on the lower column. This construction technique was typical of mill building construction when travelling cranes occupied the center bay of the structure. The columns, and their connection details, will need to be analyzed to confirm stability in conformance with current codes.
- Large-scale steel frame windows allow significant natural light into the building. The single-pane glazing lacks significant thermal resistance, and would likely need to be replaced with more energy-efficient glazing to keep heat in during the colder months and to keep heat out during the warmer months. Most of the windows are in poor condition and would require extensive rehabilitation or replacement regardless of energy efficiency concerns. As the windows are an important architectural feature of the building, they will need to be rehabilitated to National Parks Service Standards.

- Many of the steel window lintels and precast concrete window sills (Photo #1.6) are damaged and will require replacement. Steel lintels may need to be enlarged to carry loads imposed by current building codes. If replaced, the lintels should be galvanized prior to installation and painted as historically appropriate.
- The building has three load-bearing masonry walls. At the east end of the building the structure ties into the older (c. 1847) end wall of Building 2, transferring both gravity and lateral loads into that wall and building. An additional partial shear wall could help transfer lateral loads at the end of Building 1, and keep the more ornate Building 2 wall gable end wall visible.
- Unreinforced brick masonry walls are in good to fair condition. The bricks are hard, well-fired, and set in a cement rich mortar. Much of the masonry requires repointing, particularly near the south elevation ground level.
- Large cracks exist in the north and south wall masonry near the west end of the building, most likely due to thermal expansion on the long structure (Photo #1.7). The walls at the northwest and southwest corners will need to be rebuilt to tie the three walls back together. Smaller cracks occur in the intermediate piers between the windows, where the side bay framing bears on steel lintels. The cement rich mortar may have induced some of this cracking if it was stronger than the surrounding brick masonry, and the building was restrained from thermal expansion.
- The bottom masonry on the north side of the building is in poor condition due to raised grade and likely saturation from snow accumulation, rising damp, and poor site drainage.

Adaptive Reuse Potential:

- The tall center structure provides opportunity to insert an independent structure inside to provide additional floor space while maintaining some of the open qualities of the building. Another option could be to insert a floor structure inside the building that helps to transfer gravity and lateral loads from the original building into engineered frames and foundations.
- Ground-level access provides potential to sustain a wide range of occupancies, including large-scale assembly, with minimal egress and accessibility issues.
- Space is relatively straightforward to subdivide. Subdividing the space could also improve the lateral rigidity of the structure.
- Reconstruction of the west elevation to its original appearance (Photo #1.8) would address identified deficiencies in the masonry and improve the overall lateral stability of the building.
- Open access to the structural components permits relatively simple structural strengthening techniques that will be repetitive in nature. Much of the structure is well exposed, which should allow for straightforward assessment for corrosion, rot or other potential structural damage.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking.
- Insulate roof, and resurface with proper edge flashing and counterflashing.
- Strengthen existing roof structure as required, particularly near potential drift areas.
- Strengthen existing roof structure as required to provide wind uplift resistance and to transfer lateral loads through roof.
- Repair or replace existing steel windows with thermally efficient units that meet National Park Service Standards.
- Repair or replace existing steel lintels with properly galvanized and painted or prepared and painted steel.
- Repair or replace precast concrete window sills.

- Rebuild the west elevation, wrapping around to the north and south elevations, to match period of historic significance and to strengthen lateral capacity of west end wall.
- Provide shear wall at east end of building as necessary.
- Provide lateral bracing as required to resist code-required lateral loads.

4.2 Building 2 – Machine Shop, 1847, 1905 (3d floor)

Structure and Building Envelope Description:

- 11,300 square foot footprint, three stories with overhanging third floor added in 1905 (above).
- Third floor overhangs for nearly the entire building length on the south side, and approximately half the building length on the north side. Cantilevered floor has little backspan.
- Building may have originally had gutters and downspouts (Photo #2.3), which were rendered obsolete when the third floor was added.
- Building has fifteen window bays and structural bays. Other supplemental columns, girders, and trusses have been added, likely to provide additional upper-floor and roof support as the third floor was added and the building responded to additional loads.
- Unreinforced multi-wythe brick masonry perimeter bearing walls on four sides
- A shared end wall with Building 1 and with Building 3. The west gable wall (Photo #2.6 through Photo #2.8) is a significant architectural feature of the building.
- Two rows of large iron columns and timber posts create 15 structural bays on the first-floor.
- Second floor framing is suspended from original roof framing, which later became the third floor (Photo #2-13).
- Fourteen rows of iron hanger rods pass through the third floor framing to the second floor framing. A few of the hanger rods have been relocated or are missing.
- Timber and iron or steel queen rod roof trusses support raised roof above the 1905 drafting offices. (Photo #2-20, #2-11, and #2-12). The third-floor office spaces extended beyond the masonry wall of the original structure, cantilevered from the first interior (former) attic joist and spanning over the masonry walls.
- Third-floor shed dormer cladding at north elevation consists of stamped metal sheeting in a clapboard pattern (Photo #2.6), while red rolled asphalt clads the South dormer. Areas of missing cladding exist all along the dormers.
- Extensive wood window glazing exists on north and south walls at bottom two stories; with wood windows boarded up on third floor. First floor windows are 25/25 divided light, second floor windows are 15/15 divided light, and third floor windows may have been 2/2 divided light, more common to the early 1900s.
- Roof surfacing partially observed, appears to be rubber membrane as visible from satellite photos and site observations.

Observations and Evaluation:

- Upper roof surfacing appears to consist of membrane. We could not access the upper roof.
- Roof framing consists of queen rod wooden trusses, with a single purlin that carries the junction of the sloped and shed roofs. The beams and trusses will need to be analyzed for snow load capacity, and the vertically-sawn, wide-board decking above the beams will need to be replaced at deteriorated areas. We were not able to measure the sheathing thickness. The sheathing does not provide an adequate diaphragm to transfer lateral loads, and it likely does not have sufficient nailing to resist code-required wind uplift forces.
- The roof structure originally supported the second floor with iron suspension rods to create wide-open first floor and second-floor space. At some point, possibly when the third floor was added, additional timber and iron posts were installed to provide additional second floor support.
- While the structure itself is somewhat regular, many variations in the framing details will require detailed assessment to adequately confirm the integrity of existing load paths. The building has undergone many subtle framing modifications as the building evolved.
- Large wood frame windows allow significant natural light into the building. The single-pane glazing lacks significant thermal resistance, and would likely need to be replaced with more energy-efficient glazing to keep heat in during the colder months and to keep heat out during the warmer months. Most of the windows are in poor condition and would require extensive rehabilitation or replacement regardless of energy efficiency concerns. As the windows are an important architectural feature of the building, they will need to be rehabilitated to National Parks Service Standards.
- Granite headers over the first and second floor windows are mostly in good condition. Several are cracked, and will require either epoxy-dowel repair or in-kind replacement.
- The building has four load-bearing masonry walls. At the east end of the building the structure ties into the end wall of Building 3, transferring both gravity and lateral loads into that wall and building. A roof truss near the west gable end carries much of the gravity load of the roof, but part of the Building 1 roof ties into the wall in other locations.
- The brick masonry exterior of the machine shop is constructed from well-fired bricks set in a mid-19th century lime mortar. The multi-wythe brick walls double in thickness on the interior to form piers that support the second floor beams. The masonry of Building 2 is in very good condition suffering only from the effects of deferred maintenance and poor site drainage. There are some areas of brick replacement that were completed with bricks and mortar that do not match the originals very well.
- It does not appear that the masonry exterior was ever completely repointed in the 20th century. The extremely weathered original lime mortar is visible in almost all of the joints. At the top of the building, there is very little mortar left between the bricks that form the outer wythe of the cornice. There is a real danger that bricks may start to fall out of the upper wall if remedial steps such as repointing and rebuilding of these areas are not undertaken in the near future.
- As with the other buildings at the complex there is a problem with site drainage that is affecting the first ten to twelve courses of brick above the foundation.
- On the east and west elevations, the brickwork starts to corbel outward in increments starting at one brick above the second floor lintels to form a cornice that is 20 courses high. On the north and south gable ends the brickwork corbels out to form a cornice that is 13 courses high.
- Additional openings at the first floor may have been punched into the south elevation of Building 2 when Building 1 was constructed. The original second floor windows of Building 2 are visible from inside Building 1, indicating that the wall between Buildings 1 and 2 is the original exterior wall of Building 2.
- Diamond shaped iron brick ties are visible at the location of the second floor beams on the east and west elevations.
- The top portion of the granite foundation is visible on the exterior, but not interior, of the building.

Adaptive reuse potential:

- This building is the most complex structure of all the buildings we assessed. Its size and height provide the most interesting options and potential views of the water in the complex.
- Second-floor open floor plan provides excellent assembly space, assembly occupancy (or educational occupancy), but assembly occupancy increases load factors on the existing structure. Supplemental posts on the first floor and improved lateral bracing can mitigate the increased load factors resulting from more intense occupancies.
- Ground-level access provides potential to sustain a wide range of occupancies, including large-scale assembly, with minimal egress and accessibility issues.
- Space is relatively straightforward to subdivide.
- Open access to the structural components permits relatively simple structural strengthening techniques that will be repetitive in nature. Structural strengthening will require the analysis of many different isolated framing conditions created as the building was modified over time.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking.
- Insulate roof, and resurface with proper edge flashing and counterflashing.
- Strengthen existing roof structure as required, particularly near potential drift areas. Provide wind uplift resistance and transfer lateral loads through the roof to the walls.
- Repair or replace existing steel windows with thermally efficient units that meet NPS Standards.
- Strengthen cantilevered third floor framing to adequately support contemporary code required loads and wind uplift resistance.
- Repair/replace existing steel lintels with properly galvanized and painted/prepared and painted steel.
- Repair or replace cracked granite window sills.
- Repair the bearing wall between Building 1 and Building 2, and Building 2 and Building 3.
- Test a sample of the original brick setting mortar to determine what kind of lime was used in the original mortar and if additives, such as natural cement, were used to make the mortar hydraulic.
- Repoint 100% of the exterior brickwork using a mortar that replicates the binder and aggregate in the original mortar as closely as possible.
- Remove and reset bricks that are loose at the cornice.
- Modify site drainage to drain water away from the base of the building.

4.3 Building 3 – Machine Shop, 1847

Structure and Building Envelope Description:

- 4,900+/- square foot footprint, two stories with second floor added sometime around 1895, according to the SCC report.
- Second floor walls constructed of multi-wythe brick masonry, and roof trusses supplemented with additional framing to create shallow pitched continuous shed dormers while maintaining the original monitor roof (Photo #3.7).
- Building has seven window bays and six interior structural bays. Supplemental columns, girders, and trusses have been added, likely to provide additional upper-floor and roof support as the second floor was added and the building responded to additional loads (Photo #3.5, Photo #3.6).
- Unreinforced multi-wythe brick masonry perimeter bearing walls on four sides, including the shared end walls with Building 4 and with Building 2.
- Timber and iron or steel roof trusses support additional lumber and rafter framing to support the raised roof above the second floor.
- Wood windows on north and south walls. First floor windows are 25/25 divided light, second floor windows are 10/10 divided light. These windows comprise a comparable surface area to wall ratio as those in the bottom two floors of Building 2, but less area than those in Building 1 and Building 4. Windows on first floor have granite lintels, while those at second floor have shallow arch brick masonry lintels.
- Roof surfacing partially observed, appears to be rubber membrane as visible from satellite photos and site observations.

Observations and Evaluation:

- Upper roof surfacing appears to consist of membrane. We could not access the upper roof.
- Similar to Building 2, roof framing consists of queen rod wooden trusses. The building was added onto by raising the second floor roof and landing on the existing bearing wall, unlike Building 2, which relied on cantilevered floor framing over the top of the bearing wall.
- The beams and trusses will need to be analyzed for snow load capacity, and the vertically-sawn, wide-board decking above the beams will need to be replaced at deteriorated areas. We were not able to measure the sheathing thickness. The sheathing does not provide an adequate diaphragm to transfer lateral loads, and it likely does not have sufficient nailing to resist code-required wind uplift forces.
- While the structure itself is somewhat regular, some variations in the framing details will require detailed assessment to adequately confirm the integrity of existing load paths. There are fewer structural bays and trusses, which means fewer potential differences in truss conditions. Techniques used in modifying the structure included the use of double strut belly-rod trusses, which stiffened the second floor girders.
- Wood frame windows allow significant natural light into the building. The single-pane glazing lacks significant thermal resistance, and would likely need to be replaced with more energy-efficient glazing to keep heat in during the colder months and to keep heat out during the warmer months. Most of the windows are in poor condition and would require extensive rehabilitation or replacement regardless of energy efficiency concerns. As the windows are an important architectural feature of the building, they will need to be rehabilitated to NPS Standards.
- Granite headers over the first floor windows are mostly in good condition. Several are cracked, and will require either epoxy-dowel repair or in-kind replacement. Arched masonry openings over second floor windows also require spot repairs and repointing.
- The building has four load-bearing masonry walls. At the east end of the building the structure ties into the end wall of Building 4, transferring both gravity and lateral loads into that wall and building.

A roof truss near the west gable end carries much of the gravity load of the roof, but part of the Building 2 roof ties into the wall in other locations.

- The brick masonry exterior is in fair condition, in need of widespread repointing and repair of loose and missing brick. Rising damp is a problem at Building 3, as it is at all structures.
- As with the other buildings at the complex there is a problem with site drainage that is affecting the first ten to twelve courses of brick above the foundation.

Adaptive reuse potential:

- This building is the second-most complex structure of all the buildings assessed in this project scope. The later addition of another floor to the building creates more discontinuities that need to be repaired. It's much smaller size and more "in-line" load path at the north and south walls makes it less complicated to rehabilitate than Building 2.
- Second-floor floor plan provides less than optimal assembly space because existing roof trusses interrupt each bay near the sides of the building. Office space could be a possible occupancy, with individual offices or rooms placed within each truss bay and a wider, open central space.
- Ground-level access provides potential to sustain a wide range of occupancies, including components large-scale assembly combined with the other adjacent buildings, with minimal egress and accessibility issues. This structure could perhaps serve as auxiliary space to neighboring Buildings 2 and 4, potentially including service and egress functions.
- Space is relatively straightforward to subdivide, if necessary on the upper floor.
- Open access to the structural components permits relatively simple structural strengthening techniques that will be repetitive in nature. Structural strengthening will require the analysis of many different isolated framing conditions created as the building was modified over time.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking.
- Insulate roof, and resurface with proper edge flashing and counterflashing.
- Strengthen existing roof structure as required, particularly near potential drift areas, and to resist wind uplift.
- Repair or replace existing wood windows with thermally efficient units that meet National Park Service Standards.
- Strengthen second floor framing to adequately support contemporary code required loads for the intended occupancy, if required.
- Repair or replace existing granite lintels at first floor level as required, and Repair or replace granite window sills (first floor) and wood sills (second floor).
- Repair the bearing wall between Building 2 and Building 3, and Building 3 and Building 4.
- Provide lateral bracing or reinforcement as required.
- Rehabilitate the masonry, paying specific attention to details between the first and second floors, and at the top plate of the second floor.

4.4 Building 4 – Foundry, 1895

Structure and Building Envelope Description:

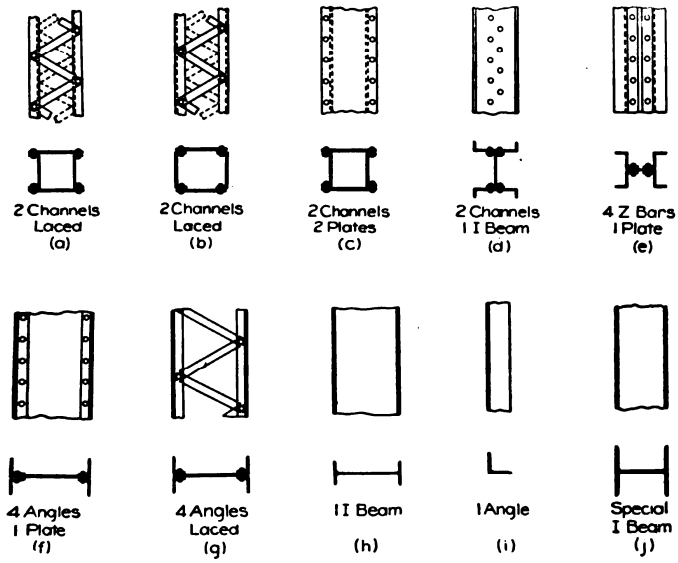
- 16,500+/- square foot footprint, single story structure with center clerestory and continuous rooftop monitor. A part of the south part of the building is two stories, and ties into the more recent Building 5 along the east and south elevations.
- Building is a relatively early example of "steel mill building construction", and served the purpose as a foundry. Second floor walls along the south side of the building are constructed of multi-wythe brick masonry.
- Two rows of steel or iron columns support the side bay roofs and a continuous crane rail. A spliced upper column, outboard of the crane rail, is tied into longitudinal metal trusses.
- Building has unreinforced multi-wythe brick masonry perimeter screen (not bearing) walls on the north and south sides.
- A concrete masonry block wall replaced the brick masonry wall at building's east end. The east end was removed and replaced with a more recent extension incorporated into Building 5.
- North and south wall columns are partially exposed on the interior and exterior. The columns consist of four angles joined together with steel lacing bars.
- Extensive wood window glazing on north and south walls, clerestory, and monitor allow significant natural light into the building. First floor windows are double-width, with shallow arch tops and 16/16 light sash. Clerestory window sash are 30-light, single-sash windows that were likely operable
- Roof surfacing partially observed, appears to be metal roofing along the north side bay and rubber membrane on the upper bays and south side, as visible from satellite photos and site observations.

Observations and Evaluation:

- The building is a relatively early example of "steel mill building" construction, in which steel or iron becomes the primary roof support material. Texts written in that time period detail that the four-angle, laced lower columns are intended for "light loading" which would certainly be the case in a hot foundry structure.

COLUMNS.—The common forms of columns used in mill buildings are shown in Fig. 98. For side columns where the loads are not excessive, column (g) composed of four angles laced is probably the best. In this column a large radius of gyration about an axis at right angles to the direction of the wind is obtained with a small amount

of metal. The lacing should be designed to take the shear, and should be replaced by a plate, (f) Fig. 98, where the shear is excessive, or where the bending moment developed at the base of the column requires the use of excessive flanges. The I beam column (h) makes a good side column where proper connections are made, and is commonly used for end columns (see Fig. 81). The best corner column is made of an equal legged angle with 4, 5 or 6-in. legs, (i) Fig. 98. Details for the bases of the three columns above described are shown in Fig. 99.



Types of Mill Building Columns form Milo Ketchum Text "The Design of Steel Mill Buildings". Column "g" (bottom row, second from left) is the type of column used in Building 4.

- The building design is similar in design to Building 1, if not completely similar in framing. Both buildings feature large banks of window glass to allow in natural light and provide ventilation. Building 1 relies upon interior bearing on masonry walls at the side bays, rather than on an iron or steel column exposed to external elements and rising damp. Later steel mill buildings, like Building 1, likely evolved from structural designs of earlier steel mill buildings, like Building 4, using more durable structural details.
- The laced angle side bay columns are in poor condition and have failed from a structural standpoint. They will need to be substantially repaired, or likely replaced. The columns are likely realizing some remaining axial capacity due to friction and incidental bond between the corroded steel and the masonry bed joints.
- The condition of the structure, particularly of the partially-exposed, corroded columns presents a complex preservation problem. Should one re-create a building detail that is faulty by design and

ill-suited for a marine-industrial environment, in the interest of authenticity and preservation? Or should a stronger structural column be placed within a new economical curtain wall built of concrete masonry, insulated appropriately, and clad on the interior and exterior with bricks? Could a less thermally-conductive substitute material fill the vertical control joints between the bricks on both faces of the wall to match the appearance of the original column? National Parks Service Preservation Brief 16, *The Use of Substitute Materials on Historic Building Exteriors* addresses some of these concerns. While the repair and conservation of original fabric is of utmost importance in preservation practice, certain building conditions and costs can justify the use of substitute materials.

- Responsible preservation practice also requires design professionals to consider the longevity of any repair or rehabilitation techniques that they specify. Future environmental exposure (marine environment atmosphere, splashback from de-icing salts) maintenance considerations (snow plowing, leaf or sand-blowing) could all undermine a designer's decision to use, for example, galvanized steel columns that replicate the original. One only needs to think about the considerable painting maintenance that all steel-framed parking structures need to undergo to understand the effects of the environment. Re-creating a failed structural detail that provides no true access to maintenance could be considered a failure of preservation to address practicality.
- The double-wide, shallow arch windows illustrate that the north and south walls were not intended to be significant load bearing elements. The side bay trusses bear directly onto plates supported by the tops of the laced angle columns, and the masonry between them was infilled. This construction technique was a major selling point of the steel mill building companies, many of which were major bridge companies. Bridge companies that branched out into steel mill building construction included American Bridge Company and the Pittsburg Bridge Company. The American Bridge company had a sales office in Portland in 1904 (as advertised in Kidder's Handbook), but we have yet to determine if they were present in 1895. In fact, at the time of publication of his *Steel Mill Buildings* text, Milo Ketchum served as the Contracting Manager for American Bridge Company's Kansas City office.
- The beams and trusses must be analyzed for snow load capacity, and the vertically-sawn, wide-board decking above the beams will need to be replaced at deteriorated areas, especially along the eaves. We were not able to measure the sheathing thickness, but its deteriorated appearance and frequent visible instances of failure causes us to believe that it does not provide an adequate diaphragm to transfer lateral loads, and it likely does not have sufficient nailing to resist code-required wind uplift forces. It is possible that all of the roof sheathing in this building may need to be replaced. Salvageable sheathing could be milled into finish trim lumber or reinstalled on shorter spans below the structural diaphragm sheathing above.
- The structure is one of the more consistently framed buildings in the complex, aside from the large concrete block wall that supports Building 5. There are fewer variations in the framing as the uniform steel components were economically mass fabricated.
- Wood frame windows allow significant natural light into the building. The single-pane glazing lacks significant thermal resistance, and would likely need to be replaced with more energy-efficient glazing to keep heat in during the colder months and to keep heat out during the warmer months. Most of the windows are in poor condition and would require extensive rehabilitation or replacement regardless of energy efficiency concerns. As the windows are an important architectural feature of the building, they will need to be rehabilitated to NPS Standards.
- Shallow arch headers over the first floor windows should be spot repaired.
- The brick masonry exterior is in fair to poor condition, in need of widespread repointing and removal at the deteriorated columns. Rising damp is a problem at Building 4, as it is at all structures, especially along the north wall.

- As with the other buildings at the complex there is a problem with site drainage that is affecting the first ten to twelve courses of brick above the foundation.

Adaptive reuse potential:

- It appears that much of the concrete masonry wall and Building 5 extension could be removed if the goal were to preserve Building 4. This would require temporary shoring of Building 4 and rebuilding the south wall to resemble the original south wall (or modified new south wall)
- Ground-level access provides potential to sustain a wide range of occupancies, including large-scale assembly, with minimal egress and accessibility issues.
- Space is relatively straightforward to subdivide, if necessary.
- Like Building 1, an infill floor could be installed independent of or in support of the existing structure to add space or lateral support.
- Open access to the structural components permits relatively simple structural strengthening techniques that will be repetitive in nature. Structural strengthening will require the analysis of many different isolated framing conditions created as the building was modified over time.

Recommended Building Envelope and Structural Rehabilitation Scope:

- As a first step, explore the feasibility of making structural modifications that meet Historic Tax Credit criteria by consulting with the National Park Service.
- Shore and stabilize the structure as required to address south and north wall column deficiencies. Shore and stabilize building as required to replace concrete masonry walls at the east end of the building, and to rebuild the east gable wall to resemble conditions from the period of historic significance.
- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking.
- Insulate roof, and resurface with proper edge flashing and counterflashing.
- Strengthen existing roof structure as required, particularly near potential drift areas, and to resist wind uplift.
- Repair or replace existing wood windows with thermally efficient units that meet National Park Service Standards.
- Repair the bearing wall between Building 3 and Building 4, and the curtain walls on the north and south sides of the building.

4.5 Building 6B – Blacksmith Shop, c. 1896-1904

Structure and Building Envelope Description:

- 6,500+/- square foot footprint, single story structure with relatively steep timber-framed roof and trapezoidal wood-framed shed addition at north side. We did not access the north side addition.
- Timber frame structure has nine interior roof bays along the length of the building (Photo #6B7). Building has ten interior bays spaced at regular intervals.
- Main part of structure lacks interior timber columns. All queen-rod trusses bear on masonry piers or upon timber plates on masonry.
- Exterior masonry features brick piers that extend one wythe beyond the primary masonry field, creating a rhythmic façade that illustrates the pattern of the structural roof framing.
- Large, tall windows, fairly low to the ground, provide excellent natural light. Most windows on the south elevation have been boarded over.
- Three-tab brick-colored asphalt shingles clad the roof, and appear to be in good condition.
- Fiberboard eave trim has completely failed.

Observations and Evaluation:

- We concur with the BSE assertion that repairs need to be performed to temporarily support the wall framing at the Building 6 and Building 6B intersection.
- Extensive water infiltration at the top of the wall is resulting in the degradation of the setting mortar and loose bricks. The brick has widespread open and failed mortar joints.
- The treatment of the masonry is tied to correcting defects in the roofing. The mortar in the courses directly below the roof is deteriorated from water infiltration and as a result the upper courses of brick are loose. Resetting the upper courses of brick may be required.
- Trusses appear to be generally in good to fair condition. However, the bearing conditions at the ends are questionable, due to the eave conditions that have caused significant water infiltration onto the upper masonry. Truss ends and bearing points should be assessed individually to confirm that no rot is present.
- Roof rafters and purlins are undersized. Supplemental rafters are required, and purlins should be intermediately supported to shorten their span. If excessive deflection has already occurred in the rafters, it will be more complex, but not insurmountable, to sister the rafters. A longitudinal bracing system, made clearly distinctive from the original structure, could transfer loads from the center of the purlins to the bottom chord of the queen rod trusses, leaving the purlins in place.

Adaptive reuse potential:

- The building is a short, easily accessed structure with a sloped roof that could easily be repaired. The ample windows allow significant natural light, and the long, regular structure could easily be converted into multiple units.
- Ground-level access provides potential to sustain a wide range of occupancies, including large-scale assembly, with minimal egress and accessibility issues.
- Space is relatively straightforward to subdivide, if necessary.
- Open access to the structural components permits relatively simple structural strengthening techniques that will be repetitive in nature. Structural strengthening will require the analysis of many different isolated framing conditions, particularly at the truss eaves.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Make necessary temporary and permanent stabilizations and repairs at the wall between Building 6 and Building 6B.

- Investigate the top of the brick walls to determine extent of mortar deterioration.
- Investigate the end bearing of the trusses and the top plate of the wall to determine if replacement is needed.
- Strengthen roof rafters, as is likely necessary.
- Analyze the original mortar to determine the type of binder and ratio of aggregate used.
- Remove and reset loos sections of brick.
- Repoint 100% of the exterior walls with a mortar that matches the properties and appearance of the original mortar.
- Replace non-matching modern granite sills with sills that match the existing.
- Perform necessary structural upgrades.

4.6 Building 7 – Car Shop, c. 1873, 1904

Structure and Building Envelope Description:

- The building appears to have been originally a long rectangular structure (Photo #7.1 and Photo #7.2), supplemented later on by a shed addition on the south side (Photo #7.5). We did not access the south side addition, which apparently served as a lumber shed.
- The single-story building has perimeter loadbearing masonry walls, and some interior loadbearing masonry partition walls.
- Shallow brick arch lintels top the windows, and granite sills are located at the base of the openings.
- The interior timber frame supports a low-pitched roof. The roof rafters at the center of the structure are rectangular rafters topped with a sloped shim piece (Photo #7.5). The rafters have long spans placing substantial weight on the masonry side walls.
- A combination of membrane and asphalt roofing covers the structure (Photo #7.9).
- Many large openings have been cut into the side bearing walls (Photo #7.1, #7.2, and #7.3).

Observations and Evaluation:

- There appears to have been significant water infiltration from defects in the roof into the brickwork at the top of the wall. The mortar in the upper courses, just below the shallow eaves, is deteriorated as a result of the water infiltration. A similar condition exists at the bottom of the wall where rising damp has deteriorated the mortar in the brick courses just above grade.
- The outer wythes are bowing and detached from the inner wythes at the brick panels between the windows on the south elevation (Photo #7.8, Photo #7.10).
- There are a significant number of cracked and damaged bricks as well as bricks that have been repaired in the past with the same cement rich pointing mortar used to point the bricks.
- There is some corrosion and brick jacking at the steel lintels installed at the newer openings into the building.
- The roof framing is in poor condition and is undersized. In many locations, water infiltration appears to have caused framing rot, and there is likely significant top wall plate rot at the eaves (Photo #7.7). In a few places, we could see daylight through the rotted roof sheathing and failed surfacing.
- The finish grade around the shed addition (Photo #7.4) appears to direct roof runoff back to the base of the south wall.

Adaptive Reuse Potential:

- The building is in poor condition. While its spaces could be rehabilitated and converted to a wide variety of uses, it would likely need to be almost completely rebuilt. The overall condition of the structure would likely dictate that it be placed on new foundations.

Recommended Rehabilitation Scope:

- Comprehensive rebuilding of the existing perimeter loadbearing walls, roof surface and sheathing removal and replacement, significant roof framing strengthening and/or replacement; essentially demolition and reconstruction on the same footprint.

4.7 Building 10 – Paint Shop, 1873

Structure and Building Envelope Description:

- 1,350 square foot footprint, single story (Photo #10.1);
- Unreinforced multi-wythe brick masonry perimeter bearing walls;
- Numerous infilled brick windows and enlarged door openings (Photo #10.3, #10.6, #10.8);
- west masonry wall has been partially rebuilt and is currently structurally unstable (Photo #10.3, #10.9);
- Some wood-framed window glazing on north and west walls;
- Battened membrane roof with numerous patches and ponding (Photo #10.2), indicating that the rafters have sagged significantly or rotted near the eaves.

Observations and Evaluation:

- We were unable to access the building interior.
- Upper roof surfacing consists of battened roof membrane, in fair to poor condition. The roof appears to be insulated, judging from conditions viewed through one of the windows.
- The masonry walls are in poor condition, with the west wall in unstable condition. This wall is in sufficiently unstable condition to warrant vacating the building, as stated in the Becker report.
- Roof framing was not visible but reportedly consists of wood rafters. It is possible that the rafters have tapered wedges placed atop each joist to create the very shallow roof pitch, as was done in Building 7 (see Photo #7.5), built around the same time.

Adaptive Reuse Potential:

- The building has a little adaptive reuse potential, due to its overall poor condition. Rehabilitating the structure would require significant time and effort, which may not be economically feasible when compared to a rebuilt structure on the same footprint.
- If the building were rebuilt, it would have to thoroughly comply with all contemporary code requirements for new construction, including foundation design.
- Reconstructing a new building to match the building during its period of historical significance is possible, depending upon future site use.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Demolish and rebuild existing walls, roof, and foundation.
- Rebuild structure to match period of historic significance, using windows that meet National Park Service Standards and building systems complying with building codes for new construction.

4.8 Building 11 – Pattern Storehouse, 1885

Structure and Building Envelope Description:

- Irregularly shaped, approximately 4,600 square foot footprint, two stories (Photo #11.1)
- Timber-framed interior with reported four-foot deep crawl space below first floor.
- Unreinforced multi-wythe brick masonry perimeter bearing walls on four sides. Building 12 upper wall appears to have been built on top of Building 11 South wall.
- Nearly-flat roof framing, pitched to the south and the north by stacking timber crib pieces beneath roof rafters (Photo #11.7 through #11.10)
- Roof appears to pitch two ways, to the east and to the west, at the intersection with the upper wall of Building 12.
- Relatively little number of wood window openings per square foot of wall.
- Climbing hillside at Fore Street drains runoff to the base of the north wall, several feet above the first floor (Photo #11.3).

Observations and Evaluation:

- We did not access the reported crawl space below the first floor. Given our experience working on structures with significant quantities of runoff pitched toward them, combined with the significant bow in the north wall, we believe that the first floor framing is probably rotting near the north wall, and no longer bracing it.
- The north masonry wall has failed (Photo #11.3, #11.5). Lateral earth pressures and possible first floor framing rot have caused the wall to bulge inward several inches. We believe that this condition creates as significant concern as the wall conditions at Building 10, and that the building should be vacated until this condition is evaluated and repaired.
- We observed evidence of a perimeter drain along the north elevation, but we were unable to confirm if it is operable.
- Roof framing consists of timber framing. The roof framing members are cribbed off of the columns at various heights to create a central ridge and adjacent slopes. This roofing system cannot transfer diaphragm loads from the roof into the timber frames below.
- The west and north unreinforced brick masonry walls are in good to fair condition. Much of the masonry requires repointing, particularly near the west elevation ground level.
- We observed active roof leaking into barrels placed on the second floor (Photo #11.8).
- The bottom masonry on the north side of the building is in poor condition due to raised grade and likely saturation from snow accumulation, rising damp, and poor site drainage.
- There appears to have been some relatively structural reinforcement to a girder tying into the common wall between Building 11 and Building 12 (Photo #11.10).
- The high roof of building 12 presents a significant potential for snow drifting (Photo #11.1, #11.2) Runoff from both roofs drains from the wall at the building junction (Photo #11.2). Previous masonry repointing repairs attempted to solve the problem, but only temporarily eliminated the symptoms.

Adaptive Reuse Potential:

- The building has a relatively short floor-to floor height between the first and second floors. Combined with the lack of windows, the ground floor space feels confining and may not be suitable for occupancies that require substantial daylight. It could become a future tenant storage area if structural concerns are addressed.
- The lack of windows results from the use as a pattern storehouse, to minimize potential draft situations in the event of a fire.
- The second floor space, despite the relative lack of windows, appears to be brighter and amenable to different commercial occupancies, if the egress were improved.

- The structural failure of the north wall presents a significant economic concern that could be an obstacle to building rehabilitation.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Shore building and rebuild north masonry wall. This will likely require excavation along the base of the north wall, and slope stabilization further back toward Fore Street. Additional work will likely be required to confirm condition of first floor framing.
- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking. Provide legitimate connections to transfer forces from upper roof through cribbing to the tops of posts, and to the tops of walls.
- Insulate roof, and resurface with proper edge flashing and counterflashing. Reconsider relationship of roof against Building 12, because splashing and snow drift will likely continue to cause structural problems along this wall.
- Strengthen existing roof structure as required, particularly near potential drift areas.
- Strengthen existing roof structure as required to provide wind uplift resistance and to transfer lateral loads through roof.
- Repair or replace existing wood windows with thermally efficient units that meet National Park Service Standards.

4.9 Building 14—Drafting Room & Storehouse, 1858-64

Structure and Building Envelope Description:

- Undetermined square foot footprint, two story (Photo #14.1)
- A shared end wall with Building 15/16.
- Wood construction at south-facing wall; use of site retaining wall buttresses for lower side walls at east and west ends (Photo #14.3, Photo #14.4).
- The wood-framed façade has more recently been re-sided, and the some windows replaced.
- A bridge leads from Building 14 to the second floor of Building 3 is in poor condition, but not assessed as part of this survey. (Photo #14.1). A bridge between Building 2 or Building 58 connects the second floor "Map Room" to the Building third floor drafting shop (Photo #14.2).

Observations and Evaluation:

- Upper roof surfacing consists of ballasted rolled asphalt, in good to fair condition. The roof is possibly insulated in some areas, but we could not determine the extent.
- Roof framing consists of timber king post trusses, purlins, and rafters. The rafters, purlins, and trusses must be analyzed for snow load capacity, and the decking above the beams will need to be replaced at deteriorated areas.
- We were not able to measure the sheathing thickness, but it likely does not provide an adequate diaphragm to transfer lateral loads, and it likely does not have sufficient nailing to resist code-required wind uplift forces.
- The current tenant reports that warm-weather condensation is prevalent, as the heat in the building rises to the peak at the Fore Street masonry wall. The condition at the top of the Fore Street wall should be assessed to provide appropriate insulation and weather protection.

Adaptive Reuse Potential:

- Ground-level access to second floor (from 58 Fore St.) and from alleyway provides potential to sustain a wide range of business occupancies, including mercantile, office, and artists' studios, with some thought to egress and accessibility issues. This structure, along with that of Building 15/16 presents a configuration almost unique within the City of Portland. While the structures do not engage Fore Street, they create a unique alleyway on the north side of the site. Properly secured and lighted, it could present unique occupancy opportunities.
- Lateral stone walls provide fire separation between individual units if second-floor walls above are outfitted with appropriate fire-rated doors.
- Reconstruction of the south elevation to its original appearance would address identified deficiencies in the wood façade and improve the overall lateral stability of the building.
- Exposed rubble stone walls, if properly repaired, could become a unique architectural feature of the interior spaces.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking.
- Insulate roof, and resurface with proper edge flashing and counterflashing. Develop a method to insulate the uppermost wall near Fore Street to protect against water and air infiltration.
- Strengthen existing roof structure as required.
- Strengthen existing roof structure as required to provide wind uplift resistance and to transfer lateral loads through roof.

- Repair/ replace existing wood windows with thermally efficient units that meet National Park Service Standards.
- Rebuild the south first-floor elevation to match period of historic significance and to strengthen lateral capacity of south wall.

4.10 Building 15/16 – Boiler House/Brass Foundry, 1858,1864

Structure and Building Envelope Description:

- Small (unknown area), two-story structure with conventional lumber framing (15) and unreinforced multi-wythe brick masonry bearing wall (16) along the south (alley) elevation. Building 16 also has an infill wooden partition below a steel beam that previously created a large door opening. Refer to photos #16.1 and #16.2.
- Brick vaults reportedly extend from Building #15 beneath the Fore Street sidewalk. We did not observe these vaults.
- Rubble dry-stacked retaining walls exist at north, west and east elevations. At Building 16, it appears that water penetrates the wall or has in the past.
- Back wall (north wall) is large stone masonry retaining wall supporting hillside at Fore Street.
- Mono-pitch wood-framed roof slopes down toward the south (alley-facing) wall.
- Two-wythe brick masonry front wall features a mixture of granite (likely original) brick, and steel or iron headers on the window and door openings.
- The remnants of the Boiler House chimney base remain between Building 15 and Building 16.
- A large standpipe at east end of building.

Observations and Evaluation:

- The wooden and brick masonry walls of both buildings are in poor condition.
- The chimney base bricks should be checked and stabilized in place.
- Timber and lumber roof framing at Building 16 is undersized for contemporary snow loads.

Adaptive Reuse Potential:

- The building's current use is as a blacksmith's forge, a use not dissimilar to its original purpose as a brass foundry. It may be necessary to rebuild most of the Building 15 framing. In that case, Building 15 would likely need to conform to contemporary code requirements for new structures. From a preservation standpoint, the blacksmith occupancy is likely to be considered as the best and highest use of the structure.
- Open access to framing in Building 16 permits relatively simple structural strengthening techniques. We assume that much of the Building 15 structure will need to be rebuilt.
- As discussed in the Building 14 section, this structure provides opportunities for unique occupancies if properly secured and lighted.

Recommended Building Envelope and Structural Rehabilitation Scope:

- Strip existing roofing, repair damaged sheathing, and add a structural diaphragm, consisting either of plywood sheathing or metal decking above the interior exposed roof decking.
- Insulate roof, and resurface with proper edge flashing and counterflashing.
- Strengthen or rebuild existing roof structure as required, particularly near potential drift areas.
- Strengthen existing roof structure as required to provide wind uplift resistance and to transfer lateral loads through roof.
- Repair or replace existing doors and windows with thermally efficient units that meet National Park Service Standards.
- Repair/replace existing steel lintels with properly galvanized, painted or prepared/painted steel.
- Rebuild the south elevation and Building 15 timber or lumber structures as required.
- Rehabilitate brick masonry front wall of Building 16, to match period of historic significance.
- Improve site drainage and grading around the alley and hillside.

5.0 RECOMMENDATIONS AND CONCLUSION

The individual structures within the Portland Company complex that were included in the project scope are in generally poor condition due to deferred maintenance and, in some cases, inherent but correctable lack of stability against lateral forces and snow loads. The severity of deterioration varies from building to building; it also varies within any given building. In some cases, significant deterioration is quite localized; in other cases, the overall structure is in a state of significant disrepair.

Buildings in poor condition do not necessarily warrant demolition. The fact that a number of the buildings within the Portland Company complex continue to be occupied—some by large assemblies for special events and some by business tenants--attests to the fact that most of the buildings are still serviceable and are in salvageable condition.

In our opinion, it is possible to address the identified structural and building envelope conditions in ways that retain each building's historic character and that are feasible from a cost perspective. To do so, however, will require case-by-case assessment, creative design solutions, and the involvement of consultants and contractors experienced in historic building rehabilitation.

We concur with many of the primary findings of the Becker Structural Engineers report as to the current condition of the individual buildings. We believe, however, that the simplified construction techniques that characterize these buildings together with the repetitive nature of many of the required repairs make possible a relatively straightforward rehabilitation project. These attributes also present an opportunity to improve lateral stability of the building within contemporary code requirements while making other repairs. The simple, modular nature of the long buildings allows for replication of the individual structural repair details. The exposed floor and roof structures provide easy access to make repairs. The limited hidden conditions lower the need to include large cost contingency factors for structural upgrades. In summary, most of the building structures are not that complicated when compared to many other historic commercial building rehabilitation projects undertaken in Portland and in Maine during the last quarter century. With proper planning, specification, and construction administration, most of the existing structures can be rehabilitated by contractors trained in preservation work, primarily in masonry rehabilitation and timber framing. Appropriate planning, engineering, and site inspection will need to occur to ensure the proper execution of the repairs.

In our opinion, three structures stand out as buildings presenting the greatest structural and building envelope challenges. The buildings in the worst condition include Building 7 (Car Shop) #10 (Paint Shop), and 11 (Pattern Storehouse). The immediate safety concerns identified by Becker Structural Engineers at the wall between buildings 6A/6B, and of the overall condition of Building 10, are valid concerns and should be addressed as soon as possible. Stabilizing the wall and roof framing between 6A and 6B can be performed as a stand-alone project prior to other rehabilitation of these buildings. Additionally, Building 11 should not be occupied due to lateral pressures exerted by soil and snow against the north wall.

It has been a pleasure to assist you with this project. If you have any further questions about the content of this report, please feel free to contact me at your convenience.

Sincerely,

Alfred H. Hodson III, P.E.
Resurgence Engineering and Preservation, Inc.

C:\2014jobs\14-032 Portland Company Complex\0326 14-032 Portland Company Complex report.doc (pdf)
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APPENDIX A

RELATIVE STRUCTURAL CONDITION AND RELATIVE REHABILITATION COSTS RESURGENCE ENGINEERING AND BECKER STRUCTURAL ENGINEERS

APPENDIX A
Portland Company Complex – March 2015
Relative Condition and Rehabilitation Cost Comparison

BUILDING NUMBER – NAME DATE	RELATIVE STRUCTURAL CONDITON			RELATIVE REHABILITATION COST	
	BECKER	RESURGENCE /BECKER SCALE	RESURGENCE SCALE	BECKER	RESURGENCE
BUILDING 1 - ERECTING BUILDING 1918	2.0	2.5 (REPETITIVE DTLS)	P2	4.0	3.5 (REPETITIVE DTLS)
BUILDING 2 - MACHINE SHOP 1847	2.5	2.5	P2+	4.5	4.5
BUILDING 3 - MACHINE SHOP 1847	3.0	3.0	P2+	3.0	3.0
BUILDING 4 – FOUNDRY/ACETYLENE HS 1895, 1904-09	1.5	1.5	VP2	4.5	4.0 (REPETITIVE DETAILS, CUSTOM REHABILITATION)
BUILDING 6B - TANK SHOP 1896-1904	3.0	3.0	P2+	3.5	3.5
BUILDING 7 - CAR SHOP 1873,1904	2.0	1.5 (BOWED WALLS)	VP1	5.0	5.0
BUILDING 10 - PAINT SHOP 1873	1.0	1.0	VP1	4.5	4.0 (REBUILD IN KIND)
BUILDING 11 - PATTERN STOREHOUSE 1885	2.5	2.0 (NORTH WALL)	VP2	4.5	4.5
BUILDING 14 – DRAFTING ROOM AND STOREHOUSE 1858,1864	NOT INSPECTED	2.0	VP3	NOT INSPECTED	3.5
BUILDING 15/16 (NO ACCESS TO B15) BOILER HOUSE/BRASS FOUNDRY 1858, 1864	1.5	1.5	VP3	3.0	3.0
Averages of common buildings inspected (excluding Building 14)	2.11	2.06		4.06	3.89

SEE FOLLOWING PAGES FOR EXPLANATION OF BECKER STRUCTURAL ENGINEERS AND RESURGENCE ENGINEERING RATING SYSTEMS

Notes:

1. Coordinate this document with "Portland Company Complex General Building Assessment" prepared by Resurgence Engineering et al, March 2015, and "Evaluation of Existing Buildings at the Portland Company Property" prepared by Becker Structural Engineers, March 28, 2014.
2. Further discussion about relative rehabilitation costs related to these structures, by Resurgence Engineering, follows this page.

APPENDIX A
EXPLANATION OF BECKER AND RESURGENCE RATING SYSTEMS

Becker Structural Engineers' (BSE) Rating System

The **relative structural conditions** rating system used in the Becker Structural Engineers Report is shown below:

1 = Very poor/unsafe/demolition likely
2 = Very poor/salvageable with significant structural rework and investment/questionable economic viability/consider demolition
3 = Poor/requires substantial structural work to elements and systems
4 = Fair/requires nominal structural work to elements
5 = Good condition/minor structural work required

Becker's **relative rehabilitation cost rating system** is based upon structural complexity and size of building, using a scale of 1 to 5 -- 1 being relatively low costs and 5 being relatively high costs. BSE gives no specific definitions of the relative costs, simply a numerical grading system. Such an approach appears to be reasonable, given the preliminary nature of assessment that both firms were instructed to provide.

Resurgence Engineering and Preservation's (REP) Rating System

For ease of comparison, REP used the same **relative structural conditions rating system** as BSE in the summary chart. However, REP believes there is a more accurate and further defined way to classify the buildings in terms of condition. *See chart on following page for REP's proposed rating system as regards condition.*

REP has used the same **relative rehabilitation cost rating system** as BSE. The BSE report provided no specific definition of cost for each rating category.

RESURGENCE ENGINEERING RELATIVE STRUCTURAL CONDITION SCALE OF EXISTING BUILDINGS IN POOR CONDITION

BSE condition #	REP NUMBER	DESCRIPTION OF CONDITION, PRE AND POST MITIGATION	LOCAL/MAINE BUILDING EXAMPLES PRE AND POST MITIGATION
(n/a)	VP1 (very poor, not salvageable)	PRE: Immediate widespread public safety threat and site/occupant safety threat if not barricaded and structurally shored; evacuate nearby buildings, streets, sidewalks, block off parking spaces. Potential for widespread debris field in event of collapse; Building cannot be re-occupied following triggering event. POST: Condemn and demolish building.	Buildings with extensive fire damage
1	VP2 (very poor but salvageable, expensive to rehabilitate, i.e. approx.. BSE cost #4 to #5)	PRE: Immediate widespread public safety threat and site/occupant safety threat if not barricaded and structurally shored; evacuate nearby buildings, streets, sidewalks, block off parking spaces. Potential for widespread debris field in event of collapse; Building cannot be re-occupied following triggering event. POST: Building assessed, barricaded, structurally shored; nearby buildings deemed safe for return; streets, and/or sidewalks and parking spots remain blocked off. Building itself cannot be occupied after stabilization. Unsafe for rescue personnel to enter if trespassers are inside. Shored and secured structure relatively expensive, but feasible, to rehabilitate.	PRE: Norway Opera House, 2007-09 POST: Norway Opera House, 2010+
1	VP3 (very poor but salvageable, moderately expensive to rehab, i.e. BSE cost #3 to 4)	PRE: *Immediate* site/occupant safety threat and localized public safety threat if not if not barricaded and structurally shored; Block off streets, sidewalks, and parking spaces. Potential for localized debris field in event of collapse; Building can be occupied following the triggering event. POST: Building assessed, barricaded, structurally shored; nearby buildings deemed safe for return; streets, and/or sidewalks and parking spots can remain blocked off or reopened following mitigation. Building itself can be occupied.	PRE: Buildings with widespread loose façade components. i.e. Masonic Temple Localized structural failures i.e. Portland Company Complex Building 4 POST: Stabilized structures, removing loose components or installing covered sidewalk and blocked off parking spaces.
2	P1 (very poor but salvageable, less expensive to rehab; i.e. BSE cost #2)	PRE: *Likely* site/occupant safety threat and localized public safety threat if not if not barricaded and structurally shored; Block off streets, sidewalks, and parking spaces. Potential for localized debris field in event of element failure; Building can be occupied following the triggering event. POST: Building assessed, barricaded, structurally shored; nearby buildings deemed safe for return; streets, and/or sidewalks and parking spots can remain blocked off or reopened following mitigation. Building itself can be resume occupancy.	PRE: Buildings with a few loose façade components that can easily be removed or snow and ice buildup that can easily and quickly be removed, POST: Stabilized structures, removing loose components or installing covered sidewalk and blocked off parking spaces.
3	P2	PRE: *Possible* site/occupant safety threat and localized public safety threat if not if not barricaded and structurally shored; No triggering event causing distress; possible change of use makes economics questionable. POST: Rehabilitation Feasibility Study considering economics for specific buildings and structures.	PRE: Portland Company Building Complex Building #1

Most of REP's condition and cost ratings align with those of BSE. Using our own rating system, however, REP's conclusions are slightly different, especially in regards to the potential for rehabilitating buildings in distress (i.e. Buildings with a "1" to "2" condition ranking). We would not have necessarily characterized these buildings as unsalvageable, as Becker suggests. Our justification for this would be to consider the cost benefits that could be realized using historic preservation tax credit incentives, along with the added flexibility afforded historic structures under the IEBC. Tax credit incentives could offset the costs of more custom-designed engineering and building envelope rehabilitation solutions. They would also offset the cost of higher-quality, longer lasting building materials necessary for the marine climate.

Our primary departures from BSE exist in Building 1, Building 4, Building 7, Building 10, and Building 11. We downgraded the relative structural condition of Building 7 and Building 11, while we upgraded the relative structural condition of Building 1. We lowered the relative rehabilitation costs of Building 1, Building 4, and Building 10. The paragraphs that follow explain the reason for our departure at each building.

For Building 1 we believe that the more recent construction date (1918), combined with the repetitive nature of the building elements, can allow for a slightly less expensive rehabilitation than indicated in the BSE report.

Building 4 could yield a relatively less expensive rehabilitation if a customized approach to reframing the edge columns and rebuilding the masonry could be achieved economically. Such an approach would have to be understood and approved in advance by the National Park Service if tax credits were desired on this building project. If historic preservation tax credits can be used on this project using a different approach to reframing the edge columns and rebuilding the masonry, while strengthening the existing structure, we disagree that this building is a likely candidate for demolition.

In our opinion, the condition of Building 7 is slightly worse than considered in the BSE report, because of the poor condition of the loadbearing masonry at the north elevation. We concur with the relative rehabilitation costs for the building.

We depart from the BSE cost condition assessment of Building 10, only in the sense that it may make the most economic sense to demolish the existing structure.

The compromised north wall at Building 11 necessitates downgrading its condition from 2.5 to 2.0 in comparison to the BSE report. We recommend that the building remain unoccupied until the north wall is stabilized. Demolition of this structure may be warranted pending further understanding of the roof framing and first floor framing conditions.

As stated in the BSE report, immediate safety concerns need to be addressed, whether as isolated repairs (Building 6A/6B common wall and truss) or comprehensive measures (vacancy of Building 11).

Basis for Cost Opinion Conclusions for Each Building

Building 1 - Erecting Building, c.1918

Relative rehabilitation costs for this structure and building envelope are based primarily upon the fact that the structure is repetitive in construction technique, offset by the likely reconstruction of the front masonry (west) wall. The staging and access cost required to perform clerestory rehabilitation from interior and exterior will be an increasing cost factor in building rehabilitation. A significant amount of steel-framed window glazing would require repair or replacement. Since this is the most recent building in the study, existing steel materials may be of higher quality and some understanding of snow loading requirements was incorporated into the design.

Building 2 – Machine Shop, c.1847

This building, the most structurally complicated and tallest within the buildings studied, would likely cost the most to rehabilitate, but could present the greatest risk/reward. The structure itself will likely take the most time to thoroughly assess from a structural and building envelope standpoint, given the number of changes that occurred over the years and the addition of the third floor. The large wooden windows on the first and second floors would be very labor intensive to rehabilitate, given the large number of individual panes. Third floor windows might not be as expensive to rehabilitate or replace, because they may have been 2:2 light sash, which were common in the early 20th century. A well thought-out temporary shoring plan is necessary to tie the cantilevered third-floor framing further back into the existing building. Third floor cladding, though high up, could be replaced relatively simply. At approximately 45 feet high and three stories, this building will be subjected to the greatest wind and seismic forces of all the buildings studied.

Building 3 – Machine Shop, c.1847

Building 3 is the second most structurally complicated building within the complex, but is not as relatively expensive to rehabilitate as Building 2. The additional floor support structure is less complicated than Building 2, lacking the cantilever framing existing at that neighboring building. The second floor also provides interior access to the much smaller clerestory, facilitating any structural work required there. The smaller overall footprint and lower percentage of glazing helps contain rehabilitation costs.

Building 4 – Foundry, c.1895

The Foundry rehabilitation work likely involves wholesale rethinking of the structure and building envelope along the exterior walls. Structural upgrades and replacement of an existing structural system that was improper for its marine, cold-weather climate may actually simplify the rehabilitation by permitting a complete column removal and replacement with contemporary steel columns, not exposed to the exterior elements. However, this more significant structural change may require the longest lead time to confirm whether the structure and building envelope modifications would be eligible to receive historic tax credits.

Building 6B – Tank Shop, c.1896-1904

Tank Shop rehabilitation is simplified because of its relatively short height, simple gable roof, and relatively small windows. Added longitudinal roof bracing can support the intermediate roof purlins between trusses and stiffen the roof against wind and seismic forces. The low roof height will likely keep the building from experiencing significant wind load increases due to height. Each one of the trusses will require further inspection, nondestructive testing and/or invasive inspection to confirm that end bearing conditions are structurally sound.

Building 7 – Car Shop, c. 1873, 1904

Although the Car Shop is a single-story structure, rehabilitation becomes complicated and more costly due to the overall poor condition and insufficient depth of the roof framing and because of the poor condition of the existing exterior masonry. The existing roof framing has such a low slope that it likely has permanent deflection "set", which will complicate efforts to strengthen the framing by sistering. Significant roof leaks in the structure have likely rotted sheathing and possibly framing, in more areas than are visible due to penetrating sunlight. The windows are not large or great in area relative to the total façade area, which would diminish the rehabilitation costs somewhat. However, the existing loadbearing masonry would likely require complete rebuilding because it is in such poor condition.

Building 10 – Paint Shop, c. 1873

Originally isolated by the remaining structures for safety purposes, the paint shop stands alone as the most significantly altered structure in the worst overall condition. Building rehabilitation is hard to justify, given the small size and poor condition. Rebuilding the structure to resemble the original during the site's period of significance, in conformance with contemporary codes, would be a more straightforward option, despite the likely required foundation upgrades.

Building 11 – Pattern Storehouse, c. 1885

The Pattern Storehouse carries with it the greatest uncertainty about rehabilitation costs. It is the only building studied that has a wood-framed first floor situated over an earthen crawl space, and it is the only structure that had the majority of its roof framing concealed by ceilings. The low-slope roof, pitching partially toward Building 12, creates drift conditions and roof runoff that are detrimental to both buildings.

Building 14 – Drafting Room and Storehouse, c. 1858-64

Tucked in between buttresses of the Fore Street retaining wall, Building 14, like the Boiler House and Brass Foundry to the immediate north, contains relatively limited floor space in a structure that is practically unique. The existing timber frame purlin and rafter system needs to be carefully assessed near the peak, as that area is vulnerable to condensation and leakage due to snow buildup and insufficient insulation.

Building 15/16 – Boiler House and Brass Foundry c.1858, 1864

We did not enter Building 15, but the visible condition of the second floor framing means the structure would likely need to be rebuilt. Building 16, the Brass Foundry, requires several of the same structural assessments and likely upgrades that Building 14 requires, as well as the rehabilitation of the small south façade.

APPENDIX B

PHOTOGRAPHS

APPENDIX C

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ATTACHMENT 4

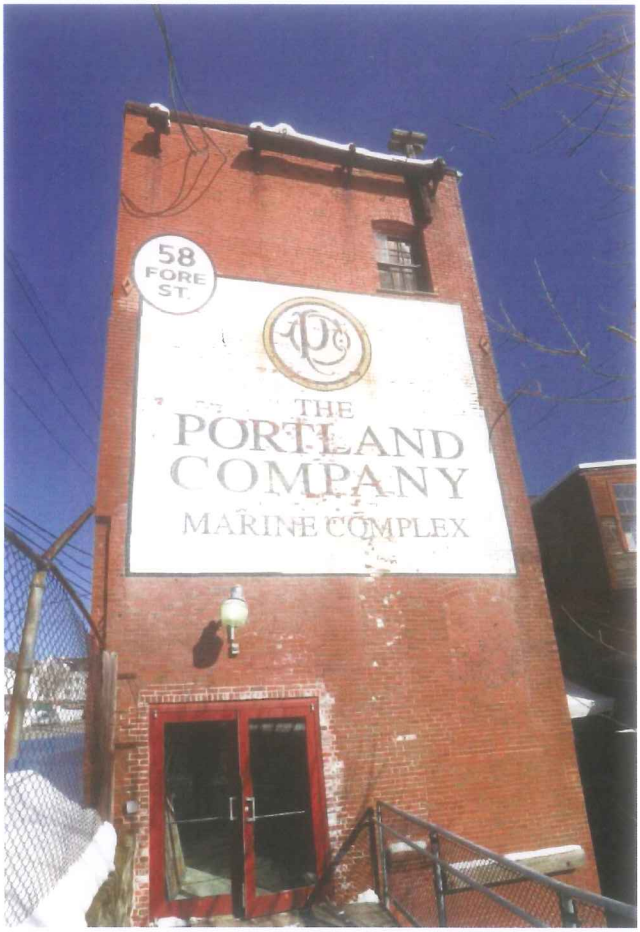
Evaluation of Existing Buildings
at the

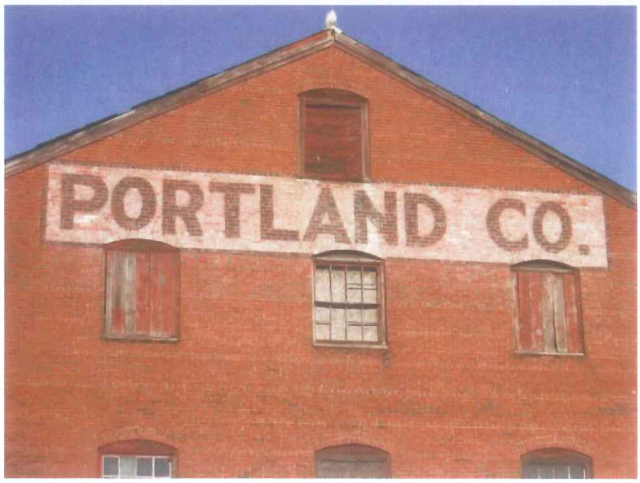
Portland Company Property

58 Fore Street
Portland, Maine

March 28, 2014

Prepared for:
CPB2 Management LLC
Portland Maine





STATE OF MAINE
PAUL B.
BECKER
NO. 6554
LICENSED
PROFESSIONAL ENGINEER

3.28.14

Prepared by:
BECKER
STRUCTURAL ENGINEERS

Book 1 of 2

Evaluation of Existing Buildings at the Portland Company Property
58 Fore Street, Portland, Maine
March 28, 2014

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Book 1

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Book 2

Appendix A – Building Drawings

BECKER
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BECKER
STRUCTURAL ENGINEERS

March 28, 2014

CPB2 Management LLC
P. O. Box 7519
Portland, Maine 04112
Attn: Kevin Costello

The Portland Company
58 Fore Street
Portland, Maine

Dear Kevin:

Per our agreement, Becker Structural Engineers, Inc. performed a review of the buildings associated with the property at the Portland Company complex located at 58 Fore Street in Portland, Maine. We visually reviewed the building exteriors and interior spaces that were reasonably accessible to provide CPB2 with a general understanding of the condition of the existing buildings on the property.

Structural Code Overview

The City of Portland, Maine enforces the Maine Uniform Building and Energy Code (MUBEC) which is an amended version of the 2009 Edition International Code Series prepared and published by the International Code Council (ICC). The International Existing Building Code (IEBC) specifically governs existing construction.

In considering the structural impacts of the redevelopment of the Portland Company property, the chapters of the IEBC discussing Repairs (Chapter 5), Alterations (Chapters 6 to 8), Change of Occupancy (Chapter 9), Additions (Chapter 10), and Historic Buildings (Chapter 11) will need to be addressed if the buildings are to be maintained in the redevelopment plan. Likely impacts of these code sections are discussed below.

Repairs (IEBC Chapter 5)

Due to the observed condition of the buildings at the Portland Company, we anticipate that of repairs will be necessary in all of the buildings. Certain conditions that can be considered dangerous were observed as part of our field investigation, and are detailed later in this report. IEBC requires that dangerous conditions shall be remedied. Repairs are permitted to be made with any material permitted by current code. In most cases repairs are permitted to be made so as to restore the elements to pre-damaged conditions. In the case of substantial structural damage, defined by a 20 percent reduction or greater in critical elements, the repair must meet the requirements of the International Building Code which governs new construction.

Alterations (IBC Chapters 6 to 8)

We anticipate that building alternations may be desired as part of the redevelopment of the Portland Company property. The IBC defines three levels of alteration. Since each redeveloped building will likely encompass a total building work area of more than 50 percent of the building aggregate area, the alterations will be defined as a Level 3 Alteration. Note that the IEBC requirements for alterations are cumulative, and a Level 3 Alteration will be required to meet the requirements of Level 1 & 2 Alterations. Critical components are as follows:

- New Elements: New structural elements are required to meet the requirements of the International Building Code governing new construction (reference IEBC Section 707.2).
- Gravity Modifications: With some code exceptions, alteration shall not reduce the capacity of the existing load capacity of gravity load carrying elements more than 5 percent of their current capacity and loads shall not be increased by more than 5 percent on existing structure members (reference IEBC 707.4). We anticipate that re-roofing will be necessary and that the addition of insulation will likely be required as part of the State Energy Code. The addition of insulation will increase snow loading on roofs and will require that roofs be analyzed for current snow loads which will likely lead to structural strengthing. In addition, several of the structures have high-low roof conditions which introduce snow drifting from aerodynamic shade. In our experience, building design of this era did not consider these drifting loads and thus we anticipate that roof reinforcing will likely be required in these conditions.
- Lateral Load Force Resisting System: The evaluation of the structure for the resistance of wind and seismic loads per the IEBC requires an evaluation of the lateral load resisting system. The level to which the building will require upgrading is determined by the level to which the structure is involved with the alteration. Where more than 30 percent of the total floor and roof area of the building is involved in structural alterations, the altered building must comply with IBC 2009 for wind loads and 75 percent of IBC 2009 for seismic forces. Below the 30 percent structural alteration threshold, the overall system only needs to meet the requirements from the time of original construction, but if alterations increase the stresses by more than 10 percent in a component or element, then the component or element must be upgraded to IBC 2009 wind forces or reduced seismic forces. In general, if wall sections are to be removed or if dead weight is added to the building as part of the redevelopment, the stresses in the existing lateral load resisting system will need to be evaluated. If the resulting stresses as a result of the redevelopment increase by greater than 10 percent then upgrades will be required.

Change of Occupancy (IEBC Chapter 9)

If maintained as part of the redevelopment, the existing buildings at the Portland Company property will be utilized in a different manner than their current use as industrial buildings. The structural portion of the building code defines four occupancy categories, the least stringent being assigned to agricultural and minor storage buildings, and the most stringent being assigned to facilities considered to be essential such as emergency response facilities and hospitals. Based on our code review the current use of these buildings would be assigned to Occupancy Category II which is the default category. We anticipate that the future use of these buildings will be of the same category, and thus the anticipated work will likely not trigger modifications or upgrades per this chapter. The exception would be in the case where a building may be used as an assembly space, education facility or medical facility. In these cases upgrades to the building's lateral load resisting system and roof structure to support snow loadings would be required.

Additions (IEBC Chapter 10)

If additions are part of the redevelopment at the Portland Company, they will be governed by Chapter 10 of the IEBC. Additions must comply with the International Building Code for new construction. If an addition is tied to or built on top of an existing building, then all or a portion of the existing building must meet the requirements of the International Building Code for new

construction. Due to the age and construction of the existing buildings it is unlikely that additions tied to the existing building can be considered without significant structural system upgrades. Thus in our experience it is generally more cost effective to keep additions structurally independent of existing building structures. This would include floor mezzanines within an existing building.

Historic Structures (IEBC Chapter 11)

Understanding the age and history of the buildings at the Portland Company, the provisions of Chapter 11 of the IEBC may apply. Historic buildings must comply with the other sections of the IEBC, except that at the discretion of the local building code official certain exceptions may be permitted. Specifically, a floor not meeting live loading requirements may be accepted provided operational controls are put in place to limit occupancy or access. Additionally, repairs to dangerous conditions may be repaired only such that the specific component or portion need be repaired rather than the entire assembly.

Additional Considerations and Limitations

Our review of the buildings within the Portland Company Complex is limited to the structural systems. Other requirements building code requirements, including but not by limitation, egress, accessibility, flooding, ventilation, fire safety and energy code requirements will need to be addressed as part of redevelopment plans. Also note our review was limited to conditions that were readily visible and accessible. There were spaces that were not safe to access as part of our review. No formal structural analysis was performed as part of this work, and material testing was not performed.

Immediate Safety Concerns

In reviewing the buildings at on the Portland Company property, we identified the following safety concerns:

Building 6A/6B: The east wall of Building 6A is supported by a timber truss at the first floor level. The truss end at the south bearing condition was found to be severely deteriorated and is considered unsafe. Temporary shoring is recommended until such time that permanent repairs can be made.

Building 10: Building 10 exterior masonry walls are severely distress and it unclear if brick wythes are still bonded together. Interior or exterior wall facing could peel off without warning. There is evidence of creep deflection at roof and concerns over ponding roof loads. It is recommended that this building not be occupied.

Building Review Notes

The following pages summarize the observed structural condition of the building in the Portland Company complex. To aid the reader we have assigned a number rating between 1 and 5 to each building. The intent is to provide within that number a summary of its structural condition with 1 representing a very poor/unsafe condition and 5 representing a good structural condition. This rating is based on our visual observation and professional opinion of costs to repair, stabilize and remediate the structural issues noted.

A more specific description of the structural rating system is as follows:

1. Very poor/unsafe/demolition likely
2. Very poor/salvageable with significant structural rework and investment/questionable economic viability/consider demolition
3. Poor/requires substantial structural work to elements & systems
4. Fair/requires nominal structural work to elements
5. Good Condition/minor structural work required.

We have also assigned a relative structural renovation cost index to each building in an effort to quantify what a renovation may cost. The cost rating on a similar scale, with 1 representing the least cost to renovate and 5 representing a major reconstruction. Note the cost rating is scaled to the size of the building in addition to the complexity of the repair.

1 = least $ ⟷ 5 = highest $

Included on the following pages are high level review notes for the buildings on the Portland Company property. A more detailed review including structural analysis can be completed if requested.

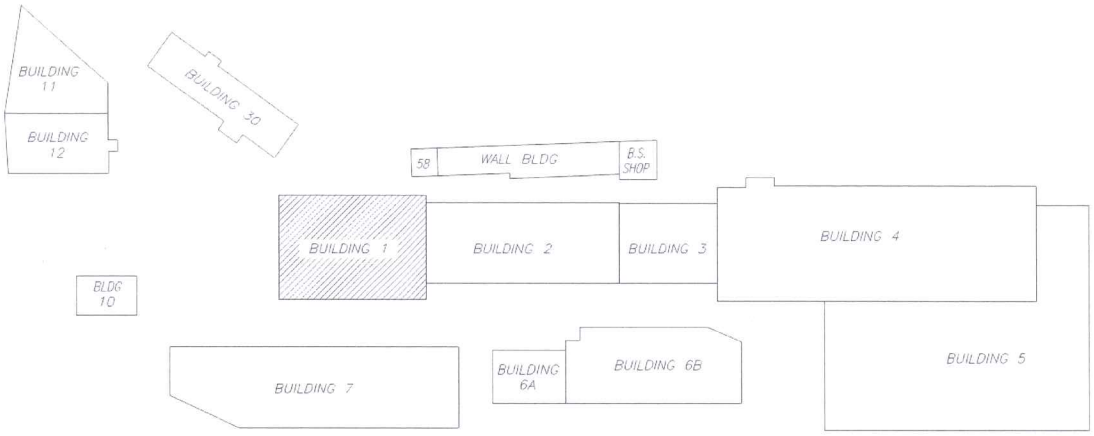
We trust this information meets your needs at this time. If you have any questions, please feel free to contact us at any time.

Sincerely,
BECKER STRUCTURAL ENGINEERS, Inc.

Paul B. Becker, P. E.
President

Ethan A. Rhile, P. E.
Associate

Building Number: 01



Location Plan

Description, Condition and Assessment:

- Building 1 features a central, longitudinal clerestory high bay space with low "saddle bag" roofs to each side (Photo 1-1).
- The high bay space has bridge crane rails with dual bridge & trolley systems.
- High bay is a steel frame with bridge crane girders at elevation of low "saddle bag" roofs. High bay is framed with clear span steel trusses and decked with wood board sheathing.
- Low roofs are framed with steel beams and girders, and decked with wood board sheathing.
- Low bay exterior walls are multi-wythe unreinforced brick masonry bearing walls.
- The steel frame high roof structure is likely not rated for snow loadings and the low bay roofs are likely not designed for snow drifting due to the high-low roof condition. Both conditions will likely cause overstresses in framing and decks.
- Wood plank roof decking was rotting in several locations, particularly at eaves due to leaking roofs (Photo 1-2). In general, roof appears to have leaks throughout. Wood deck not effective as diaphragm to transfer lateral loads.
- Wooden roof eaves with missing pieces and rot.
- Masonry piers along south elevation had large vertical cracks, likely a result of thermal stresses in the brick and discontinuity of steel lintels. Steel lintel framing over large windows cause disruption of brick piers and cause structural instability of piers with a hinge type condition. Crack allows water infiltration which causes further structural damage (Photo 1-4).
- The lintel flanges exposed over windows at the exterior are rusted with expansion causing rotation and masonry damage.
- Windows are archaic with steel frames, single pane glazing, no thermal break, poor glazing seals, broken panes and corrosion.
- Concrete window sills are spalled and cracked with exposed reinforcing in many locations.
- Many brick masonry joints have missing mortar, particularly at eave drip line below window sills. Moss was noted to be growing in masonry joints at and above the pavement

line. Masonry also has wide spread areas of distress including loose and missing mortar, cracks and spalls. (Photo 1-3)

- South high bay windows have been covered with opaque corrugate panels indicating poor condition.
- South low roof appears to have been overframed to enhance slope.
- Upper roof appears to be an out of date tar and chip roof.
- No definable lateral load resisting system in either principal direction.
    - Limited frame action in high bay of transverse direction. Offset column splices at low/high roof transition and crane girder create a stiffness discontinuity (Photo 1-5).
    - No method to transfer clerestory loads to lower level in longitudinal direction.
    - End wall and side walls have large openings; unreinforced masonry bearing walls known to have poor performance in seismic events.
    - Wood diaphragms likely inadequate to transfer diaphragm shears to exterior walls.

Anticipated Structural Outcomes for Renovation/Restoration:

- Replace roof decking with metal deck along with new roofing and insulation. Establish diaphragm connections to existing walls.
- Reinforce roof to meet snow loading requirements.
- Introduce lateral load resisting system with wall shotcrete or steel frame.
- Repair exterior masonry and rebuild certain areas as required. Extensive rebuilding will be necessary to address cracked masonry pier conditions. Clean masonry.

Structural Condition Rating	*2.0*
Structural Renovation Cost Rating	*4.0*

Rating Justification:
All major structural systems are affected in a renovation. Exterior masonry piers have major vertical cracks. Steel lintels create a hinge condition in exterior masonry piers and therefore their stability is questionable. End bay has large masonry openings that are not original to construction and seismic performance of system is very questionable. Rehabilitation of open one story space would have high unit costs considering necessary investment in structure verse net usable space.

Photo 1-1: General View, Building 1

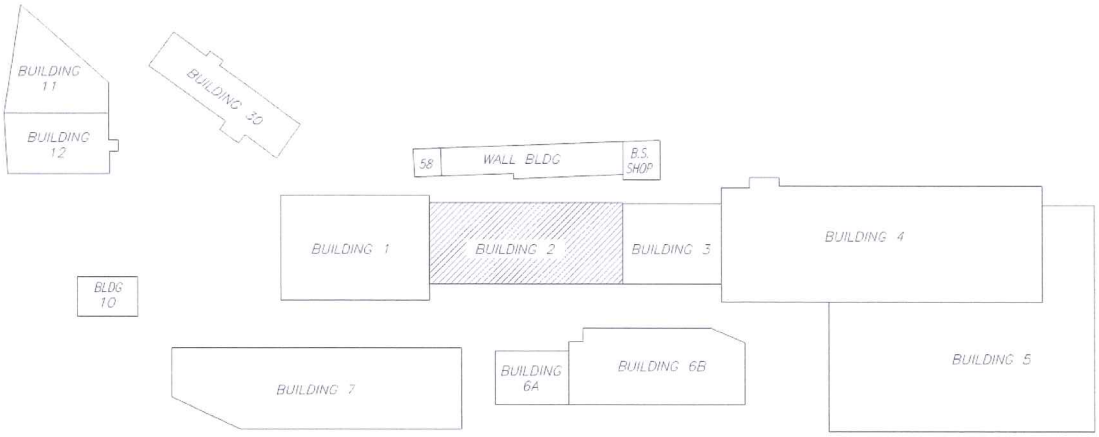
Photo 1-2: Wood deck condition at eave.

Photo 1-3: Building 1 at eave drip line. Note sill condition, window condition, moss and missing mortar.

Photo 1-4: Vertical brick masonry crack at southwest pilaster.

Photo 1-5: Column discontinuity at low-high roof condition.

Building Number: 02



Location Plan

Description, Condition and Assessment:

- Building 2 features open bay ground floor, second floor hung from timber trusses/loft area above (Photo 2-1). Loft area has overhanging shed roof structure that appears to been added after the original construction. Exterior brick masonry walls are load bearing.
- Several timber posts have been added between the ground floor and second floor for supplemental support. Hanger rods from above were removed in several locations and it is likely these posts were provided to supplement the structure (Photo 2-2).
- Second floor and loft show evidence of significant permanent creep deflection.
- Queen and king post trusses rods, steel beams and other methodology have been utilized to supplement the second floor framing in an inconsistent manner (Photo 2-2).
- Modified hangers were noted extending from the loft trusses to the second floor framing.
- At the roof and loft level, charring and fire damage of truss members and wood decking was noted. Several members had substantial charring damage (Photo 2-3).
- Evidence of roof leaking was prevalent.
- At the trusses, broken truss cast iron hanger saddles were noted in several locations (Photo 2-4).
- At the trusses, separation at member compression joints was noted suggesting overstresses and/or broken connection (Photo 2-5).
- A double truss diagonal was replaced with a single, undersized diagonal in one location.
- The roof rafters appeared undersized by current standards.
- The loft overhangs appear to have an insufficient back span on cantilever members.
- Exterior asphalt siding of loft overhangs is in poor condition with large area missing. Windows are covered with plywood panels. Underside of overhang appears to be covered with metal corrugated panels. Some panels appear loose.
- Exterior masonry has open joints and wide spread areas of distress including missing mortar and missing bricks.
- Windows are archaic with wood frame double hung sashes, single pane glazing, no thermal break, and poor glazing seals. Some windows have been replaced.
- Windows in loft area covered with plywood.
- Granite windows sills cracked in several locations.

- Loft level is sided with asphalt shingle siding. Siding in poor condition with pieces falling off.
- No definable lateral load resisting system in either principal direction.
    - Open space with no cross walls in transverse direction.
    - Wood diaphragms likely inadequate to transfer diaphragm shears to exterior walls.

Anticipated Structural Outcomes for Renovation/Restoration:

- Reinforce roof rafters to meet snow loading requirements.
- Reinforce and repair timber roof trusses to address charring, broken and ineffective connections.
- Introduce lateral load resisting system with wall shotcrete or steel frame.
- Reinforce floor sheathing and establish diaphragm connections at second floor and loft level.
- Level and strengthen floors with new vertical load carrying elements and isolated horizontal framing.
- Repair exterior masonry and rebuild certain areas as required. Clean masonry.
- Remove loft cantilevers and restore historic dormer framing and detailing.
- Introduce permanent columns at lower level to relieve truss loads.

Structural Condition Rating	*2.5*
Structural Renovation Cost Rating	*4.5*

Rating Justification:
Existing roof trusses have broken hanger connections, separated joints and some fire damage. Hanger rods extending to from the roof to the second floor structure have been removed. Re-establishment of load paths is necessary to correct these conditions and will require extensive rework including the establishment of alternate load paths. Loft overhangs will likely be replaced with dormer to match historic conditions which will require extensive reframing. Exterior masonry is in need of wide repointing. Structural repair/alteration cost is high, but costs are distributed over a large area reducing unit costs. Basic "bones" of building are good. It has a permanent "set" to many floors and framing members, and appears to have been heavily loaded in its lifetime and yet remains structural "significant". There is much to work with.

Photo 2-1: Building 2 exterior south elevation.

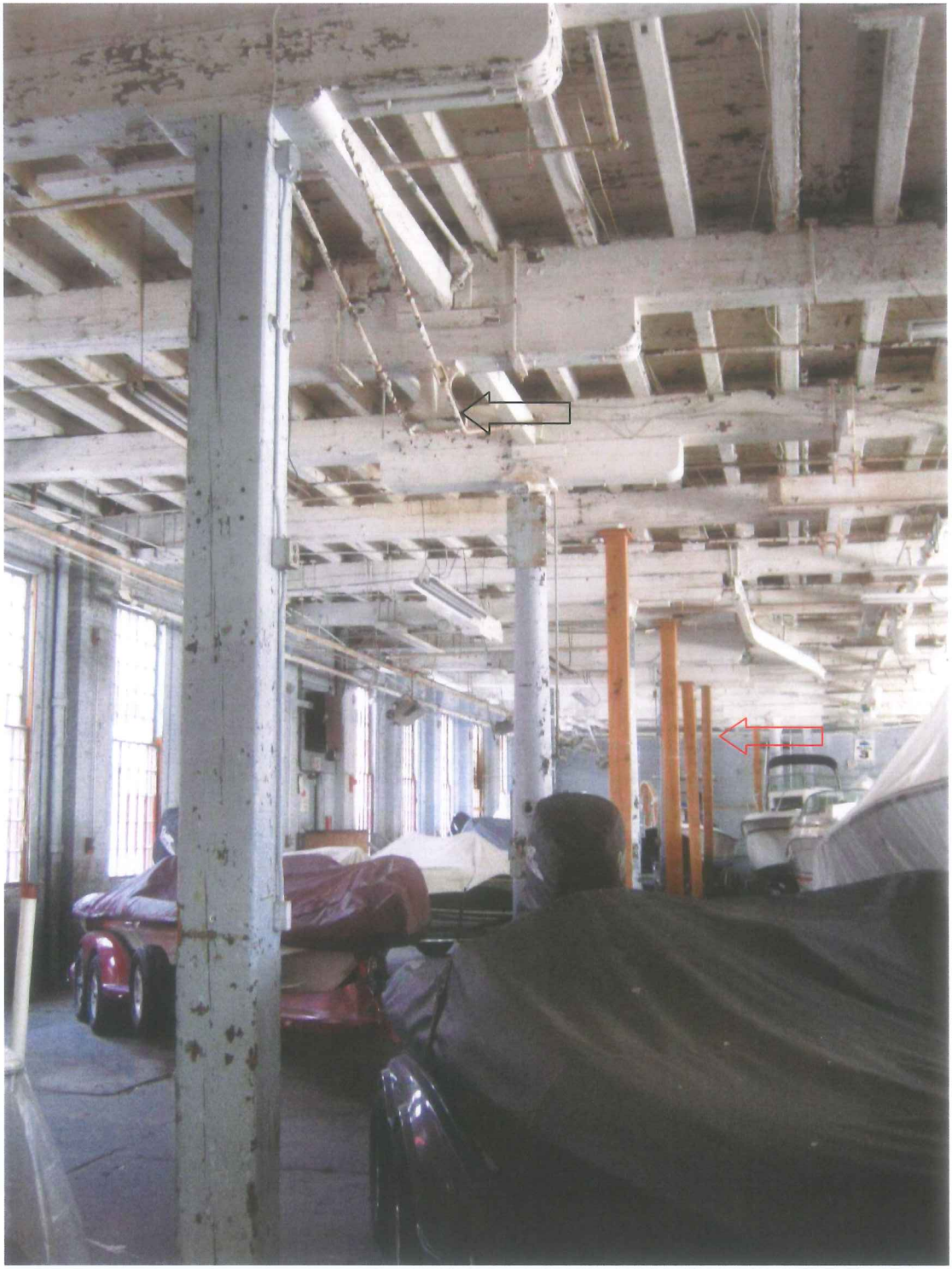


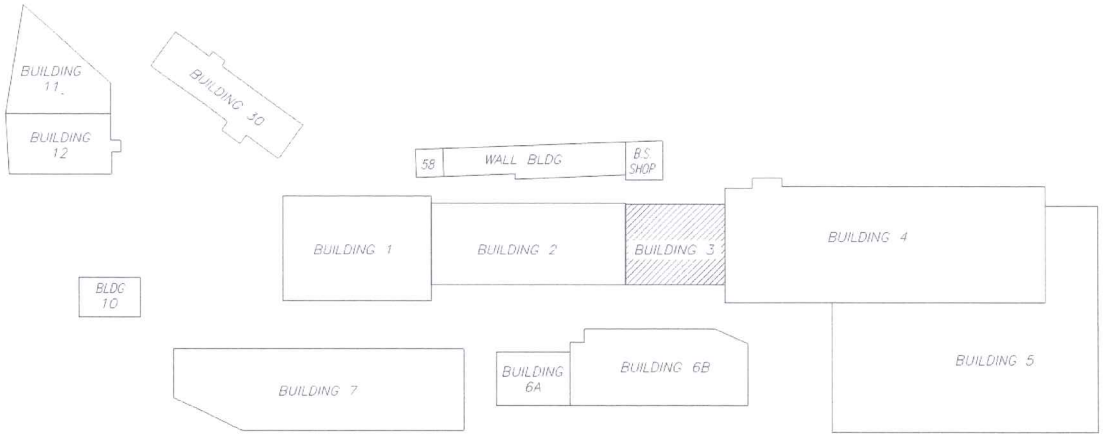
Photo 2-2: Interior photo, building 2 taken from the ground floor. Note added posts, king post truss.

Photo 2-3: Charring of truss top chord.

Photo 2-4: Broken truss hanger saddle hanger.

Photo 2-5: Timber truss joint separation.

Building Number: 03



Location Plan

Description, Condition and Assessment:

- Building 3 is two stories with a flat roof with a center bay popup. Second floor is constructed with timber queen post trusses with intermediate timber support posts. Exterior brick masonry walls are load bearing.
- Several timber posts have been added between the ground floor and second floor for supplemental support. Hanger rods from above were removed in some locations and it is likely these posts were provided to supplement the structure (Photo 3-2).
- Second floor show evidence of permanent creep deflection.
- A steel "T" column was added in one location presumably to eliminate an interference. Unbalanced loading on the cantilevered ends of the "T" beam may not be rationally stable (Photo 3-2).
- Evidence of roof leaking was prevalent.
- Shrink wrap covered "shed" area is located on high roof.
- The roof rafters appeared undersized by current standards.
- Wooden arch trim and window trim loose and rotting in several locations.
- Wooden eave trim missing in some locations.
- Exterior masonry has open joints and wide spread areas of distress. We noted vegetation on corbelled bricks, loose bricks, loose and missing mortar.
- Windows are archaic with wood frame double hung, single pane glazing, no thermal break, and poor glazing seals. Some windows have been replaced.
- Exterior unreinforced masonry walls are the lateral system of the building.
    - Open space with no cross walls in transverse direction.
    - unreinforced masonry bearing walls known to have poor performance in seismic events.
    - Wood diaphragms likely inadequate to transfer diaphragm shears to exterior walls.

Anticipated Structural Outcomes for Restoration:

- Reinforce roof rafters to meet snow loading requirements.
- Introduce lateral load resisting system with wall shotcrete or steel frame.

- Reinforce floor sheathing and establish diaphragm connections at second floor and loft level.
- Level and strengthen floors with new vertical load carrying elements and isolated horizontal framing.
- Repair exterior masonry and rebuild certain areas as required. Clean masonry.

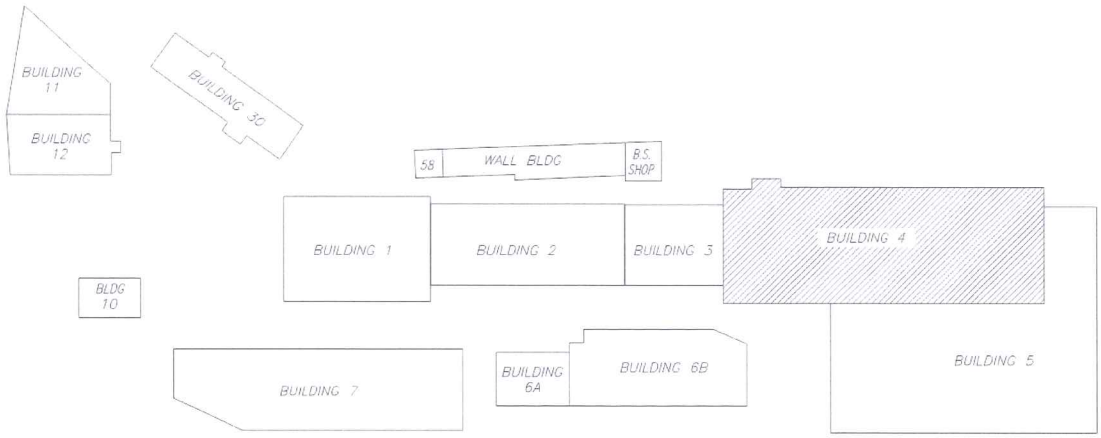
Structural Condition Rating	*3.0*
Structural Renovation Cost Rating	*3.0*

Rating Justification:
Leveling and strengthening of floors will require extensive re-work of floor framing. Roof framing will require reinforcing throughout the roof for strengthening to meet IBC snow loading requirements. Exterior masonry is in need of wide spread repointing/repair. Building has no "deal breakers".

Photo 3-1: Exterior view of Building 3

Photo 3-2: Interior view of Building 3. Note supplemental post, "T" column, queen post trusses.

Building Number: 04



Location Plan

Description, Condition and Assessment:

- Building 4 features a central, longitudinal double clerestory high bay space with low "saddle bag" roofs to each side [configuration similar to building 1] (Photo 4-1 & 4-2).
- The high bay space has bridge crane.
- High bay is a steel frame with bridge crane girders at elevation of low roofs. High bay is framed with clear span steel trusses and decked with wood board sheathing (Photo 4-3).
- Low roofs are framed with steel trusses, and decked with wood board sheathing.
- Exterior lattice steel columns were intended to support low roofs at exterior brick walls. In most instances, the steel lattice columns are corroded at ground level to the point that the columns are no longer effective and the only remaining support is the exterior masonry wall (Photos 4-4 & 4-5). Relying on a secondary load such as these unreinforced brick infill walls is not structural sound. Shoring of building exterior steel frame where columns are deteriorated is advised.
- Low bay exterior walls are multi-wythe unreinforced brick masonry, originally intended as non-loadbearing infill between steel columns.
- The steel frame high roof structure is likely not rated for snow loadings and the low bay roofs are likely not designed for snow drifting due to the high-low roof condition. Both conditions will likely cause overstresses in framing and decks.
- Wood plank roof decking was rotting in several locations, particularly at eaves due to leaking roofs (Photo 4-2). In general, roof appears to have leaks throughout. Wood deck not effective diaphragm to transfer lateral loads.
- Wood window trim with missing and rotten pieces.
- Siding at high bay area covered with an asphalt roofing material appears in poor condition.
- Windows are archaic with wood frames, single pane glazing, no thermal break, and poor glazing seals.
- Wood window sills rotting and in poor condition.
- Concrete window sills are spalled and cracked in many locations.
- Masonry also has wide spread areas of distress. Many open joints, spalls and cracked bricks and diagonal cracking are noted, particularly at base of building (Photo 4-5).
- No definable lateral load resisting system in either principal direction.

- Limited frame action in high bay of transverse direction. Compromised exterior columns render frame action ineffective.
- Trussing of clerestory in longitudinal direction provides method of transferring high roof shears to low roof. Resolution of this shear to the exterior masonry walls would require transfer across wood, board sheathed diaphragm and this diaphragm is likely ineffective.

Anticipated Structural Outcomes for Restoration:

- Lattice columns are compromised and will require complete replacement if structure is to be maintained. Replacement would require substantial reconfiguration of exterior wall system in order to remove and replace existing columns.
- Replace roof decking with metal deck along with new roofing and insulation. Establish diaphragm connections to existing walls.
- Reinforce roof to meet snow loading requirements.
- Introduce lateral load resisting system with wall shotcrete or steel frame.
- Repair exterior masonry and rebuild certain areas as required. Extensive rebuilding will be necessary to address deteriorated steel columns. Clean masonry.

Structural Condition Rating	*1.5*
Structural Renovation Cost Rating	*4.5*

Rating Justification:
In order to repair exterior severely corroded columns embedded in exterior masonry walls, the entire exterior masonry façade will need to be deconstructed, the columns repaired and the exterior masonry reconstructed. Many of the original relic bricks will likely be destroyed in this process. If original foundation is to be reutilized, façade will need to be reconfigured to protect columns from corrosion. Given the large open volume of this building, the required structural repairs identified in the above sections have a high unit cost.

Photo 4-1: Exterior of Building 4. Note a majority of the south and east faces of the building are wrapped by Building 5.

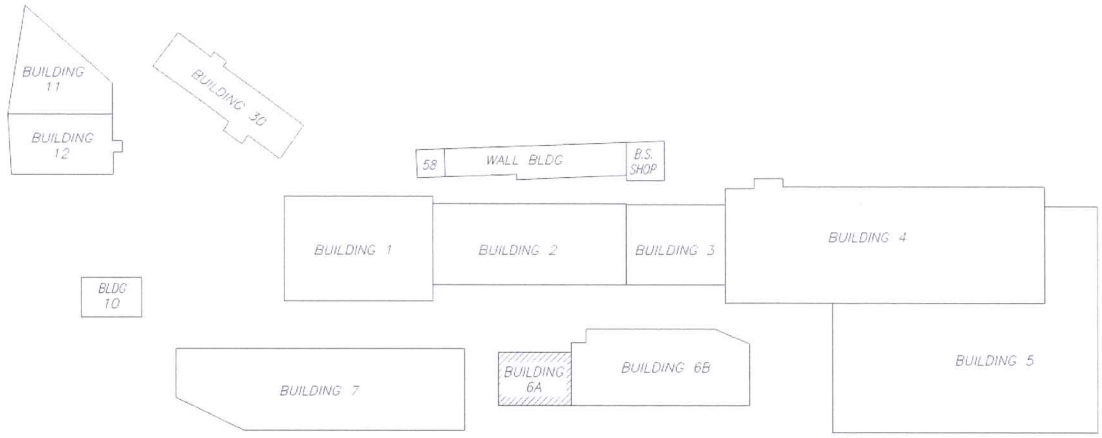
Photo 4-2: Exterior of Building 4, North Side.

Photo 4-3: View of Building 4 interior looking east. Note plastic leak catch.

Photo 4-4: Column at exterior wall embedded in masonry. Note column section completely deteriorated.

Photo 4-5: Column at exterior wall embedded in masonry. Note column section completely deteriorated. Also note open masonry joints, cracked bricks.

Building Number: 6A



Location Plan

Description, Condition and Assessment:

- Building 6A is a 3-story building with centerline timber beam and column line supporting rough sawn floor and roof joists. Exterior walls are load bearing multiwythe brick masonry. Note first floor open space that is part of Building 6B extends below building 6A (Photo 6A-1).
- Floors have slope to center beam bearing line. It is suspected that the center bearing line has either settled or timber column bases have deteriorated (Photo 6A-2). Timber column bases were surrounded by a concrete slab-on-grade and could not be observed.
- The east wall of Building 6A is supported by a timber truss at the first floor level. The truss end at the south bearing condition was found to be severely deteriorated and is considered unsafe. Temporary shoring is recommended until such time that permanent repairs can be made.
- Several floor joists have longitudinal splitting and may have been overstressed (Photo 6A-3 & 4).
- Visual evidence of prior leaking was visible at the roof level, but leaks did not appear to be active (Photo 6A-5).
- Some roof rafters appeared to be out of plumb. Stabilization means to prevent rotation such as wood blocking was not present (Photo 6A-5).
- Masonry also has wide spread areas of distress. Areas of missing mortar, areas of bulging noted. Southeast corner appears to have been repaired from either a drainage issue or a vehicle impact. Open joints noted in various locations particularly at window heads. Spalled bricks were noted. Moss was noted to be growing in masonry joints at and above the pavement line (Photo 6A-6).
- Rotting wood noted at window sills and at roof eaves (6A-6).
- First and third floor windows constructed of wood and are in poor conditions. Replacement windows noted at second floor.
- Elevator shaft present, but elevator removed.
- Lateral Load Resisting System relies on un-reinforced exterior masonry walls.
    - Unreinforced masonry bearing walls known to have poor performance in seismic events.

- The east wall of building 6A appears to be wood framed and bears on a truss above the first floor level and does not extend to the ground floor. This results in a stiffness discontinuity for the lateral force resisting system which may amplify seismic loads in other portions of the system.

Anticipated Structural Outcomes for Restoration:

- Center bearing foundations may require rework; additional investigation will be required to understand cause of column settlement.
- Lateral load resisting system will require retrofit to address stiffness discontinuity. Introduce lateral load resisting system with wall shotcrete or steel frame.
- Repair exterior masonry including repointing, rebuilding bulged areas, cleaning.
- Replace first and third floor windows.
- Replace wood elements and repaint.

Structural Condition Rating	*3.5*
Structural Renovation Cost Rating	*3.0*

Rating Justification:
Basic building structure was well built and is in fair condition. Building masonry will require repairs and rebuilding in several locations, but extent is limited. Upgrades in roof insulation will likely require an upgrade of the roof structure to support additional snow load, but this is very accessible and of limited area. Unsafe condition of building east wall/truss will require shoring and repair. Foundation work inside an existing building, if required, will add to cost. An elevator may need to be added and shaft may need to be expanded to support elevator of sufficient size per current IBC and Maine State requirements. Nature of upgrades is not daunting.

Photo 6A-1: Building 6A exterior view.

Photo 6A-2: General view of center bearing line of Building 6A at second floor level.

Photo 6A-3: Floor joist splitting.

Photo 6A-4: Floor joist splitting.

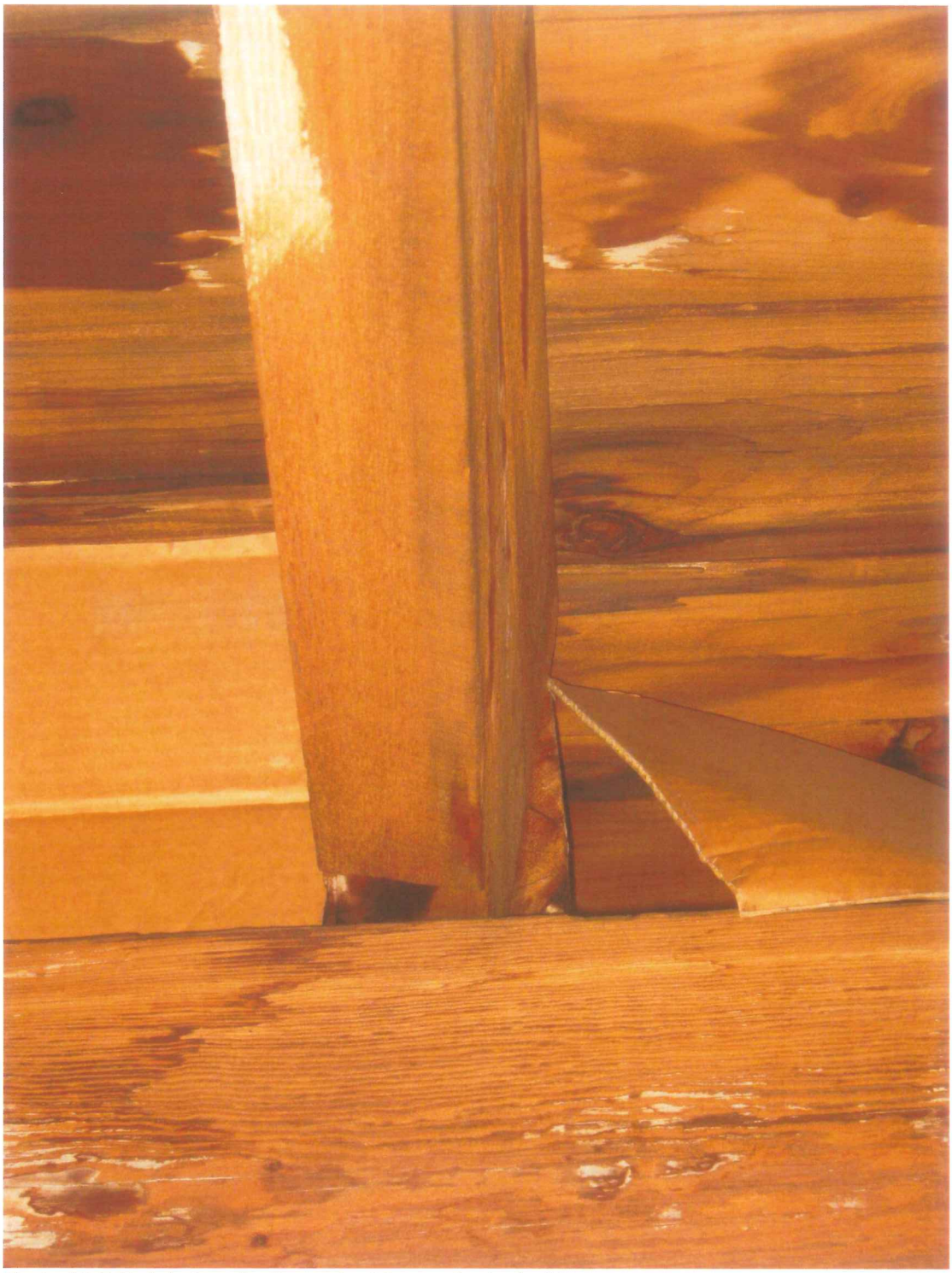
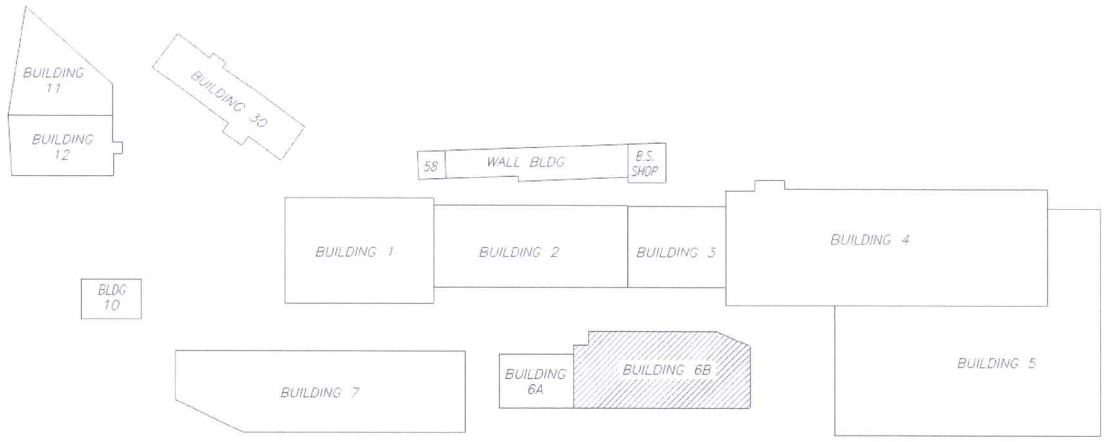


Photo 6A-5: Rotated roof rafter and evidence of prior leaking.

Photo 6A-6: Moss, spalled bricks, open masonry joints and rotting wood sill at Building 6A.

Building Number: 6B



Location Plan

Description, Condition and Assessment:

- Building 6B is a 1-story building with timber gable roof trusses spanning the space. The open floor space extends under building 6A.
- The east wall of Building 6A (visible in 6B space) is supported by a timber truss at the first floor level. The truss end at the south bearing condition was found to be severely deteriorated and is considered unsafe. Temporary shoring is recommended until such time that permanent repairs can be made.
- Roof rafters supported by truss/purlin system appear undersized for snow load.
- Roof trusses appear well built but are likely not designed for current snow loads.
- Visual evidence of prior leaking was visible at the roof level, but leaks did not appear to be active (Photo 6A-5).
- Masonry also has wide spread areas of distress. Areas of missing mortar noted.
- Wood eave trim in poor condition and peeling off the building.
- Several windows are covered with asphalt roofing material. Remaining wood windows are in good to fair condition.
- Lateral Load Resisting System relies on un-reinforced exterior masonry walls.
    - Unreinforced masonry bearing walls known to have poor performance in seismic events.
    - The east wall of building 6A appears to be wood framed and bears on a truss above the first floor level and does not extend to the ground floor. This results in a stiffness discontinuity for the lateral force resisting system which may amplify seismic loads in other portions of the system.
    - Wood diaphragms likely inadequate to transfer diaphragm shears to exterior walls.

Anticipated Structural Outcomes for Renovation/Restoration:

- Repair timber roof truss supporting the exterior wall of Building 6A.
- Lateral load resisting system will require retrofit to address stiffness discontinuity. Introduce lateral load resisting system with wall shotcrete or steel frame.
- Repair exterior masonry including repointing, cleaning.
- Reinforce existing roof rafters and existing wood trusses.
- Replace wood elements and repaint.

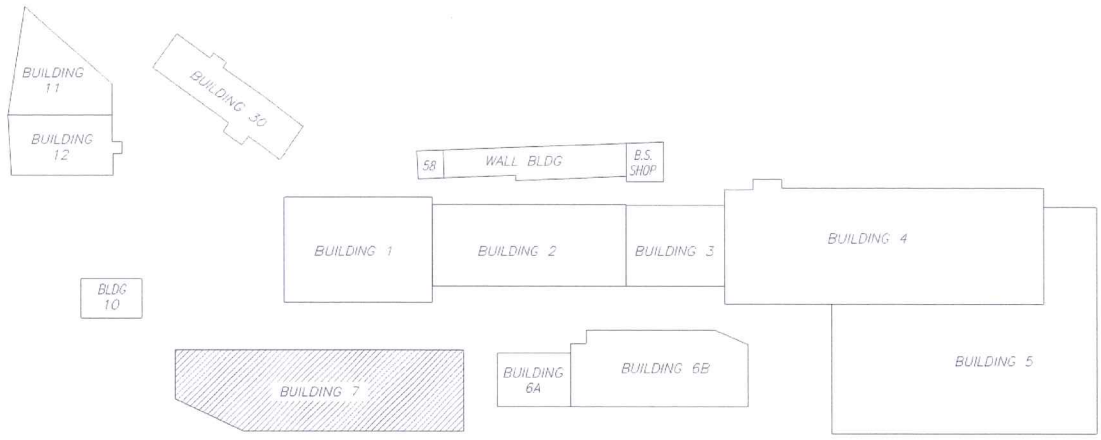
Structural Condition Rating	*3.0*
Structural Renovation Cost Rating	*3.5*

Rating Justification:
Building masonry will require repairs and rebuilding in many locations. Upgrades in roof insulation will likely require an upgrade of the roof structure, including roof rafters and timber trusses to support additional snow load. Truss upgrades may be costly. Unsafe condition of truss supporting Building 6A will require shoring and repair.

Photo 6B-1: Buildings 6A (left) and 6B (right).

Photo 6B-2: Failed (deteriorated) end of timber truss supporting exterior wall of Building 6A.

Building Number: 7



Location Plan

Description, Condition and Assessment:

- Building 7 is a 1-story building flat roof building with an addition at the west end, south side.
- Roof is wood framed. Roof framing is undersized. Portions of roof have been covered with bituthane and appear to be in poor condition. Roof has many leaks causing deterioration of wood. Daylight visible through roof in at least one condition.
- A small portion of the roof was repaired from a previous failure.
- Eaves appear to be in poor condition with rotting and loose wood, and loose flashing.
- Exterior brick masonry south wall has significant sweep to the north.
- Windows appear to be original wood windows, appear to be in poor condition with missing panes, covered in rigid insulation in many areas.
- Brick masonry has bulging, numerous open joints, spalled bricks and cracking at steel lintels.
- Wood frame shed in the southeast portion of the building is in poor condition with roof sagging and uneven/bowed walls.

Anticipated Structural Outcomes for Renovation/Restoration:

- Reinforce or replace all roof framing
- Repair all column rot.
- Replace/repair/patch/overlay existing wood decking.
- Reconstruct, repair and strengthen masonry bearing walls.
- Remove existing wood framed shed.

Structural Condition Rating	*2.0*
Structural Renovation Cost Rating	*5.0*

Rating Justification:
Building masonry walls are in poor condition and in most cases will require rebuilding with new bearing structure meeting current IBC code requirements. Foundation condition is unknown and may require upgrade to current IBC code requirements as a result of reconstruction. Roof framing is in poor condition and extensive replacement would be necessary. Exterior masonry walls require strengthening with any renovation. Essentially rebuilding entire framings system and lateral system.

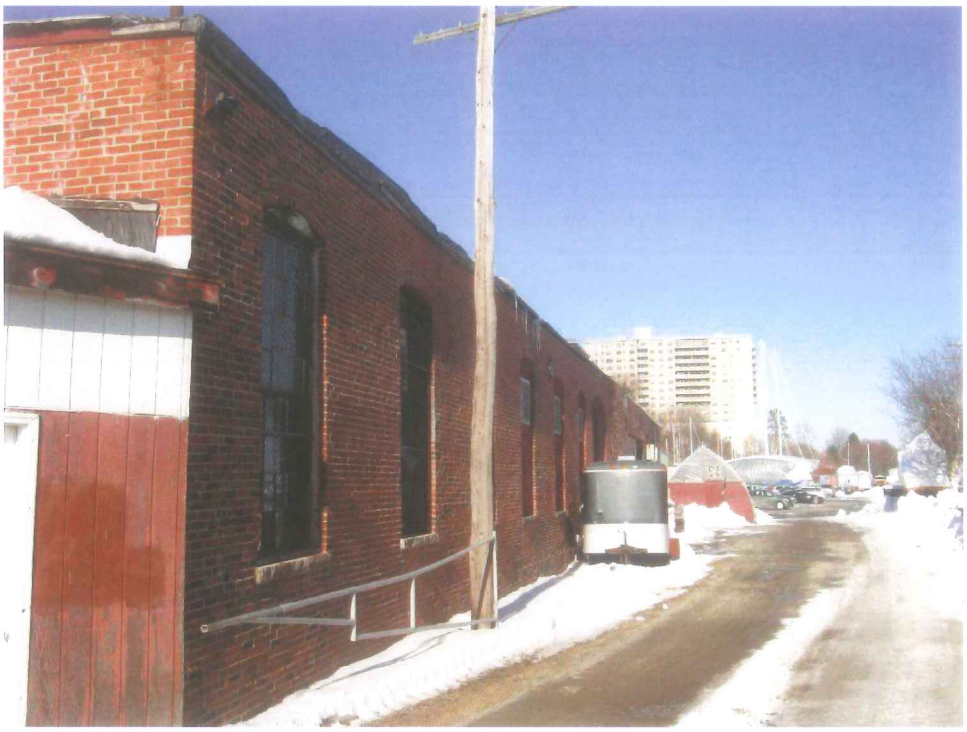
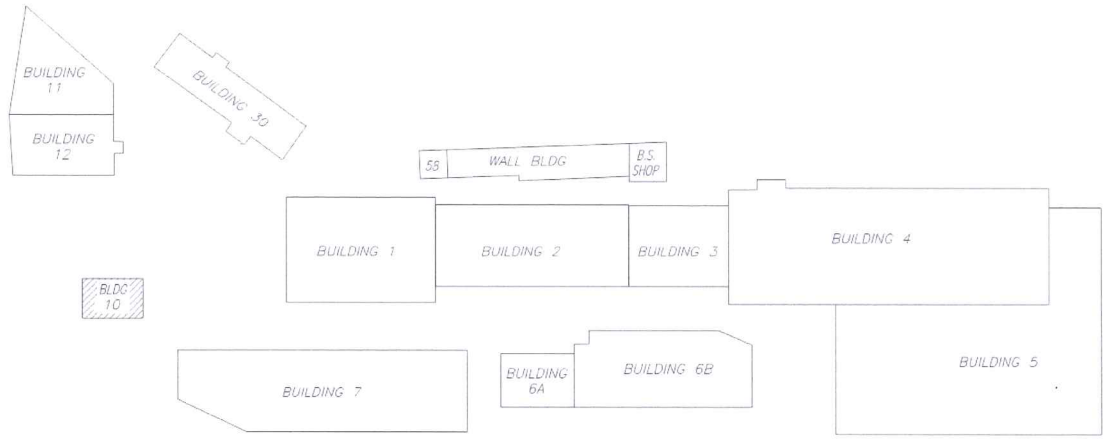


Photo 7-1: South elevation of Building 7.

Photo 7-2: North elevation of Building 7.

Building Number: 10



Location Plan

Description, Condition and Assessment:

- Building 10 is a 1-story building flat roof building.
- Based on operations we did not enter this building.
- Roof is presumed to be wood framed. From exterior the roof appears to be sagging.
- Eaves appear to be in poor condition with rotting and loose wood, and loose flashing.
- Exterior brick masonry walls have sweep, large bows and evidence of settlement, numerous open joints, repairs without toothing, loose and spalled bricks.
- A majority of the original brick masonry window openings have been filled with brick or wood infill panels.
- Windows appear to be original wood windows, appear to be in poor condition.
- Building 10 exterior masonry walls are severely distress and it unclear if brick wythes are still bonded together. Interior or exterior wall facing could peel off without warning. Evidence of creep deflection at roof and concerns over ponding roof loads. It is recommended that this building not be occupied

Anticipated Structural Outcomes for Renovation/Restoration:

- Reconstruct and repair masonry bearing walls
- Reinforce or reconstruct all roof framing
- Replace/repair/patch/overlay existing wood decking.

Structural Condition Rating	*1.0*
Structural Renovation Cost Rating	*4.5*

Rating Justification:
Building masonry walls are in poor condition and in most cases will require rebuilding with new bearing structure meeting current IBC code requirements. Foundation condition is unknown and may require upgrade to current IBC code requirements as a result of reconstruction. Roof framing is in poor condition and extensive or complete replacement would be necessary.

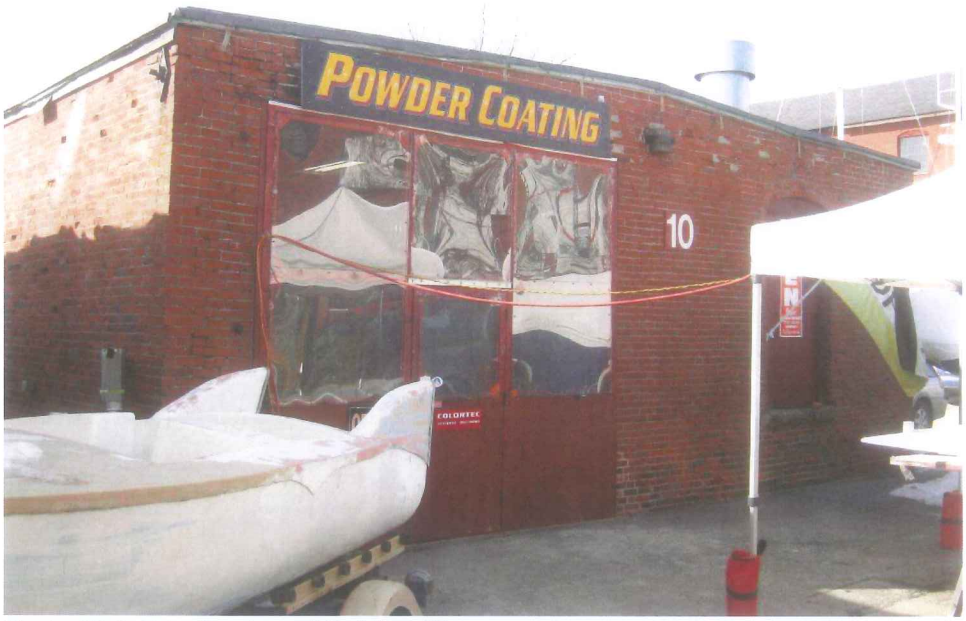


Photo 10-1: Exterior view of Building 10.

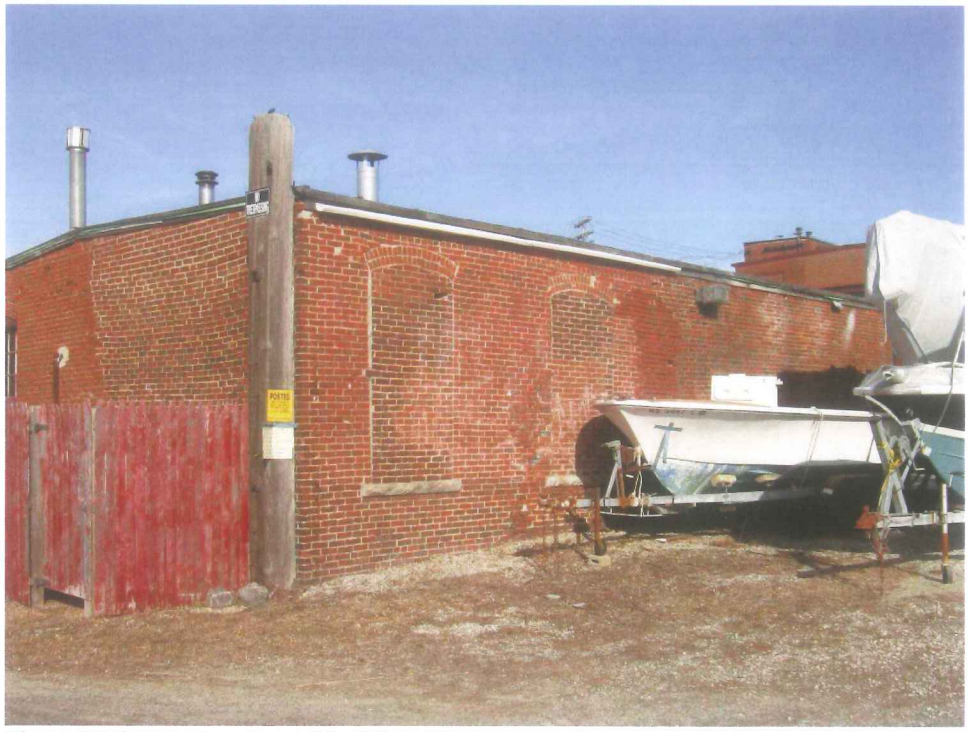
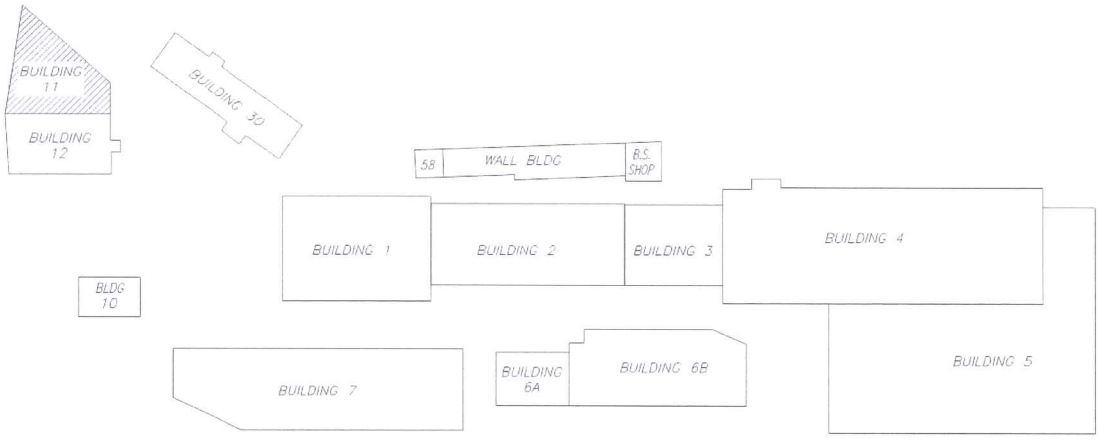


Photo 10-2: Exterior view of Building 10.

Building Number: 11



Location Plan

Description, Condition and Assessment:

- Building 11 story is a two story building with a shallow pitch roof (Photos 11-1 & 2).
- South half of roof pitches into wall of building 12 and is a poor drainage condition. Building 12 roof also drains into the same area. The resulting drain water runs down the back wall of the building. It is evident that the masonry in this area has been repaired previously. The wall is stained and continues to suffer damage from water (Photo 11-2).
- Roof is likely not designed for sliding and drifting snow coming from adjacent Building 12 pitched roof.
- The exterior ground floor wall to north is retaining an embankment and is severely bowed inward from the window sill line up (Photo 11-3). Window wells in this area provide avenue for water entry (Photo 11-4).
- The ground floor dips suggesting there may be deterioration of wood joists and sills below the floor, similar to Building 12. The floor has been decked over with plywood and painted so examination of columns and framing was not possible.
- Second floor framing is rough saw wood joist framing with timber beams and posts. Beam checking was noted, perhaps due to drying from unit heaters.
- Roof framed utilizing timber girders supporting rough sawn wood joists and decking. Acoustic ceiling conceals roof framing; catch buckets were spread throughout and staining indicates roof actively leaks (Photo 11-5).
- Roof framing utilizes stacked system to create pitch. There is no bracing present to stabilize stacked wood and prevent roll-over (Photo 11-5).
- Tar and chip roof system is beyond design life and leaks.
- Lap jointed framing showed cracking extending from tension corner.
- Exterior brick masonry bearing walls show distress over windows, wide spread open joints. Open joints at eave noted and some small areas of bulging. Open joints noted at drip lines.
- Corroded steel lintels.
- West elevation wall is swept inward to the east. East wall also noted as swept.
- Bow noted over main entry.

Structural Condition Rating	*2.5*
Structural Renovation Cost Rating	*4.5*

Rating Justification: Exterior grade retained by north wall has created severe bow in exterior wall. Fore Street right-of-way is well established and unlikely to be modified, and therefore retaining condition will remain. Roof pitching toward Building 12 with drainage water running down the west wall constantly jeopardizes the envelope of Building 12. Roof framing is undersized. Repitching roof would require complete upgrade to address drifting and sliding snow from adjacent Building 12 Roof.

Photo 11-1: Buildings 11 (right) and 12 (left) looking at southeast corner.

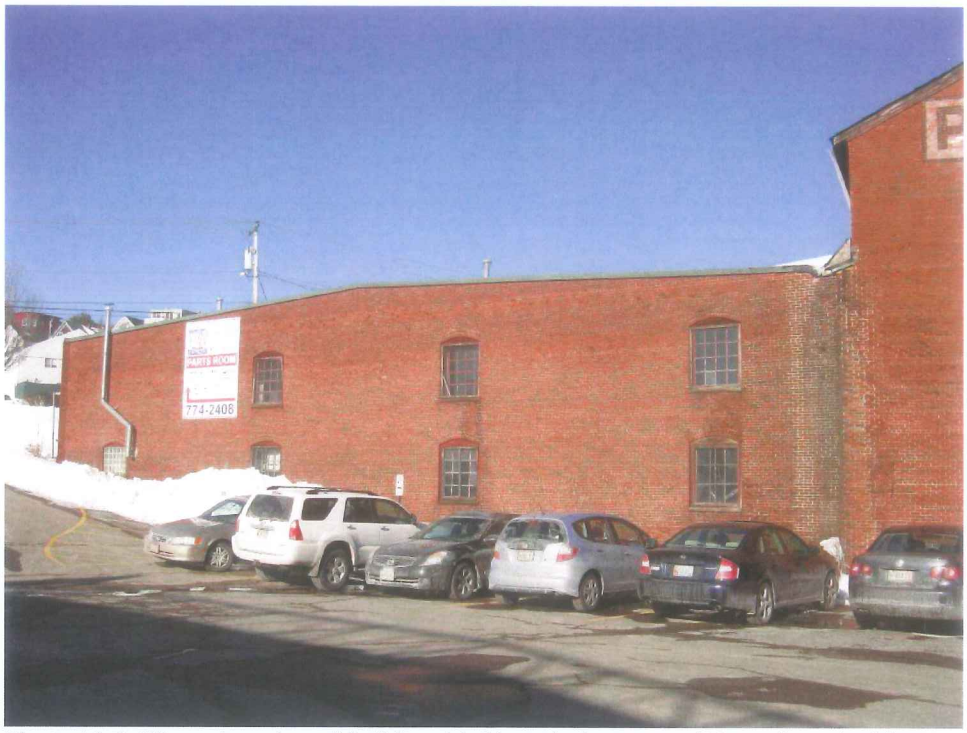


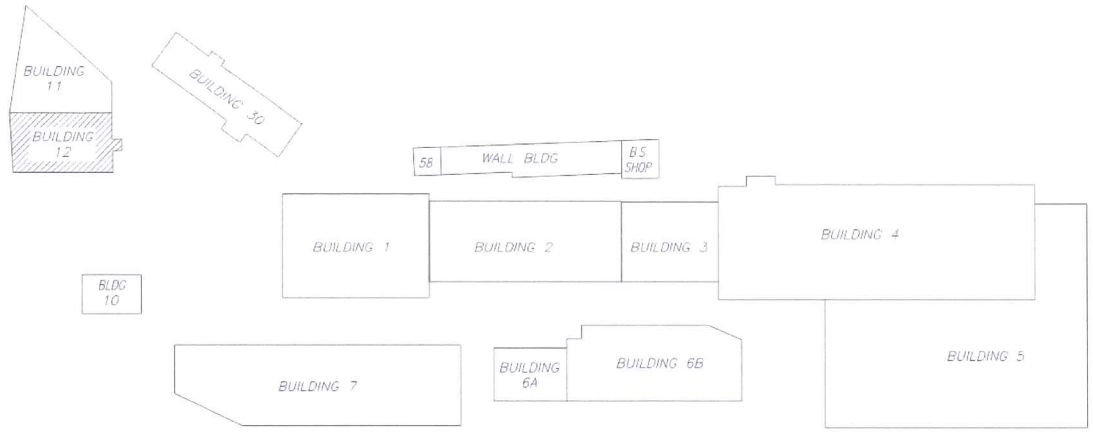
Photo 11-2: West elevation of Building 11. Note drainage condition where building 11 meets building 12.

Photo 11-3: Bowed north wall retaining embankment (lines added for emphasis).

Photo 11-4: Window wells and embankment at north wall.

Photo 11-5: Stacked framing system for Building 11 roof. Note leak catch bucket behind column.

Building Number: 12



Location Plan

Description, Condition and Assessment:

- Building 12 story is a three story building with gable roof and mezzanine space in gable.
- Slate roof materials are loose and missing in many locations, particularly at corners. North half of gable drains onto the roof of Building 11. Wood roof eave trim rotten loose or missing in several locations (Photo 12-2). Some rafter tails appear rotten in some locations. Daylight visible through roof on the east side and rotten sheathing noted in many locations. Roof rafter framing appeared undersized.
- Roof has sag along the longitudinal axis.
- Third floor deck and joists rotten in areas below leaking roofs.
- The ground floor dips to the center. Wood sills bearing on grade and columns bearing on grade were observed to be rotten. In one location the post supporting from the structure above was actually hanging from the floor beam due to the deterioration of the column base (Photo 12-4).
- Note that foundation drains are visible along the west side of the building and that wall appears to be in a low spot. It is likely that the ground floor wood sills and wooden column bases are frequently exposed to wetting.
- Second floor framing is rough saw wood joist framing with timber beams and posts. In general, framing appeared to be in good condition with framing practices consistent of the period. A joist at the northwest corner of the building had the end completely rotted off, possibly from a roof leak running down the face of the wall.
- Separation was noted at the diagonal beam supports at the columns extending from the first to second floor.
- Exterior brick masonry bearing walls show distress and are in fair condition- Distress noted included:
    - Arching & diagonal cracks over windows that extend through the entire width of the masonry (Photo 12-5).
    - Open joints in many locations.
    - Bulging in some locations.
    - Rust jacking at steel lintel on the east side.
    - Walls bowed inward on south and west elevations.

- Evidence of previous shed roof removal- Bulging and slip plane from flashing left in place.
- Entry shed masonry in poor condition.
- Open joints noted in west gable (east gable appears to have been repointed).
- Wooden lintels noted at interior rotting and sagging.

- Wooden window and sills in poor condition with broken and missing panes, rotting wood (Photo 12-1, 2 & 5).

Structural Condition Rating	*3.0*
Structural Renovation Cost Rating	*4.0*

Rating Justification: The roof of building 12 is in poor condition and has been letting water into the building for an extended duration. Roof, upper floor and columns of building will require repairs or reconstruction. Masonry damage is significant and portions of masonry walls will need to be rebuilt. Building is located at a low point on the site and drainage condition at crawlspace will need to be resolved. Despite issues, structural "bones" of building are substantial and it was well constructed in its day.

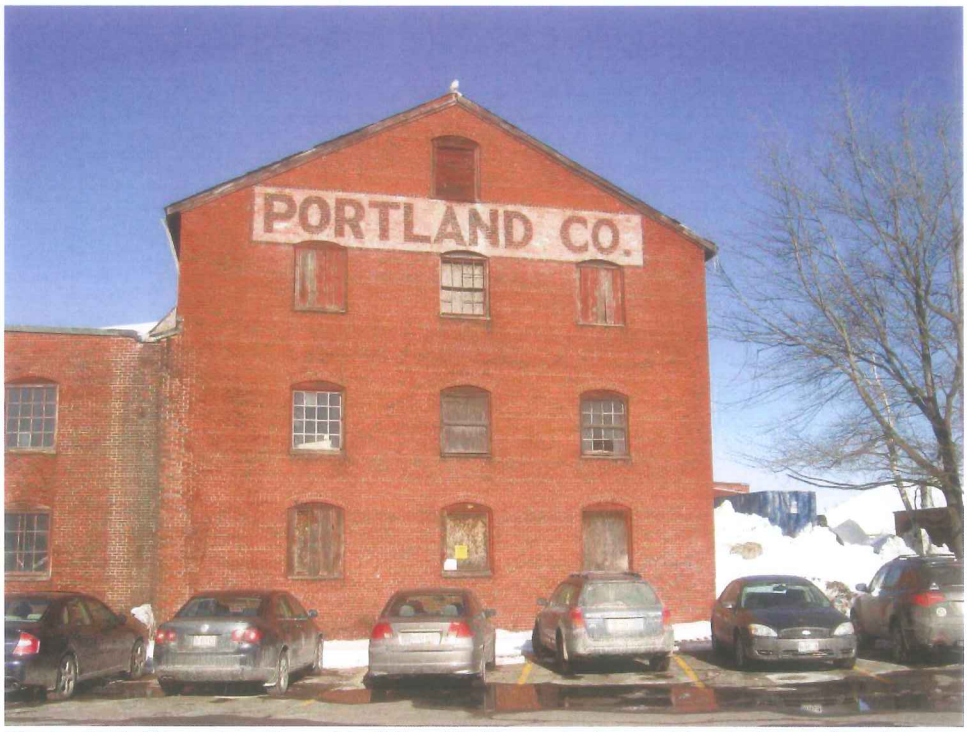


Photo 12-1: West elevation of building 12. Note windows with missing and broken panes, loose slates at eaves.

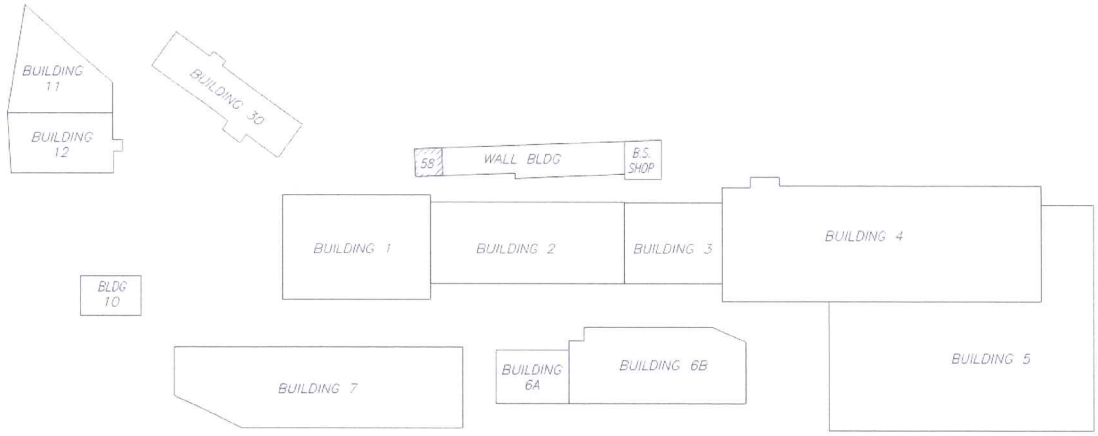
Photo 12-2: Eave with loose slates, missing eave trim, masonry cracking and broken windows.

Photo 12-3: Daylight visible at through roof sheathing. Condition is at both ends of roof.

Photo 12-4: Rotting column bottom, floor joists and sills at ground floor.

Photo 12-5: Diagonal masonry cracking over window opening, open joints, rotting window sill.

Building Number: 58 Fore Vault/Tower



Location Plan

Description, Condition and Assessment:

- Brick masonry vault tower structure with concrete and steel beam floors. Upper floor was inaccessible due to poor condition of connecting bridge.
- Interior walls were wet and growing moss indicating substantial water penetration or condensation within space.
- Rust flaking where steel beams entered wall may indicate damage to beam end at penetration.
- Exterior brick masonry had joints missing mortar, missing bricks, staining.
- Roof not reviewed.
- Windows broken with missing panes.

Anticipated Structural Outcomes for Restoration:

- Exterior masonry repointing, replacement of bricks and small areas of rebuild. Clean all brick surfaces and apply breathable masonry sealer.
- Remove brick around beams ends, repair beams end and rebuild brick.
- Seismic upgrade may be necessary depending on final use.
- Roof condition unknown, but based on condition of roofs on other buildings in complex, assume roof may be leaking.

Structural Condition Rating	*3.5*
Structural Renovation Cost Rating	*2.5*

Rating Justification: Moisture transmission through masonry must be stopped to prevent further degradation of this structure. In order to do so, exterior masonry walls will need to be repaired and repointed, and a breathable sealant applied to the building. Air exchanges and ventilation must be provided on the interior to help dry the structure. Steel beam ends may be compromised requiring repairs. Extensive shoring will be required to repair beam ends.

Photo 58-1: 58 Fore Street Vault/Tower structure viewed from Fore Street.

Photo 58-1: Moss growing on interior walls.

Photo 58-3: Beam end condition with flaking rust.

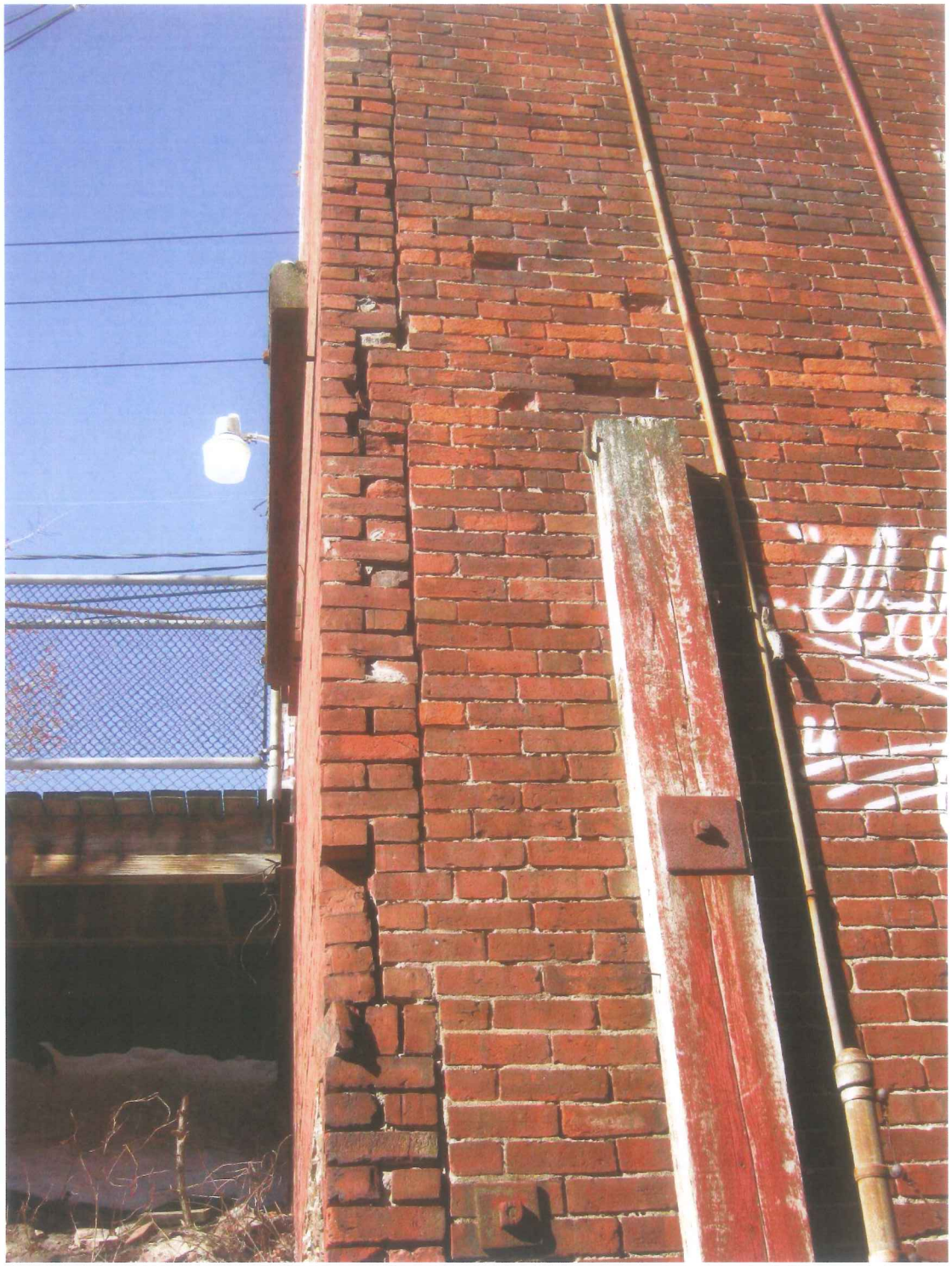
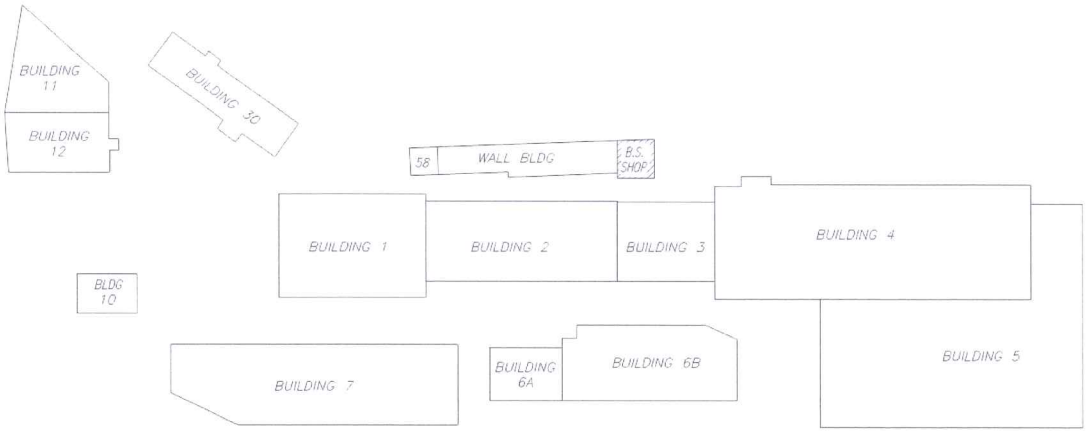


Photo 58-4: Open joints and missing bricks at the corner of the vault/tower.

Building Number: Blacksmith Shop (Building 16)



Location Plan

Description, Condition and Assessment:

- Wood rafter framed roof, back wall and side walls are stone retaining wall for embankment, brick masonry front wall (Photo 16-1).
- Fore Street stone retaining wall at is dry stacked. It was apparent that water travels through the wall.
- North stone walls may be buttressing Fore Street retaining wall.
- Brick masonry had numerous open joints, missing bricks, bulging and moss growth near drip line.
- East side stone wall butts brick masonry front wall to the south; condition is poorly bonded with an open joint.
- Roof rafters appeared to be in good condition, but daylight was visible through roof around chimney penetration.
- Roof eave has been redecked with OSB at eave; roof is covered with shrink wrap.
- Entry did not meet code due to door height.
- Wood windows have broken panes and missing sashes.
- No eave board, building generally not weather tight.
- It is believed that groundwater penetrates this building through the retaining wall.

Anticipated Structural Outcomes for Restoration:

- Repair exterior masonry including extensive repointing and rebuilding to creating contiguous wall conditions.
- Replace windows.
- Create accessible entrance and incorporate 2 means of egress.
- Roof reinforcing to support snow load of properly insulated roof.

Structural Condition Rating	*1.5*
Structural Renovation Cost Rating	*3.0*

Rating Justification:
Building currently is not weather tight and extensive work will be necessary address this condition. Entry conditions will need to be brought up to current code for fire and egress compliance. Roof likely not framed to address drifted snow from adjacent high roof/street and will require reinforcement.

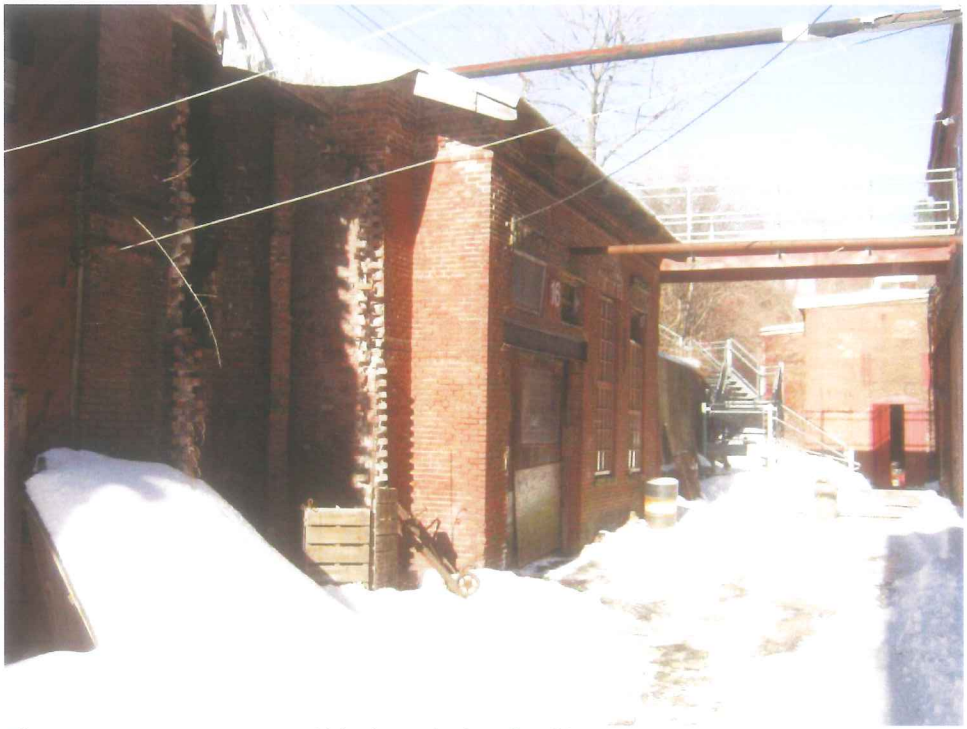
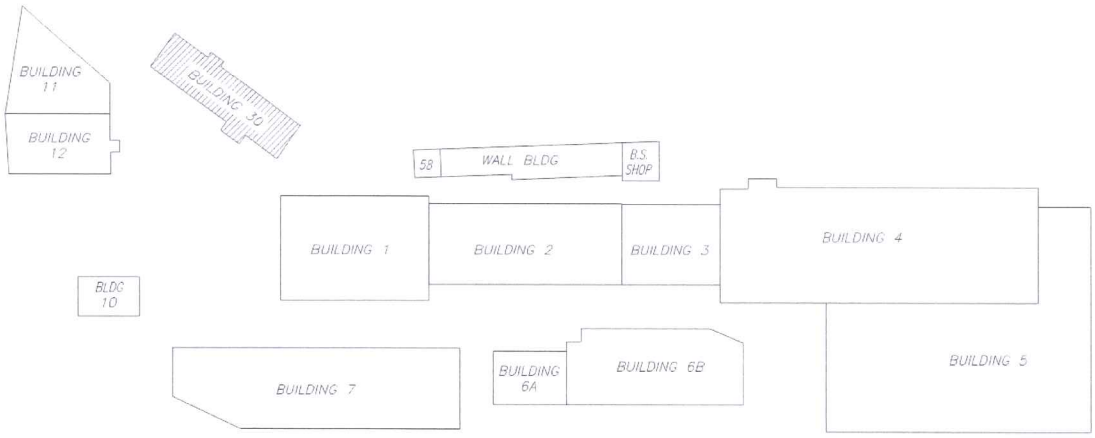


Photo 16-1: Exterior view of blacksmith shop/Building 16.

Building Number: 30



Location Plan

Description, Condition and Assessment:

- Building 30 is a two story building with a third story roof pop up area to the east.
- Review as limited- Hard ceilings were in place at time of review and spaces were occupied.
- Peeling paint was noted particularly at the high roof eave (Photo 30-2).
- Siding was uneven and may suggest underlying issues (Photo 30-2).
- Evidence of leaking was noted in several locations on the fixed ceiling adjacent to the southwest wall (Photo 30-3).
- On the south face open joints were noted with horizontal steel protruding. The steel was corroded. Other open joints and missing bricks were noted.
- Window lintels were rusted with mortar separation from the horizontal leg.
- Building exterior sealants are past design life.
- Downspout were leaking and frozen.
- Entry step heights do not meet code requirements.

Anticipated Structural Outcomes for Restoration:

- Repaint existing building.
- Repair exposed lintel conditions with replacement, hot dipped galvanized steel lintels.
- Consider residing and updating air vapor barrier systems.
- Isolate leaking and repair condition with flashing, replacement siding and/or masonry sealing.
- Replace building sealants

Structural Condition Rating	*5.0*
Structural Renovation Cost Rating	*1.0*

Rating Justification:
Building is considerably more modern than other structures reviewed on property; majority of repairs will be cosmetic or performed to improve energy efficiency/weather tightening.

Photo 30-1: Southwest elevation of building 30.

Photo 30-2: Peeling paint at roof eave, uneven siding.

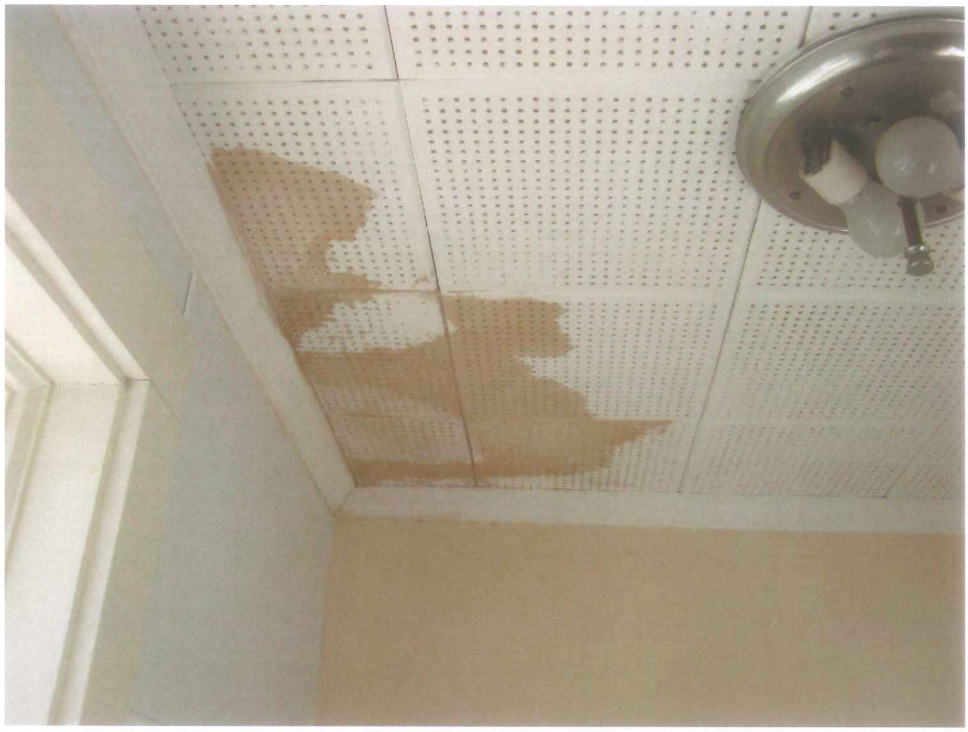


Photo 30-3: Leaking noted at ceiling adjacent to southwest wall.

Photo 30-4: Mortar falling from joint with steel protruding; corroded steel lintel and broken mortar adhesion.

End of Book 1

BECKER
STRUCTURAL ENGINEERS

Attachment 5

APPENDIX A

RELATIVE STRUCTURAL CONDITION AND RELATIVE REHABILITATION COSTS RESURGENCE ENGINEERING AND BECKER STRUCTURAL ENGINEERS

APPENDIX A
PORTLAND COMPANY COMPLEX – MARCH 2015
RELATIVE CONDITION AND REHABILITATION COST COMPARISON

BUILDING NUMBER – NAME DATE	RELATIVE STRUCTURAL CONDITON			RELATIVE REHABILITATION COST	
	BECKER	RESURGENCE /BECKER SCALE	RESURGENCE SCALE	BECKER	RESURGENCE
BUILDING 1 - ERECTING BUILDING 1918	2.0	2.5 (REPETITIVE DTLS)	P2	4.0	3.5 (REPETITIVE DTLS)
BUILDING 2 - MACHINE SHOP 1847	2.5	2.5	P2+	4.5	4.5
BUILDING 3 - MACHINE SHOP 1847	3.0	3.0	P2+	3.0	3.0
BUILDING 4 – FOUNDRY/ACETYLENE HS 1895, 1904-09	1.5	1.5	VP2	4.5	4.0 (REPETITIVE DETAILS, CUSTOM REHABILITATION)
BUILDING 6B - TANK SHOP 1896-1904	3.0	3.0	P2+	3.5	3.5
BUILDING 7 - CAR SHOP 1873,1904	2.0	1.5 (BOWED WALLS)	VP1	5.0	5.0
BUILDING 10 - PAINT SHOP 1873	1.0	1.0	VP1	4.5	4.0 (REBUILD IN KIND)
BUILDING 11 - PATTERN STOREHOUSE 1885	2.5	2.0 (NORTH WALL)	VP2	4.5	4.5
BUILDING 14 – DRAFTING ROOM AND STOREHOUSE 1858,1864	NOT INSPECTED	2.0	VP3	NOT INSPECTED	3.5
BUILDING 15/16 (NO ACCESS TO B15) BOILER HOUSE/BRASS FOUNDRY 1858, 1864	1.5	1.5	VP3	3.0	3.0
Averages of common buildings inspected (excluding Building 14)	**2.11**	**2.06**	.	**4.06**	**3.89**

SEE FOLLOWING PAGES FOR EXPLANATION OF BECKER STRUCTURAL ENGINEERS AND RESURGENCE ENGINEERING RATING SYSTEMS

Notes:

1. Coordinate this document with "Portland Company Complex General Building Assessment" prepared by Resurgence Engineering et al, March 2015, and "Evaluation of Existing Buildings at the Portland Company Property" prepared by Becker Structural Engineers, March 28, 2014.
2. Further discussion about relative rehabilitation costs related to these structures, by Resurgence Engineering, follows this page.

APPENDIX A
EXPLANATION OF BECKER AND RESURGENCE RATING SYSTEMS

Becker Structural Engineers' (BSE) Rating System

The **relative structural conditions** rating system used in the Becker Structural Engineers Report is shown below:

1 = Very poor/unsafe/demolition likely
2 = Very poor/salvageable with significant structural rework and investment/questionable economic viability/consider demolition
3 = Poor/requires substantial structural work to elements and systems
4 = Fair/requires nominal structural work to elements
5 = Good condition/minor structural work required

Becker's **relative rehabilitation cost rating system** is based upon structural complexity and size of building, using a scale of 1 to 5 -- 1 being relatively low costs and 5 being relatively high costs. BSE gives no specific definitions of the relative costs, simply a numerical grading system. Such an approach appears to be reasonable, given the preliminary nature of assessment that both firms were instructed to provide.

Resurgence Engineering and Preservation's (REP) Rating System

For ease of comparison, REP used the same **relative structural conditions rating system** as BSE in the summary chart. However, REP believes there is a more accurate and further defined way to classify the buildings in terms of condition. *See chart on following page for REP's proposed rating system as regards condition.*

REP has used the same **relative rehabilitation cost rating system** as BSE. The BSE report provided no specific definition of cost for each rating category.

RESURGENCE ENGINEERING RELATIVE STRUCTURAL CONDITION SCALE OF EXISTING BUILDINGS IN POOR CONDITION

BSE condition #	REP NUMBER	DESCRIPTION OF CONDITION, PRE AND POST MITIGATION	LOCAL/MAINE BUILDING EXAMPLES PRE AND POST MITIGATION
(n/a)	VP1 (very poor, not salvageable)	PRE: Immediate widespread public safety threat and site/occupant safety threat if not barricaded and structurally shored; evacuate nearby buildings, streets, sidewalks, block off parking spaces. Potential for widespread debris field in event of collapse; Building cannot be re-occupied following triggering event. POST: Condemn and demolish building.	Buildings with extensive fire damage
1	VP2 (very poor but salvageable, expensive to rehabilitate, i.e. approx.. BSE cost #4 to #5)	PRE: Immediate widespread public safety threat and site/occupant safety threat if not barricaded and structurally shored; evacuate nearby buildings, streets, sidewalks, block off parking spaces. Potential for widespread debris field in event of collapse; Building cannot be re-occupied following triggering event. POST: Building assessed, barricaded, structurally shored; nearby buildings deemed safe for return; streets, and/or sidewalks and parking spots remain blocked off. Building itself cannot be occupied after stabilization. Unsafe for rescue personnel to enter if trespassers are inside. Shored and secured structure relatively expensive, but feasible, to rehabilitate.	PRE: Norway Opera House, 2007-09 POST: Norway Opera House, 2010+
1	VP3 (very poor but salvageable, moderately expensive to rehab, i.e. BSE cost #3 to 4)	PRE: ***Immediate*** site/occupant safety threat and localized public safety threat if not if not barricaded and structurally shored; Block off streets, sidewalks, and parking spaces. Potential for localized debris field in event of collapse; Building can be occupied following the triggering event. POST: Building assessed, barricaded, structurally shored; nearby buildings deemed safe for return; streets, and/or sidewalks and parking spots can remain blocked off or reopened following mitigation. Building itself can be occupied.	PRE: Buildings with widespread loose façade components. i.e. Masonic Temple Localized structural failures i.e. Portland Company Complex Building 4 POST: Stabilized structures, removing loose components or installing covered sidewalk and blocked off parking spaces.
2	P1 (very poor but salvageable, less expensive to rehab; i.e. BSE cost #2)	PRE: ***Likely*** site/occupant safety threat and localized public safety threat if not if not barricaded and structurally shored; Block off streets, sidewalks, and parking spaces. Potential for localized debris field in event of element failure; Building can be occupied following the triggering event. POST: Building assessed, barricaded, structurally shored; nearby buildings deemed safe for return; streets, and/or sidewalks and parking spots can remain blocked off or reopened following mitigation. Building itself can be resume occupancy.	PRE: Buildings with a few loose façade components that can easily be removed or snow and ice buildup that can easily and quickly be removed, POST: Stabilized structures, removing loose components or installing covered sidewalk and blocked off parking spaces.
3	P2	PRE: ***Possible*** site/occupant safety threat and localized public safety threat if not if not barricaded and structurally shored; No triggering event causing distress; possible change of use makes economics questionable. POST: Rehabilitation Feasibility Study considering economics for specific buildings and structures.	PRE: Portland Company Building Complex Building #1

Most of REP's condition and cost ratings align with those of BSE. Using our own rating system, however, REP's conclusions are slightly different, especially in regards to the potential for rehabilitating buildings in distress (i.e. Buildings with a "1" to "2" condition ranking). We would not have necessarily characterized these buildings as unsalvageable, as Becker suggests. Our justification for this would be to consider the cost benefits that could be realized using historic preservation tax credit incentives, along with the added flexibility afforded historic structures under the IEBC. Tax credit incentives could offset the costs of more custom-designed engineering and building envelope rehabilitation solutions. They would also offset the cost of higher-quality, longer lasting building materials necessary for the marine climate.

Our primary departures from BSE exist in Building 1, Building 4, Building 7, Building 10, and Building 11. We downgraded the relative structural condition of Building 7 and Building 11, while we upgraded the relative structural condition of Building 1. We lowered the relative rehabilitation costs of Building 1, Building 4, and Building 10. The paragraphs that follow explain the reason for our departure at each building.

For Building 1 we believe that the more recent construction date (1918), combined with the repetitive nature of the building elements, can allow for a slightly less expensive rehabilitation than indicated in the BSE report.

Building 4 could yield a relatively less expensive rehabilitation if a customized approach to reframing the edge columns and rebuilding the masonry could be achieved economically. Such an approach would have to be understood and approved in advance by the National Park Service if tax credits were desired on this building project. If historic preservation tax credits can be used on this project using a different approach to reframing the edge columns and rebuilding the masonry, while strengthening the existing structure, we disagree that this building is a likely candidate for demolition.

In our opinion, the condition of Building 7 is slightly worse than considered in the BSE report, because of the poor condition of the loadbearing masonry at the north elevation. We concur with the relative rehabilitation costs for the building.

We depart from the BSE cost condition assessment of Building 10, only in the sense that it may make the most economic sense to demolish the existing structure.

The compromised north wall at Building 11 necessitates downgrading its condition from 2.5 to 2.0 in comparison to the BSE report. We recommend that the building remain unoccupied until the north wall is stabilized. Demolition of this structure may be warranted pending further understanding of the roof framing and first floor framing conditions.

As stated in the BSE report, immediate safety concerns need to be addressed, whether as isolated repairs (Building 6A/6B common wall and truss) or comprehensive measures (vacancy of Building 11).

Basis for Cost Opinion Conclusions for Each Building

Building 1 - Erecting Building, c.1918

Relative rehabilitation costs for this structure and building envelope are based primarily upon the fact that the structure is repetitive in construction technique, offset by the likely reconstruction of the front masonry (west) wall. The staging and access cost required to perform clerestory rehabilitation from interior and exterior will be an increasing cost factor in building rehabilitation. A significant amount of steel-framed window glazing would require repair or replacement. Since this is the most recent building in the study, existing steel materials may be of higher quality and some understanding of snow loading requirements was incorporated into the design.

Building 2 – Machine Shop, c.1847

This building, the most structurally complicated and tallest within the buildings studied, would likely cost the most to rehabilitate, but could present the greatest risk/reward. The structure itself will likely take the most time to thoroughly assess from a structural and building envelope standpoint, given the number of changes that occurred over the years and the addition of the third floor. The large wooden windows on the first and second floors would be very labor intensive to rehabilitate, given the large number of individual panes. Third floor windows might not be as expensive to rehabilitate or replace, because they may have been 2:2 light sash, which were common in the early 20th century. A well thought-out temporary shoring plan is necessary to tie the cantilevered third-floor framing further back into the existing building. Third floor cladding, though high up, could be replaced relatively simply. At approximately 45 feet high and three stories, this building will be subjected to the greatest wind and seismic forces of all the buildings studied.

Building 3 – Machine Shop, c.1847

Building 3 is the second most structurally complicated building within the complex, but is not as relatively expensive to rehabilitate as Building 2. The additional floor support structure is less complicated than Building 2, lacking the cantilever framing existing at that neighboring building. The second floor also provides interior access to the much smaller clerestory, facilitating any structural work required there. The smaller overall footprint and lower percentage of glazing helps contain rehabilitation costs.

Building 4 – Foundry, c.1895

The Foundry rehabilitation work likely involves wholesale rethinking of the structure and building envelope along the exterior walls. Structural upgrades and replacement of an existing structural system that was improper for its marine, cold-weather climate may actually simplify the rehabilitation by permitting a complete column removal and replacement with contemporary steel columns, not exposed to the exterior elements. However, this more significant structural change may require the longest lead time to confirm whether the structure and building envelope modifications would be eligible to receive historic tax credits.

Building 6B – Tank Shop, c.1896-1904

Tank Shop rehabilitation is simplified because of its relatively short height, simple gable roof, and relatively small windows. Added longitudinal roof bracing can support the intermediate roof purlins between trusses and stiffen the roof against wind and seismic forces. The low roof height will likely keep the building from experiencing significant wind load increases due to height. Each one of the trusses will require further inspection, nondestructive testing and/or invasive inspection to confirm that end bearing conditions are structurally sound.

Building 7 – Car Shop, c. 1873, 1904

Although the Car Shop is a single-story structure, rehabilitation becomes complicated and more costly due to the overall poor condition and insufficient depth of the roof framing and because of the poor condition of the existing exterior masonry. The existing roof framing has such a low slope that it likely has permanent deflection "set", which will complicate efforts to strengthen the framing by sistering. Significant roof leaks in the structure have likely rotted sheathing and possibly framing, in more areas than are visible due to penetrating sunlight. The windows are not large or great in area relative to the total façade area, which would diminish the rehabilitation costs somewhat. However, the existing loadbearing masonry would likely require complete rebuilding because it is in such poor condition.

Building 10 – Paint Shop, c. 1873

Originally isolated by the remaining structures for safety purposes, the paint shop stands alone as the most significantly altered structure in the worst overall condition. Building rehabilitation is hard to justify, given the small size and poor condition. Rebuilding the structure to resemble the original during the site's period of significance, in conformance with contemporary codes, would be a more straightforward option, despite the likely required foundation upgrades.

Building 11 – Pattern Storehouse, c. 1885

The Pattern Storehouse carries with it the greatest uncertainty about rehabilitation costs. It is the only building studied that has a wood-framed first floor situated over an earthen crawl space, and it is the only structure that had the majority of its roof framing concealed by ceilings. The low-slope roof, pitching partially toward Building 12, creates drift conditions and roof runoff that are detrimental to both buildings.

Building 14 – Drafting Room and Storehouse, c. 1858-64

Tucked in between buttresses of the Fore Street retaining wall, Building 14, like the Boiler House and Brass Foundry to the immediate north, contains relatively limited floor space in a structure that is practically unique. The existing timber frame purlin and rafter system needs to be carefully assessed near the peak, as that area is vulnerable to condensation and leakage due to snow buildup and insufficient insulation.

Building 15/16 – Boiler House and Brass Foundry c.1858, 1864

We did not enter Building 15, but the visible condition of the second floor framing means the structure would likely need to be rebuilt. Building 16, the Brass Foundry, requires several of the same structural assessments and likely upgrades that Building 14 requires, as well as the rehabilitation of the small south façade.

Attachment 6
Draft Portland Company Historic District Boundary
Boundary is offset from north elevation of Building #4 by width of alley to immediate east.
Boundary is offset from south elevation of Building #4 by width of street to immediate east.
ATLANTIC ST
EASTERN PROM
ST LAWRENCE ST
WATERVILLE ST
KELLOGG ST
ADAMS ST
MUNJOY SOUTH
FORE ST
THAMES ST
5
4
14-16
3
6B
2
6
1
30
11
7
10
1 inch = 100 feet
0 50 100 200 300 400 Feet
N