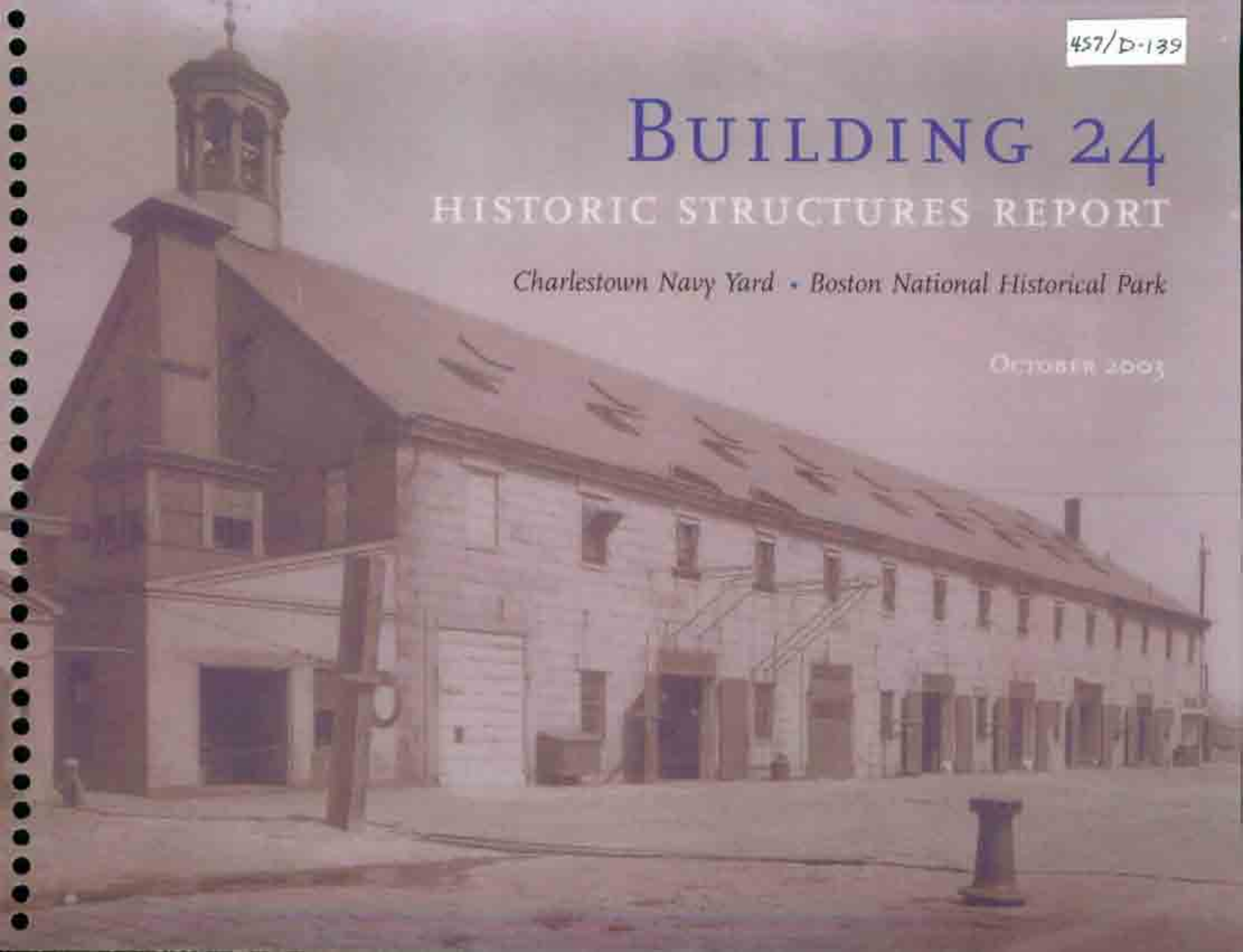
BUILDING 24

HISTORIC STRUCTURES REPORT

Charlestown Navy Yard • Boston National Historical Park

OCTOBER 2003



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HISTORIC STRUCTURES REPORT

Charlestown Navy Yard • Boston National Historical Park

SEPTEMBER 2003

PREPARED BY GOODY, CLANCY & ASSOCIATES

Contents

COVER & TITLE PAGE PHOTOGRAPH:
"Office Building and Rigging Loft, Looking South-east, Boston Navy Yard, Aug. 2, 1910." CNY Archives *(BOSTS 9498)*

PHOTOGRAPH, THIS PAGE:
Detail of gear mechanism for the marine railway

Executive Summary and Administrative Data

EXECUTIVE SUMMARY

Research Methodology

Research was conducted at the National Park Service Charlestown Navy Yard Archives and the National Archives in Waltham, MA. Additional field investigation of the building was conducted to verify information found in the archives. All information was logged into a Microsoft Word spreadsheet and tracked in chronological order.

The major research finding for this report was the confirmation of Naval Constructor Samuel M. Pook as the designer of the building. There are references in the current record that attribute the building to Joseph Billings. A review of the archival records confirmed that Billings was appointed after the construction of the building.

The chronology of building construction and sequence of alterations has been identified as part of this report. An in-depth search of the archives compiled many years of information on the structural settlement and distortions of the original 1847 building, and the subsequent 1913 structural rebuilding. The historical structural readings taken were invaluable to be able to establish which structural issues are active, and which are stable and non-moving.

Statement of Significance

The significance of the building is its continued industrial use. It was constructed to house the Joiners' and Carpenters' Shop and Rigging Loft, and continues into the 21st century as the maintenance and repair facility for the USS *Constitution*. It is this industrial nature and the changes that the building has undergone over time to accommodate its changing uses that are relevant. This evolution also makes it impossible to set one date of significance.

The original construction is significant as a prime example of mass masonry construction and the Boston Granite style so popular in this area at the time of its construction. Its simplicity and structural solidity make it a significant building. The building underwent ongoing changes to the interior use and configuration throughout the 19th and 20th centuries. The exterior walls are all that stand of the original building, making them of primary significance.

A fire in 1910 caused extensive damaged to the roof of the building, and prompted the first major change to the exterior of the building. There was a focus at that time to make the Navy Yard buildings "fireproof". Due to this directive, although the fire was confined to the roof members, the wooden timbers and floor framing were removed from the interior of the building. Cast in place concrete columns and beams were installed in place of the wooden members and tied into the existing exterior walls.

The original 1847 roof was a simple gable with 16 skylights on the east and west roof slopes. The 1913 roof was also a gable, but contained a monitor that was nearly the full length of the roof. The monitor contained operable windows for its full length. The roof constituted the most visible change to the building since its construction. In both roof schemes, there was an allowance for air circulation in the third floor roof space, as this space has always been used for industrial or manufacturing purposes.

The 1913 "rebuild" of the structure is significant as it showcases the evolution of the management of the Navy Yard buildings. This type of framing structure was installed in many buildings during this time period as a way to ensure that fire did not destroy buildings. The roof, which is the only visible change from the exterior, has been in place for 90 years and is historically significant in its own right.

The 1943–44 east extension to the building is also a significant element in the yard. It is one of the few remaining World War II additions in the yard. The need for additional space was urgent and the extension was built as a temporary structure. It has since gained significance, in its own right, as an example of the yard during the WWII years. The extension is deteriorating and is in need of repair. One could possibly make an argument that it was built as a temporary structure, and should be torn down instead of being restored. This was an argument made as the Navy Yard was being decommissioned, and lead to the removal of most of the other WWII structures in the yard. As one of the last remaining WWII structures, to tear it down would be to remove a significant part of the yard and the building's history and evolution. The extension nearly doubled the useable space of the building, which the M&R Facility currently needs to function effectively.

Period(s) of Significance

The building has three distinct periods of significance. The 1847 exterior granite structure is significant as the oldest part of the structure, and as an example of massive, bearing masonry construction. The 1913 rebuild has gained significance in its own right as an early fireproof insertion into a Navy Yard building. The roof with its distinctive monitor is a character defining feature in the yard. The 1943 addition is significant as one of the only surviving World War II additions remaining in the Navy Yard.

Due to the extensive rebuilding in 1913 and the east extension to the building in the 1940s, the building does not have one clear period of significance. Any changes made to the west, north and south elevations of the original building should be sympathetic to the 1913 rebuilding. Changes made to the 1940s east extension should be sympathetic to the date of its construction. The significance of the building lies in its evolution over time, and its industrial use. Due to this industrial history and evolution, it is not feasible, nor advisable, to return the building to its 1847 configuration or appearance.

Recommendations for Treatment and Use

Building 24 affords the unique opportunity to not only preserve the industrial character of the building, but the industrial use as well. The use of the building by the U. S. Navy Maintenance and Repair Facility is a logical continued industrial use of the building. A change in use would require extensive upgrade of finishes and intervention to the floor plans.

The most urgent recommendation for treatment is to make the necessary structural repairs to stabilize the building. The repair to the deteriorated wooden piles is first priority. When these repairs are made, the repairs to the roof and the masonry walls to make the building weather tight should occur.

An ongoing upgrade of the elements of the building to make it functional as an industrial work space are recommended. This work includes making the third floor monitor windows and sky-lights operable to improve circulation and ventilation in that space. It is assumed that, as long as the building continues to house industrial functions, there will be an ongoing reconfiguration of the floor plans, equipment locations and office requirements. This ongoing evolution is in keeping with the building.

It is recommended that any changes made to the exterior of the building should be in keeping with the age of the part of the building where it occurs. All changes to the masonry walls should be in keeping with the 1847 buidling. All changes to the 1913 elements, including the monitor and the building windows and doors, should be in keeping with the 1913 drawings. All changes to the 1943 east extension should be in keeping with the 1943 drawings.

BUILDING 24 HISTORIC STRUCTURES REPORT

ADMINISTRATIVE DATA

Names, numbers and locational data used to refer to the historic structure

The building is a two-and-one-half-story mill-style workshop located within the National Park portion of the original Charlestown Navy Yard. Originally referred to as the Joiners' and Carpenters' Shop and Rigging Loft, the current building numbering scheme for the Navy Yard was instituted in the early 1870s, and designated the structure as Building 24.

Proposed treatment of the structure including the source document

Building 24 currently houses the Maintenance and Repair Facility for USS *Constitution* and is under a cooperative agreement with the U. S. Navy. There is no know change in the proposed of the structure. Construction documents are being developed by Goody, Clancy and Associates to restore the exterior of the building in 2004. The work includes structural repair of the deteriorated wooden piles, masonry restoration of the damaged stone, replacement of the slate roof, and replacement of the monitor windows, elevator shaft windows and skylights.

Related studies

The Boston National Historical Park *General Management Plan/Volume II*, dated 1980, gives a comprehensive overiew of the park development. It describes the historic zones and Cultural Resource Management directives and legislation related to the development of the park.

Frederick Black and Edwin C. Bearss' *The Charlestown Navy Yard 1842–1890* was an invaluable source for information on the yard as a whole, and on individual buildings within the yard for the time period identified. Frederick Black's two-volume *The Charlestown Navy Yard 1890–1973* continued the story begun in the Black and Bearss volume.

Stephen Carlson's *Charlestown Navy Yard: Historic Resource Study*, dated 2003, was important for setting the context of the Charlestown Navy Yard within the context what was happening nationally.

Cultural resource data

The official closure of the yard came in 1974. President Gerald Ford signed the Boston National Historic Park Act of 1974, authorizing the establishment of Boston National Historical Park, a unit of the National Park system. Charlestown Navy Yard became the seventh site within this park with spread across Boston and Charlestown. The *National Register of Historic Places Inventory-Nomination Form*

was completed in October 1978, and listed Building 24 as a contributing element within the site. It stated that the "Charlestown Navy Yard is nationally significant in illustrating the naval and industrial history of the United States". It further stated that Building 24 was "significant to the history of American naval technology and architecture".

Recommendations for documentation, cataloging and storage of materials generated by the HSR

The National Park Service has done an excellent job of cataloging and storing the material that they currently house on the building. It is recommended that research be done to determine what information may be housed in Washington DC that could be of use to the Navy Yard.

Further research required

Further research into the original uses of the spaces, and the types of skills performed in the building, would be interesting from a materials and technology point of view. This would require research by a person versed in shipbuilding and retrofitting.

Research Team

Lisa Howe of Goody, Clancy & Associates lead the research team. Structural information and analysis was contributed by Wayne King of Ocmulgee Associates and geotechnical information was contributed by Robert Hoyler of McPhail Associates. Phil Hunt, Museum Specialist at the Charlestown Navy Yard was instrumental in compiling and presenting all of the archival information to the team. Stephen Carlson and Bill Barlow of the National Park Service provided infinite information about the yard and its use over time.

Presentation of Information in Report

All references for information found in the text are located in the Building Chronology spreadsheet (Appendix A). Footnotes are used only in locations where the information is not contained in the spreadsheet.

All reference information for photographs and drawings are located in the Building Chronology spreadsheet (Appendix A).

Not all of the drawings from the archives are included in the report. Only the drawings thought to be necessary to illustrate a point in the text were included.

Historic photographs are designated by appendix letter B and the number of the image, i.e. (B2). Historic drawings are designated by the appendix letter C and the number of the image, i.e. (C4).

Part I | Developmental History

PART 1 | DEVELOPMENTAL HISTORY

A. Physical Description

Built in 1847–48 as the Joiners' and Carpenters' Shop and Rigging Loft, Building 24 is a two-and-one-half-story mill-style workshop located within the National Park portion of the original Charlestown Navy Yard. The building is rock-faced granite post and lintel construction, in a style referred to by Douglas Shand Tucci as the "Boston Granite Style" common in the mid-1800s[1].

The original building structure consisted of 20-inch-thick masonry perimeter walls and heavy timber floor and roof framing. The 20-inch perimeter walls consist of 8-inch-thick granite units and three wythes (12 inches) of brick. Story-high door openings occur in every other bay around the perimeter of the first story. Window openings are present in the bays between the doors and in every bay on the second story.

In 1913, the wood floor and roof framing was demolished and replaced with cast-in-place concrete floor framing and structural steel roof framing that included supports for a roof monitor. The concrete and steel beams were supported by two rows of interior columns and by the original exterior masonry walls. The 1913 concrete post and beam system is arranged in three bays across the width of the building and 15 bays along its length.

The original building is approximately 200 feet long by 71 feet wide. The first or ground floor is an exposed concrete slab on the ground; the second and third floors are finished with wood flooring over the concrete beam and slab system; the roof is sheathed with slate laid on tongue-and-groove wood roof decking.

A wood-framed extension was constructed to the east of the original building in 1943, doubling the floor plan of the building. The extension is a two-story flat-roofed structure with asbestos shingle siding. It was constructed as a temporary structure, but remains in place and is slated for exterior restoration in 2004.

B. Historical Background & Context

Charlestown Navy Yard

The Charlestown Navy Yard was in continuous operation from its inception in 1800 through its closure in 1974. The yard experienced surges of activity and periods of uncertainty, predicated on the military needs and climate of the time. Charlestown was one of six navy yards established in 1800. At the close of World War II there were eleven shipyards. In 2002 the number of navy yards had been reduced to four.

Although unofficially called the Charlestown Navy Yard almost from its first days of operation, the name was not officially given to the facility until Congress used the term in the 1974 enabling legislation for Boston National Historic Park. Until November 1945, the yard was know as the

Boston Navy Yard or U. S. Navy Yard, Boston, or variations thereof. In a reorganization of naval shore facilities in 1945, the yard was officially designated as Boston Naval Shipyard. This report uses Charlestown Navy Yard to refer to the facility without regard to what the official name was at any given time.

The War of 1812, the Mexican War, the Civil War, WWI, WWII and the Korean War saw periods of rapid growth and activity in the yards. Each bout of activity was followed by a sharp and troublesome decline. Each period of growth was accompanied by advancements in technology and innovation.

In the 1950s navy policy favored privatization of most manufacturing and retrofit of vessels. This dealt a serious blow to the value of the navy yards and they became increasingly vulnerable to budget cuts. In the 1960s Secretary of Defense Robert S. McNamara determined that there were too many yards, and that Boston, New York and Philadelphia should be closed. He was successful in closing New York in 1966. This sentiment was continued into the 1970s. In 1973 Boston and San Francisco were closed.

The official closure of the yard came in 1974. President Gerald Ford signed the Boston National Historic Park Act of 1974, authorizing the establishment of Boston National Historical Park, a unit of the National Park system. Charlestown Navy Yard became the seventh site within this park that spread across Boston and Charlestown. The Charlestown Navy Yard included approximately 30 acres at the southwest end of the yard. The act also stipulated that the yard include the USS Constitution. Building 24 houses the Maintenance and Repair Facility for the USS Constitution and is under a cooperative agreement with the U. S. Navy.

Building 24 Design and Construction

There is some confusion in the recent record as to who designed the building and its date of construction. The research conducted for this report revealed the following chronology of design and construction. The building was designed in 1847 by Naval Constructor Samuel M. Pook and was constructed as the Joiners' and Carpenters' Shop and Rigging Loft in 1848.

Alexander Parris, an architect known for his design in the Greek Revival style, was responsible for designing and overseeing construction on approximately 14 buildings within the yard[2]. Parris was discharged in 1843, due to sweeping reorganization of appointments and responsibilities.

In 1843, Samuel M. Pook was appointed Naval Constructor and was the chief of the Bureau of Construction, Equipment and Repairs. He served in this capacity until 1853 when Joseph Billings was appointed to the new position of Civil Engineer. At the time of Pook's service, the Naval Constructor was responsible for the designing of buildings, as well as vessels.

In some recent written documentation, the design of Building 24 is attributed to Billings. Following the chronology outlined above, it appears unlikely that Billings was the designer. Pook was the Naval Constructor for the period of the building's design and construction and it can be inferred that he was the designer. The design was attributed to Pook in Black and Bearss' 1993 document entitled *Charleston Navy Yard, 1842–1890*.

The funds to construct the Joiners' and Carpenters' Shop and Rigging Loft were included in an appropriations measure enacted by Congress in March 1847 for Fiscal Year 1848. The cost of $39,985 was one of the largest projects funded that year, further solidifying the construction date to prior to Billings' appointment.

Building Designation—Naming and Numbering

Originally called the Joiners' and Carpenters' Shop and Rigging Loft, the current building-numbering scheme for the Navy Yard was instituted in the early 1870s, designating the structure as Building 24. Prior to the systematic numbering scheme, many buildings were identified by the number of the site shown on the yard's 1828 master plan, or were referred to by various names based upon the building's current use. The building will be referred to as Building 24 in this report.

Further confusion surrounds the designation and date of Building 24. In October 1847, submitted as part of the improvements for Fiscal Year 1848, was a proposal for a sail loft and cordage storage facility to be located on Site No. 24. Later in the document, the author refers to the Sail Loft and Cordage Storage Facility as Building No. 24. The Sail Loft and Cordage Storage building is Building No. 33, which was not completed until 1852. Unfortunately, the incorrect numbering was repeated in other locations, which in effect attributes Building 24 to a later date, increasing the confusion around the designer of the building.

C. Chronology of Development & Use

On October 10, 1846, a letter outlining the "Annual Report and Estimates for this yard for the year commencing on 1st July 1847 and ending 30th June 1848" was sent from Foxhall A Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, in Washington, DC. Included in this extensive letter was the following statement: "Of the objects embraced in this report which are not on the approved plan I wish to observe that the building for the Joiners Shop – Carpenters Work Shop and Rigging Loft near the Dry Dock is much wanted, it will be near the place where most of the repairs of ships are made. Much time & expense would be saved in the transportation of materials to and from the Dock."

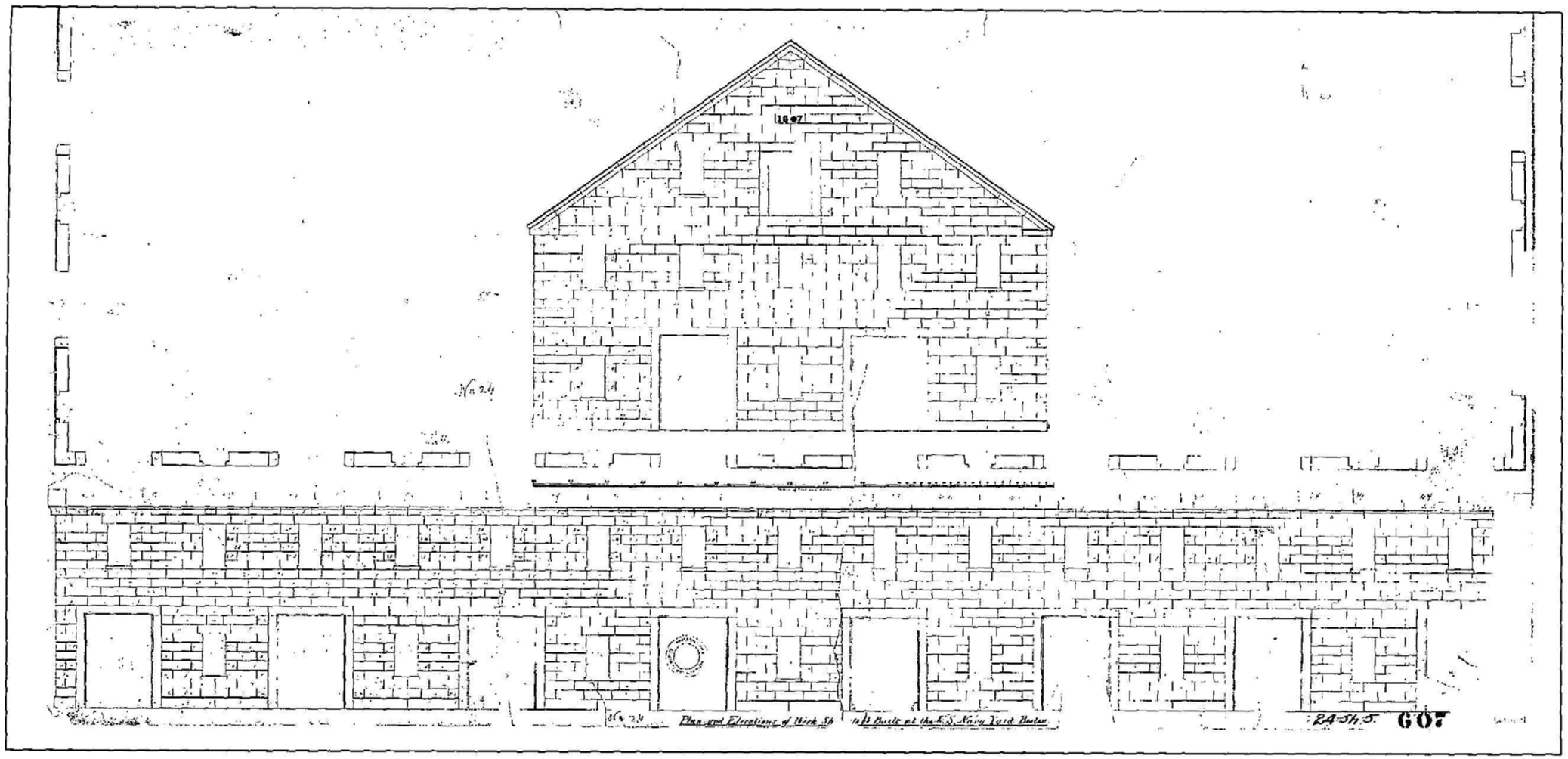
The 1846 letter also states, "Estimates for a proposed Joiners Shop Carpenters work shop & Rigging loft to be built near the Dry Dock No 54[3]. The building to be of granite (edged with ashlar similar to the Rope walk) to be 200 ft long 70 ft wide. Probable cost of materials $25,631.00, probable cost of labor $14,354.00, Total. $39,985.00."

This plea laid out the need for the building, and the importance of the location adjacent to Dry Dock No. 1, which was completed in 1833. Interestingly, USS *Constitution* was the first ship to enter Dry Dock No. 1. Throughout 1846 and 1847 drawings and estimates were sent to Washington for review. The project was included in the Congressional funding bill of March 1847 and work began on the structure in the summer of 1847.

During construction of the building, a letter was written from Commandant Parker stating that "The muster Bell at this yard is broken and we shall be compelled to get a new one. The Belfry at the Ship House is rotten, and the House itself not very strong. I propose (with the approbation of the Bureau). To erect a Belfry on the new Carpenters & Joiners Shop work building". This change was approved and the belfry remained on the north end of the building until 1910.

A complete set of the original drawings was not found during the research for this report. Two individual undated sheets, which appear to be original and are located in the Charlestown Navy Yard archives, are described below.

Drawing 24-5 (C1), labeled "Plan and Elevation of Work Sh(op) to be Built at the U. S. Navy Yard Boston." is assumed to be from 1846 or 1847. The drawing shows the plan of the building, an end elevation and a side elevation. Each stone is numbered in red pencil, with the stone sizes delineated. This may be the contractor's working drawing for the stone.



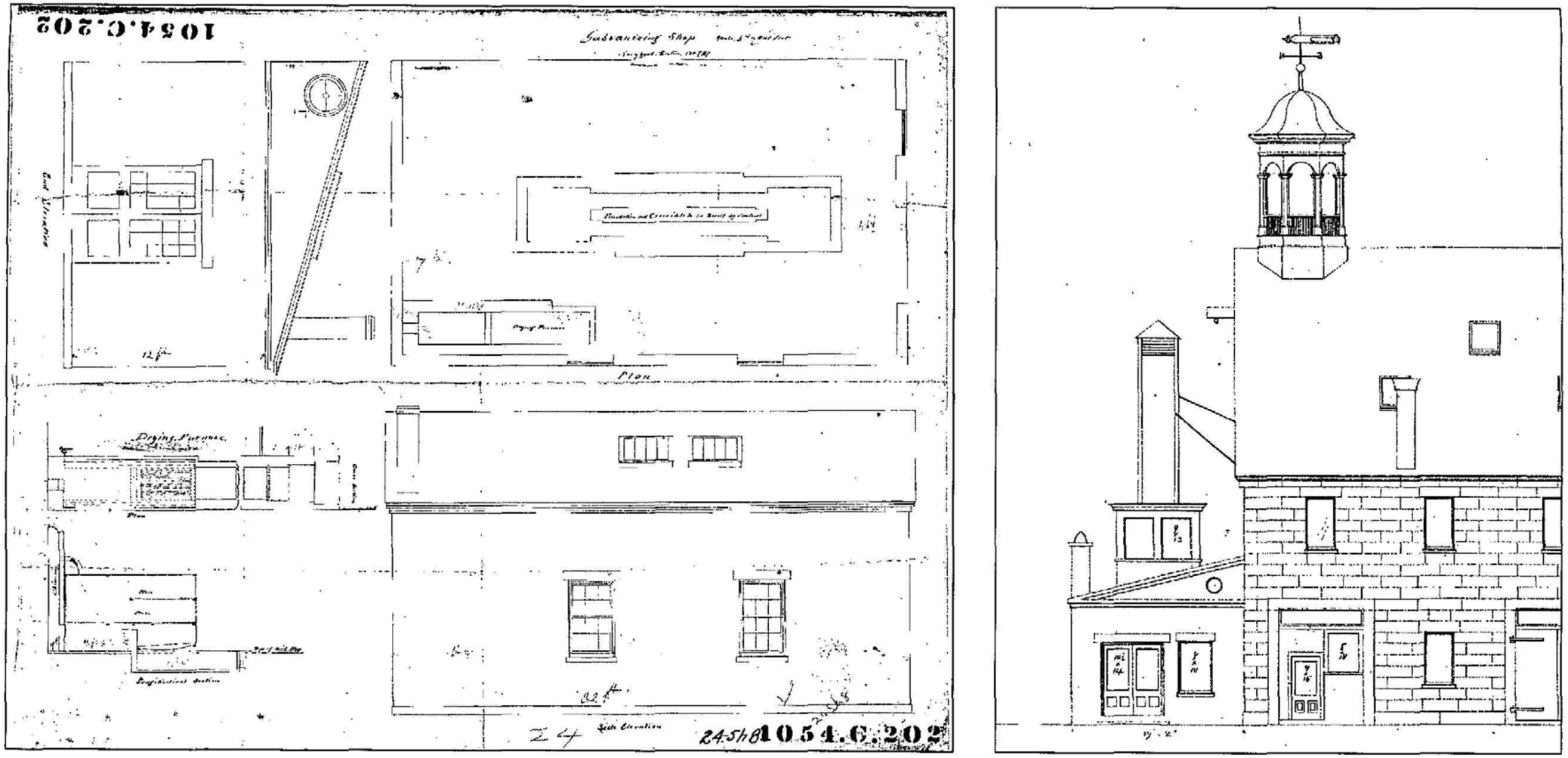
(C1) *Drawing 24-5, labeled "Plan and Elevation of Work Sh(op) to be Built at the U. S. Navy Yard Boston".*

Drawing 24-7 appears to be contemporaneous with 24-5. It has no title or date, but has labeled drawings of "Riggers Loft Floor" and "Joiners Loft Floor". They are floor framing plans, with notes and number and dimensions of beams in pencil. This drawing may also be a contractor's working drawing.

The earliest image found of the building is an engraving included in Black and Bearss' 1993 history of the yard. The image is a "View of the Dry Dock at the U. S. Navy Yard, Charlestown, Mass." from *Gleason's Pictorial Drawing Room Companion*, vol. I, No. 7, June 14, 1851 (B1). The roof of the building is visible and shows multiple skylights on the west slope of the roof, and a double chimney on the south end.

In 1856–60 alterations were made to the building to designate storage space for tools and items needed for the operation and maintenance of the dry dock.

An 1857 image entitled "View of the Interior of the United States Navy Yard, Charlestown, Mass." from *Gleason's Pictorial Drawing Room Companion*, Nov. 29, 1857 shows the building in the distance with the muster bell on the north end, the skylights on the west slope of the roof and the double chimneys on the south end (B2).

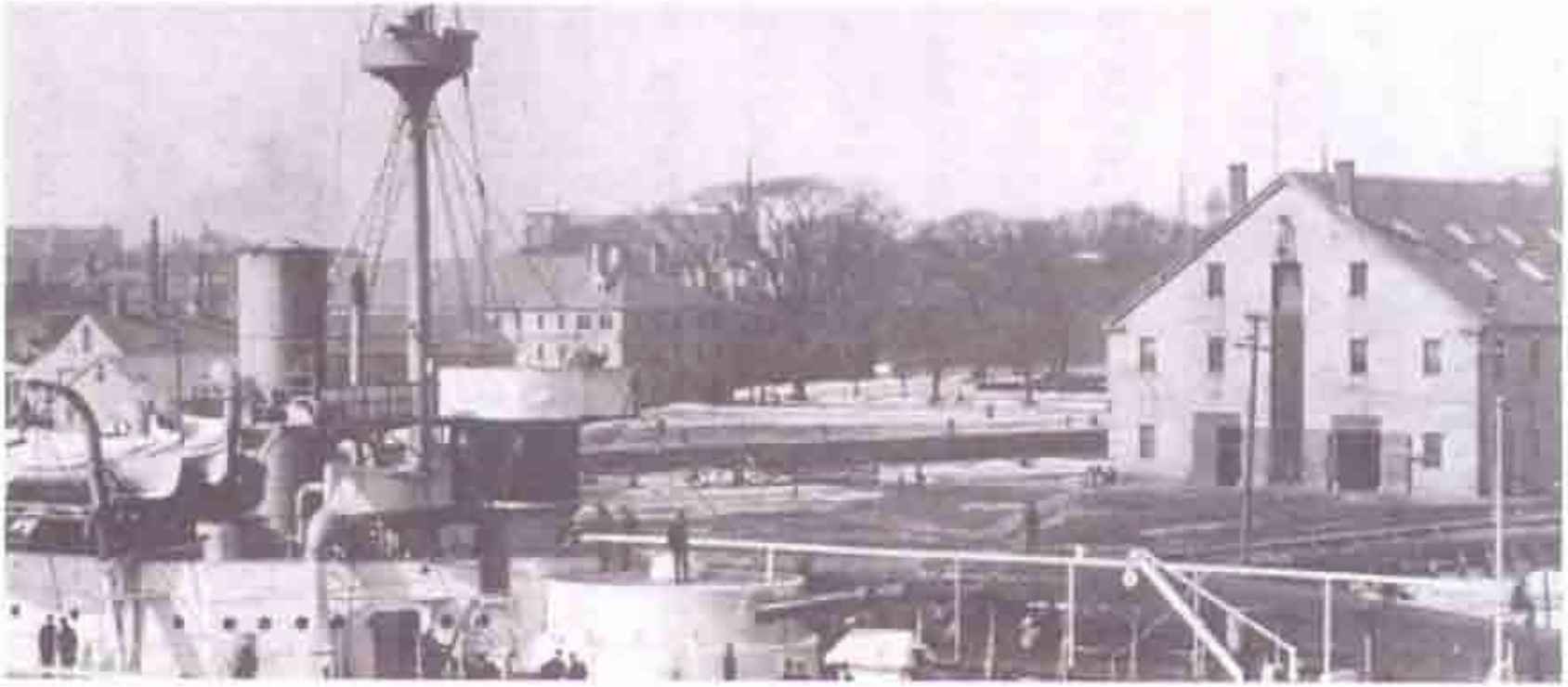


(C2) *Drawing 24-8, at left, shows plans and elevations for the galvanizing shop addition, which also appears on the end of the building elevation shown in Drawing 24-4* **(C4).**

A galvanizing shop was added to the north end of the building in 1867. Plans and elevations for the addition exist in the archives (C2). Plans, sections and elevations of the entire building in 1873 show a chimney and monitor added to the galvanizing shop (C4). A note on the drawing says: "Build of Stone backed with Brick. Partitions of Wood. Galvanizing Shop of Brick. 1st & 2nd Stories Occupied by Construction, Loft occupied by Equipment. Roof Slated. No Gutters."

The 1873 first floor and second floor plans (C4) designate room uses consistent with the industrial nature of the building, such as the galvanizing shop and carpenter's shop, whereas the joint use of the building is apparent from designations such as the Naval Constructor's Office. The Rigging Loft takes up most of the third floor, with small offices and storerooms. A scale platform is shown outside the building foundation wall, adjacent to the Weigher's Office, and is in the exact location of a foundation uncovered during excavation of structural test pits in 2002.

The room designations are consistent with records that indicate joint uses for many of the buildings, starting in the 1860s. Building 24 housed storage space and the rigging loft operated by the Equipment Department, and office space and the galvanizing shop of the Department of Construction and Repair. The Department of Construction and Repair



(B5) *Photo of the USS Ampbitrite at Boston Navy Yard in the late 1890's (copied from Black, 1988, p. 115). Looking northwest from the harbor, showing the full south elevation and partial east elevation. Note original door panels, the pulley above the rigging loft door, wood slats from third floor opening to ground, and blueprint-drying rack extending from the south elevation second floor westernmost window.*

was responsible for all work on ships, and was headed by the Naval Constructor. This combined usage possibly saved the building from a serious fire in 1869. A fire started in the rigging loft (3rd floor) in February. According to the Naval Constructor, the fire was discovered by the men of the galvanizing shop and extinguished before it caused much damage to the building. He implied that the fire was caused by negligence of the Equipment employees.

Building 24 is visible in the background of an 1870 photograph of USS *Wachusett* (B4). It shows the south end chimneys, skylights and a chimney on the west roof slope. Drawing 24-2 is a "Sketch of chimney in Rigging Loft", dated 1868. The chimney in the photo is in the correct locations of the roof, as drawn, and is probably the chimney in the sketch. During the 1890s the clerical staff of the Department of Construction and Repair increased steadily. A photograph from the late 1890s shows the building in the background (B5). The third floor doors are open on the south end of the building. There are vertical wooden slats that run from the third floor opening to the ground. These are probably to protect materials that were being hoisted from the rigging loft from getting snagged or abraded by the rough-hewn granite blocks. There is a blueprint drying rack extending from the second floor, western most window on the south elevation. The 1873 drawings (C4) show a Draftsman's Office located on the second floor in the southwest corner, verifying the use of the room as a printing room.

(B6) *Photo "Office Building and Rigging Loft, looking South-east. Boston Navy Yard. Aug. 2, 1900." CNY Archives (BOSTS 9298 & BOSTS 9585 & BOSTS 10047).*

There is a set of drawings (C5, C6) and two good-quality photographs (B6, B7) of the exterior from 1900. Much can be deciphered from these images about the condition and the usage of the building at that time. The drawings show room designations, interior partitions, and transom and door configurations. The building continued to be used for the combination of office space and shop space, as it was starting in the 1860s.

The photographs contain a wealth of information and clearly document the building prior to the 1913 rebuild. There are striped awnings on some of the windows. The awnings are located on the windows where there are offices. The windows in the offices were also replaced with 2/2 sash (as opposed to the 12/12 original sash still visible in some of the storage and work spaces). A Printing Room is shown on the second floor plan. There are two blueprint drying racks visible in the exterior photographs at the second and third windows from the north, the Printing Room location on the floor plans. There are clear images of the muster bell, doors, windows, the galvanizing shed, "Porch A" door vestibule at southern most west elevation door, the vertical wooden slats below the third floor loading doors, and the skylight and roof configuration. The photograph shows that the galvanizing shed has a monitor and chimney not included in the 1867 drawings. Although there was no written documentation found regarding the "vault" installed in the northwest corner of the building, the photographs show the openings blocked off. The granite used for the infills is very light, compared to the surrounding stone, indicating that it had been installed a short time before the photograph was taken.

A 1903 photograph of Pier 1 (B8), with Building 24 in the background, shows little change from 1900. In 1909, due to consolidation of Navy departments, the Construction and Repair shipwrights were moved from Building 24 to Building 114. A plan of the second and third floors from 1909 shows room designations (C7). The second floor was used solely for office space, with room designations of drafting room, printing room (moved one bay north from the 1900 plans, reconfiguration of the granite is visible on the building currently), Clerks Room, Naval Constructor's office, etc. The third floor is the rigging loft, with storerooms and existing department offices.

In September 1910, there was a fire in the building. The majority of the damage appears, from 1913 photographs, to be to the roof (B9). The building was then being used as the Construction and Repair offices and rigging loft and was abandoned *after* the fire.

The building underwent a major rebuilding in 1913-1914. There are extensive drawings of the reconstruction work, and construction photographs that methodically track the demolition and rebuilding work (B9-

(B9) "NAVY YARD BOSTON BLDG 24 FROM W JULY 2 1913 24-8" Looking southeast. Shows the building after the 1910 fire and before the demolition of the roof and interior framing for reconstruction.

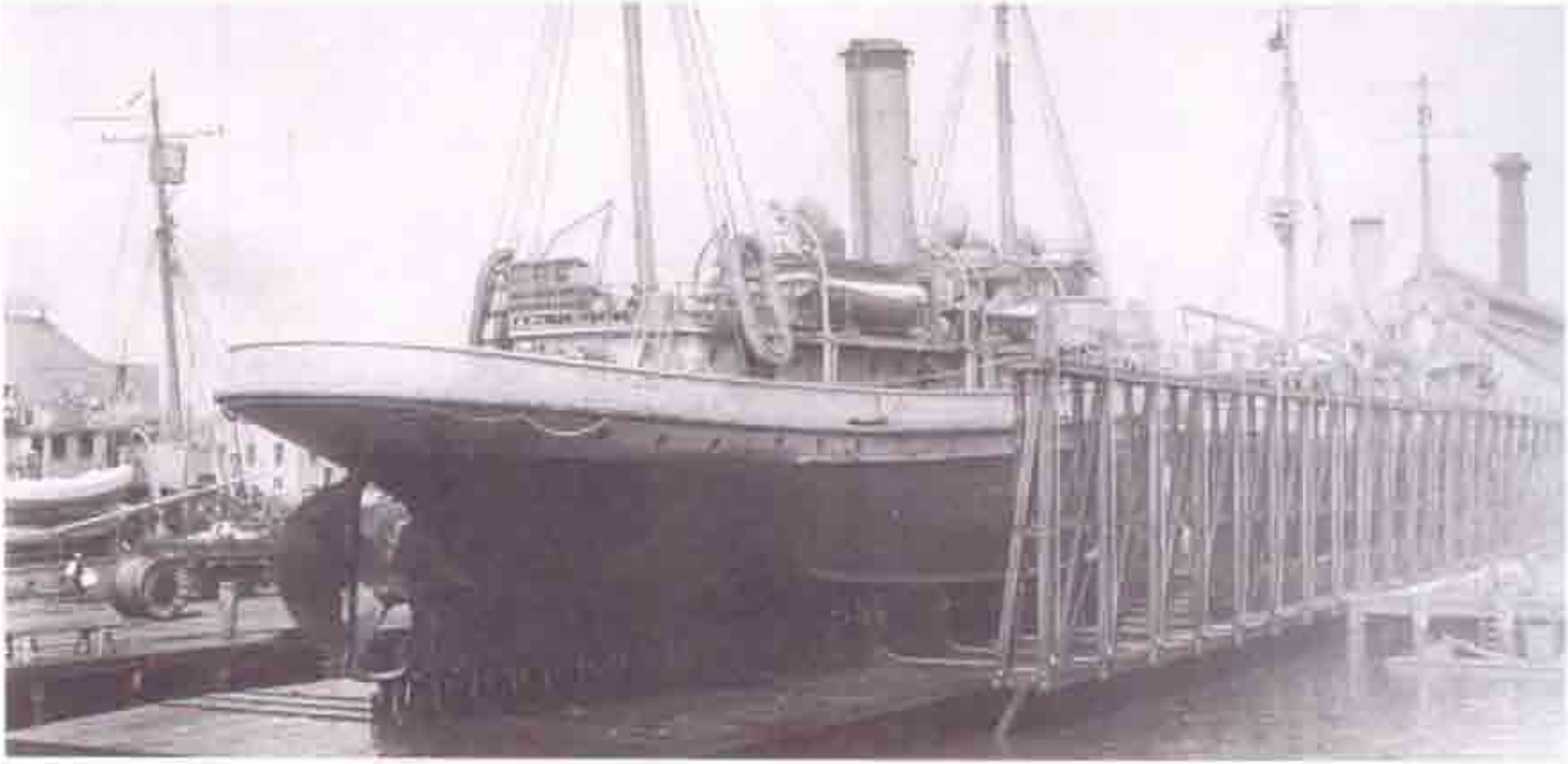
(B18) "24-17 NAVY YARD BOSTON BLDG 24 FROM SE APR 1 1914 C M LEACH CONT". Interior after the 1910 fire, looking north in a photo from 1913.

830). The building was, in effect, gutted. All of the heavy timber roof trusses and floor framing structure were removed. The exterior granite walls remained. The wooden elements were replaced with cast-in-place concrete floor framing and structural steel roof framing. This was probably done in an effort to make the building "fireproof". The concrete and steel floor framing beams were supported by two rows of interior cast concrete columns and by the original exterior masonry walls.

The visible exterior changes to the building from the 1913–14 reconstruction include the addition of a monitor on the roof, the addition of a gutter along the east and west eaves, and installation of 1/1 window sash. The galvanizing shop is gone from the north end of the building, and there is an area of light color (probably paint) in the location of the structure.

The drawings contain full size details of the door casings, window sash and the exterior brick mold. The roof framing was originally proposed to be cast concrete, but was changed during the design phase to be structural steel. The original plans also show an elevator, which was deleted during the design phase. The use of the building is documented by the room designations on the floor plans, including courtroom, library, museum, boardroom and an office for the chaplain.

The building underwent minor renovations during the remainder of the 1910s, including installation of a sprinkler system, installation of supports for rope to be stretched, lighting in the rigging loft and second floor, installation of locker rooms, a new chimney and hot water tank, and a fire escape. There were plans in 1918 for a proposed elevator at the north end of the building. It was never constructed.

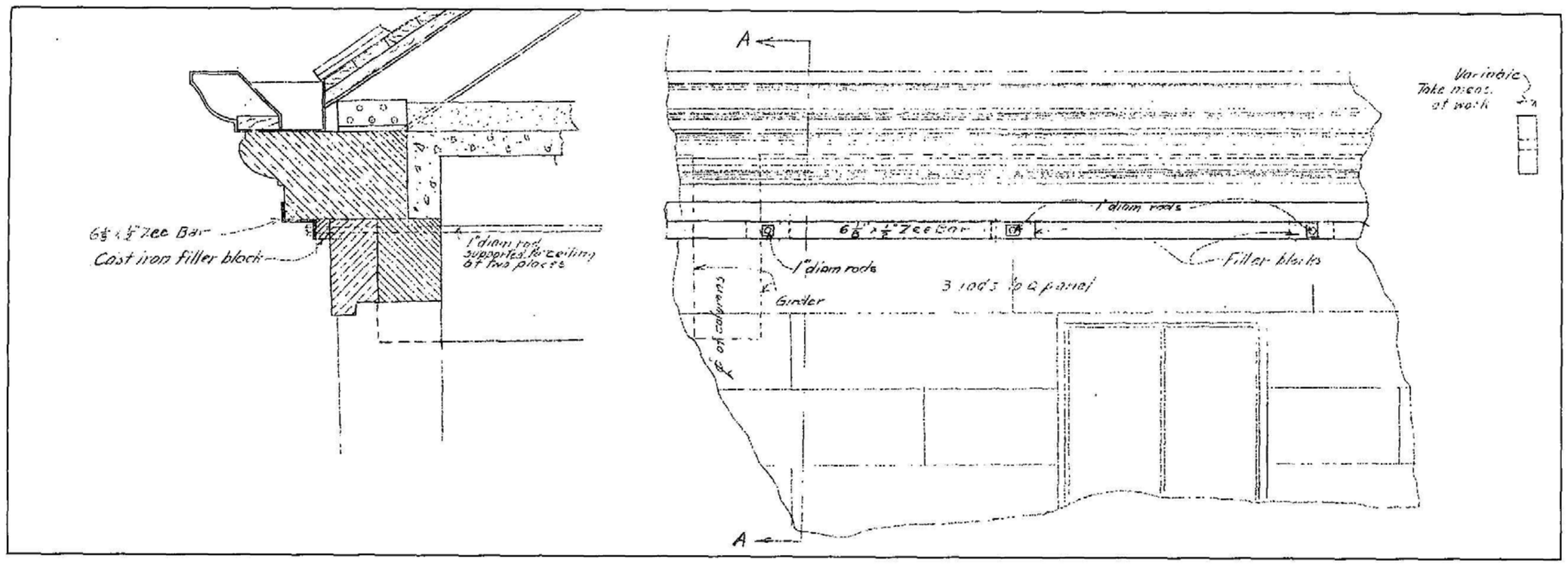


(B45) 1919 photo showing marine railway in operation. Building visible in background, monitor windows open

In 1918–1919 a marine railway was constructed at the south end of Building 24 (B41, B44, B45, B52). Frederick Black explains the marine railway:

> *"A marine railway, or hauling-out ways, is a mechanism for exposing the underwater portions of small ships and boats. Essentially, it consists of an inclined railway projecting into the water and on which travels a cradle with an endless-chain arrangement. In "docking," the cradle is run down the rails into the stream and the vessel maneuvered to a position where the hull can be secured to the cradle and hauled out of the water. A marine railway serves the same purpose as a dry dock."*

The drydock was capable of hauling out vessels up to 2000 tons. The marine railway began service on June 9, 1919 and became an important addition to the yard. The chain mechanism, located in the southeast corner of the building, is still in place (B50). Modifications were made to the building to accommodate the operation of the marine railway. The first floor lintel of the eastern window has been raised and a steel lintel installed. A photograph of 1917 (B40) shows the lintel in its original location and a 1919 photograph (B43) shows the south elevation of the building with the modification.



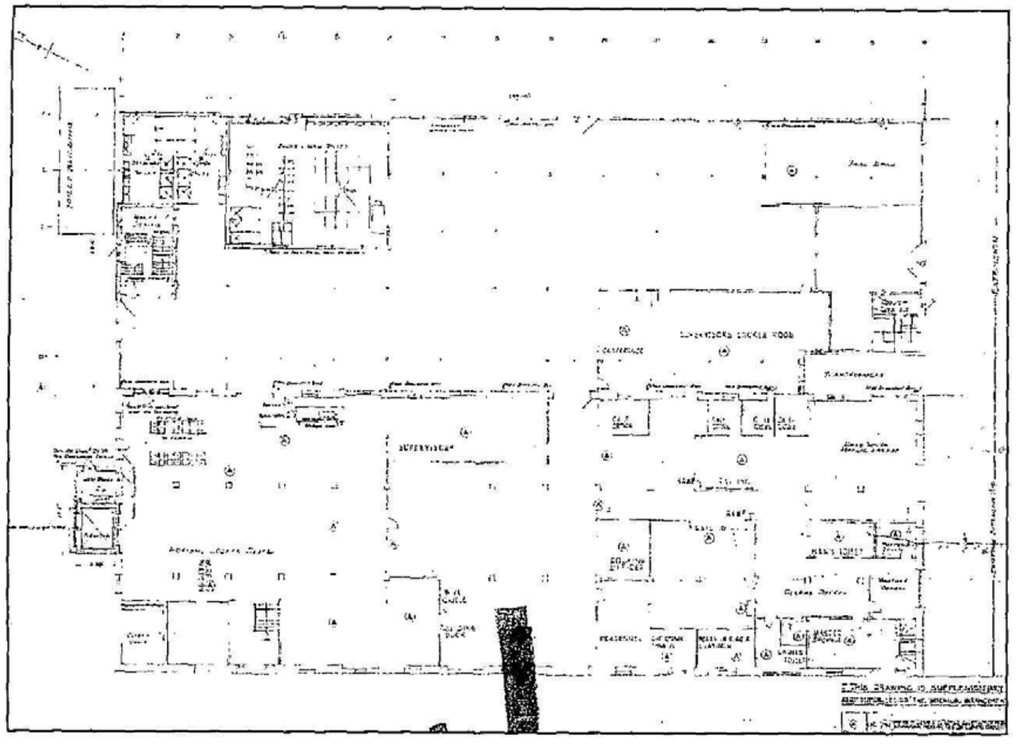
(C11) *Drawing 24-53 showing detail section and elevation with Z-shaped channel and tie-rod system installed in 1922.*

In 1919 is found the first written record of structural problems with the building. Drawing 24-48 "Plan Showing Elevations at Bottom of Girders Supporting 3rd Story Floor Beams, Taken Jan. 25, 1919." A note on the drawing states "Crack at back of stone cornice extends between Cols 1–14 on east side and between Cols 5–14 on west side. The crack is 1/2" to 2-1/2" in width, 1/6" deep." The crack noted can still be seen along the third floor eaves. The concrete slab is cracked along the rafter line.

A handwritten sheet entitled "Test Readings for Spreading of Outer Walls Bldg #24" contains a note stating, "Marks on Cols within the Building were checked and no appreciable settlement was found to have taken place." The readings were taken on January 31, 1919. Readings were again taken in 1921 on January 17, March 21, April 21, and August 14 indicating total amount of settlement since Jan. 1919.

Drawing 24-53 "Plan Showing Method of Repairs at Coping of Building", dated March 22, 1922, shows an elevation and section of a Z-shaped channel and tie-rod system that was installed through the cornice (C11). Presumably, this system was installed to counter the perceived spreading of the walls as noted above. See the Existing Conditions Section of this report for the structural analysis of this problem.

When the roof was constructed in 1913 a monitor was installed along the ridge, with a continuous row of pivoting wood sash. The monitor was likely installed to provide light and ventilation to the Rigger's Loft. The original roof had 18 skylights on each slope for light and ventilation to the work space. The original 1913 roof did not have skylights. In 1927 Drawing 24-54 "Skylights for Rigging Loft (Third Floor)" shows the addition of two dormers per roof slope. The details show four long panes of overlapping glass, similar to greenhouse glazing details. A photograph of the west elevation of the building in 1937 (B48) shows four skylights on that roof slope. An aerial photograph from 1940 (B49) shows the west roof slope with six skylights, the current configuration of skylights.



(C15) *Drawing 24-79 showing first-floor plan of 1943 addition.*

Lighting installation and upgrades to all floors of the buildings occurred throughout the 1930s.

A 1934 "Map of U. S. Navy Yard, Boston, Mass. Showing Conditions on June 30, 1934" notes that Building 24 is a Production Department building and that it is the "Riggers, Laborers, New Work Office."

Drawing 24-58, dated 1939 (C12), shows the floor plans for all three floors, with room use designations. The first floor included: locker room, store room, fuel bin, block and rope stowage, laborer's lobby, material and tool rooms, stowage, lockers & office, marine railway head house, and clerks & files. The second floor included: inspector naval material, files, janitor, inspectors, stock, sailmakers office, sail loft, riggers, storeroom, clerks, chief radio electrician inspector, stock, women's toilet, men's toilet and vault. The third floor was designated as the riggers loft, with some area taken up by stock rooms, an office, lockers and a toilet room. The building apparently continued its mixed use through this era.

Building No. 24 East Extension was designed in 1942 and constructed in 1943 (C13-C16). The drawings include an "Elevator & Hose Tower" on the north end of the original building. This time, the elevator was constructed and was extant at the time of this report. This was a time of intensive "temporary structures" building at the Navy Yard. No photographs were found that document the construction of the extension. There was no correspondence found detailing the use of the building or the reason for its construction.

The use of the building continued to be modified over time (C17-C20). In the 1940s the second floor was used for life netting, dip ropes, bow mats, boat fenders, cargo net, diving etc. Diving equipment was stored in the vault. The third floor was used for storage of leather work life lines, grinders, ladders, sludge barge material, etc.

Drawings from the 1940s through the 1970s indicate maintenance, change in use and minor upgrades to the interior of the building. Work included ventilation of locker rooms, floor layout changes in the original building and the extension, skylight installation over the painters' locker rooms, new firestair egress from the rigger's loft, and lighting upgrades. The photographs from this time span show very little change to the exterior of the building, with the exception of the skylights and the west dormer, shown for the first time in a ca. 1950 photograph (B51).

In the 1950s there are notes regarding structural issues. In 1954 a crack in the cast-in-place columns and floor slabs is noted in a memorandum from the Inspection Division to the Shops Engineer requesting authority to investigate the condition. Elevations were taken of the underside of the concrete beams in the original building in from 1954 through 1961, at fairly regular intervals, to monitor for structural movement (see Structural Conditions section for evaluation of this structural condition).

(851) Looking north from the east side of Drydock 1. Partial north end of building and marine railway visible. Dormer has been installed on west roof.

Photographs from the 1970s feature items not indicated on previous drawings or written correspondence. Photo ASF 1410 (854) shows an exterior door lintel with a crack in the center, with structural steel in place to support the cracked lintel.

There are documents from 1973 which were part of the transition from the Navy Yard to the National Park Service. The documents include floor plans (C21, C22) for proposed uses, and a handwritten sheet noting the existing conditions of the building. There are memos and plans in a 1973-74 Public Works Division folder that outline conditions of heat, power and utilities and an inventory of materials stored on the exterior of the building. A plan, dated 11/8/73 shows the layout of machinery and allocates space assignment to the USS *Constitution* Repair Facility. There are also memos regarding the consolidation of facilities upon closure of the Boston Naval Shipyard.

There are records of Section 106 review for work completed on the building from the late 1970s through 2000. This work includes a request in 1979 to replace the built-up roofing on the extension. The request was reviewed and approved, but it is obvious from the existing conditions that the roof was not replaced. A 1982 request to upgrade Navy M&R shops was reviewed and approved, stating that "modifications would include items required to improve habitability, security and serviceability of the interior". Temporary partitions, wooden lumber storage racks, vent system for paint room, modifications to the floor for new machinery and modifications to the electrical system to accommodate new machinery were included in the work.

Other incidental work through the 1980s and early 1990s included removal of an interior stair in the addition, rehabilitation of toilet areas in the addition, and new office build out. In 1991 the windows in the extension were replaced. The Section 106 review states that all details of the windows need to match the original. The last documented work to the building occurred in 2000 when the boilers in the building were replaced and the louvers enlarged.

Work has been performed on the building by the Navy M&R Facility to maintain the building. This work has not been documented and it is hard to decipher what was completed prior to their use of the building, and what has occurred since.

The building continues its industrial use into the 21st century, evolving and changing as needed to service and maintain the 18th century living legacy—the USS *Constitution*.

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[1] Rhoda Dorsey, Douglas. Rhoda Dorsey, Douglas. Built in Boston: City and Suburb 1800-1950. Amherst, MA: The University of Massachusetts Press, 1978, 1988 (reprint), p. 18.

[2] U. S. Department of the Interior. National Register of Historic Places Inventory Nomination Form. 1978. (HHB F-210).

[3] This is a direct quote from 1840 letter, not a misprint in this report. It is referring to Dry Dock 1. It is unknown why it was referred to as Dry Dock 3A in this letter.

Part 2 | Existing Conditions and Use

PART 2 | EXISTING CONDITIONS AND USE

A. Existing Conditions Overview

Introduction

A preliminary visual survey of the building was conducted on March 28, April 3 and April 5, 2002 by Goody, Clancy and Associates, Inc., the architects and prime consultant for the National Park Service and Ocmulgee Associates, Inc., consulting structural engineers. The west elevation roof and cornice were inspected from an aerial lift provided by the National Park Service. This enabled a close inspection of the slate tiles, gutter and sections of the cornice, including locations where large pieces of granite have spalled off.

Fig. 1 *West Elevation. Due to obstructions at ground level, a full view of the entire facade is not possible.*

General Description of Building 24

Building 24 is a 15-bay, two-and-one-half-story massive granite structure (Figs. 1–4). The original construction of the building consisted of 20-inch-thick masonry perimeter walls with heavy timber floor and roof framing. In 1913, the wood floor and roof framing was demolished and replaced with cast-in-place concrete floor framing and structural-steel roof framing that included supports for a roof monitor. The concrete-and-steel beams were supported by two rows of interior columns and by the original exterior masonry walls.

Fig. 2 East Elevation.

Fig. 3 North Elevation

Fig. 4 South Elevation, 1847 Original Building

Fig. 5 South Elevation, 1942 Addition

The original granite building is approximately 200 feet long and 71 feet wide. The first or ground floor is an exposed concrete slab on the ground; the second and third floors are finished with wood flooring over the concrete beam and slab system; the roof is sheathed with slate laid on tongue-and-groove wood roof decking. The 1913 concrete post and beam system is arranged in three bays across the width of the building and 15 bays along its length.

The 20-inch perimeter walls consist of 8-inch-thick granite units and three wythes (12 inches) of brick. Story-high door openings occur in every other bay around the perimeter of the first story. Window openings are present in the bays between the doors and in every bay on the second story. All openings are formed by a single granite lintel spanning the opening.

In 1943 a "temporary" addition was built along the east elevation of the original granite building (Fig. 5). It measures 200 feet long by 70 feet wide and is connected to the original building. The structure is wood framed with a flat roof. The siding is asbestos shingles, with a built-up tar and gravel roof.

Considerable structural deterioration and distortion are present in the long west and east perimeter walls of the original building and the roof framing above these walls. Three causes have been identified for these conditions: foundation settlement; splaying rafters and rust-jacking. The foundation settlements appear to be stable at this time, but deterioration continues due to water infiltration into masonry cracks and due to corroding steel on the exterior of the building.

The structural integrity and protection against water infiltration should be the primary objectives of any restoration. The building is a structure that currently houses a maintenance facility. The level of restoration specified for this building may be based on very different standards than those used for a more high style structure. The level of restoration must be decided by the NPS, to determine how clean the building should be, which of the surface applied elements should be removed, and how "pristine" the restoration should be. The following treatment recommendations require refinement after these discussions about appropriate levels of restoration. These recommendations are based on the use of the structure remaining industrial.

The interior of the 1847/1913 and 1943 buildings have been altered as needed by each successive occupant, and modified to meet current needs. Little original or historically significant material remains in the buildings. The mechanism for the marine railway is one of the few remaining elements. The remainder of the significant interior elements is associated with the structure of the building, not with the subsequent partitions and alterations. The current floor plans and room uses are shown on the existing conditions drawings in Appendix D.

B. Materials Conditions

Description of Materials, Condition and Possible Causes of Deterioration

The materials and their conditions will be described below. Structural issues will be addressed separately at the end of this section.

Component: 1847/1913 Building—Granite Walls

Description

There is evidence on the exterior of the building of its evolving use over time. The northwest corner window and door openings were infilled with granite for the construction of a vault in that corner. There are three windows on the second floor that have small notched areas at the sills that were filled with granite. These are locations where the blueprint drying racks extended from the windows. After the racks were removed, the notches were infilled (Fig. 6). There are brick patches above the first floor on the north elevation where the galvanizing shop joists were embedded in the wall. There is dark staining below the rigging loft doors on the north and south elevations where the wooden slats were located.

Fig. 6 *Notches on either side of these windows just above the sills were infilled with granite after removal of blueprint-drying racks.*

Significance

The rock faced ashlar granite blocks of the original building are the only remaining material from the 1847 construction. The granite appears to be from Quincy, MA and is no longer quarried. The massive blocks, constructed in a simple post and beam structure, is a significant remaining example of the Boston Granite Style popular in the mid-1800s. These factors make this part of the structure highly significant. The granite should be restored to repair deficiencies in the structure and to remove elements that are causing damage to the stone. A character defining feature of the building is its industrial nature. The building should not be "over restored" to remove all evidence of the evolution of the building. Significant fasteners and infills that tell a story should remain on the building, unless they are causing damage to the stone.

Fig. 7 *Step cracks have formed along some mortar joints due to structural movement of the building.*

Fig. 8 *West elevation cornice stone with spalled stone, rusted gutter fasteners, and rusted Z channel.*

Conditions

(a) Structure. The granite blocks are in excellent condition, except where they are experiencing damage as the result of structural settlement. There are several locations where granite lintels are cracked or spalled and large step cracks have formed at the mortar joints due to structural movement of the building (Fig. 7). See the Structural section that follows.

(b) Cornice Stone Spalls. The 1913 drawings show that the gutters are bolted to the cornices with steel expansion bolts. Water infiltration under and through the gutters have corroded the bolts and subsequent rust-jacking has pried and split the faces of the stone. Large clefts of stone have broken off the cornices at random locations. These breaks occur where the 1913 gutter was bolted to the top of the cornice stones (Figs. 8 & 9).

(c) Mortar. The mortar joints are in fair condition, requiring repointing of at least 50% of the joints. It appears that the building has been repointed several times in the past and it is not known whether the mortar used is the appropriate mix for the surrounding stone. If the mortar mixes for

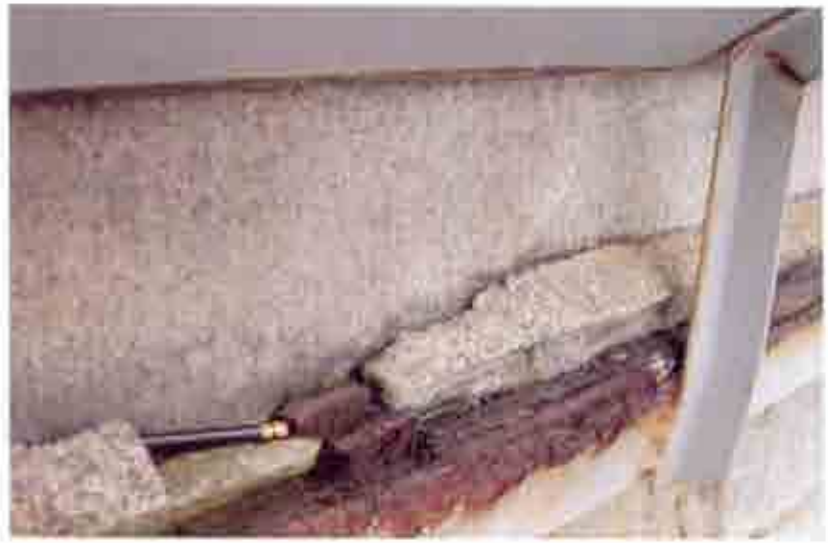


Fig. 9 *West elevation cornice stone. Note mortar filler in gap created at Z channel.*

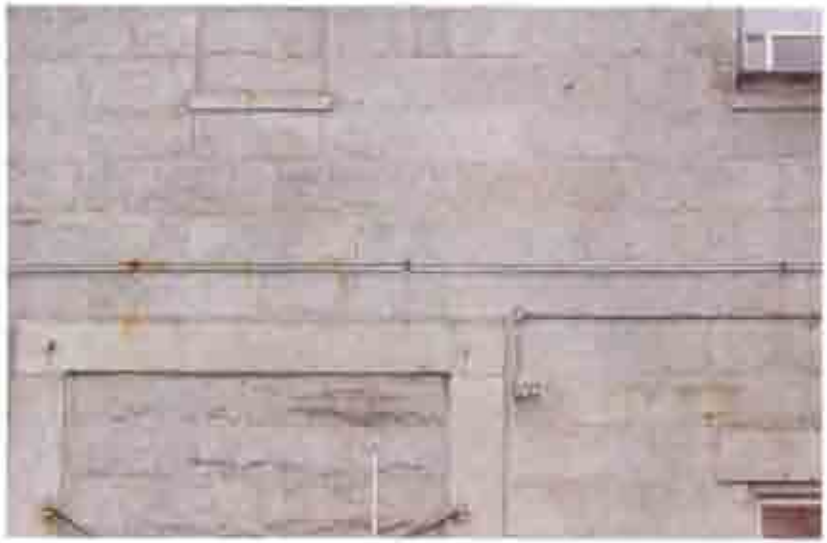


Fig. 10 *Old fasteners for surface elements long since removed remain in the granite, leading to staining of the surrounding stone.*

the original mortar and the subsequent repointing campaigns are not recorded in the archival records, laboratory analysis of the original mortar is recommended to determine the appropriate mortar mix for the repointing work.

(d) Fasteners. This is a utilitarian building and the location of conduit, fasteners and attachments to the surface has been haphazard. There are many generations of attachments to the building, from the original shutter hold-opens, to exterior electrical conduit, to signage from various eras. All of these elements have typically been fastened to the building by drilling into the granite or mortar joints and inserting a steel bolt or pin. Some of the surface elements have since been removed, leaving a steel pin, bolt or fastening device embedded in the granite. Typically these steel elements are rusting and staining the building, and in the worst cases the pin is expanding due to the rust and cracking or spalling the surrounding stone (Fig. 10).

(e) Soiling. The stone is generally soiled from atmospheric pollutants, with some rust staining in isolated areas. The soiling does not appear to be causing accelerated deterioration of the stone.

Treatment Recommendations

(a) Structure. The structural issues will be addressed below.

(b) Cornice Stone Spalls. The steel fasteners installed to hold the wood gutter nailer should be removed to prevent further rust jacking and spalling of the cornice stone. The areas of spalled cornice should be repaired with dutchman stones. The holes should be filled with round, core dutchman, installed using epoxy adhesive. The cornice stone profile should be replicated, and the dutchman fastened using epoxy and stainless steel pins.

(c) Mortar. At least 50% of the mortar joints require repointing, due to failure of the mortar, or surrounding structural repairs. Repointing the building 100% is recommended while other work is occurring on the building, to take advantage of the scaffolding erected for other work on the building. Scaffolding is often a large percentage of the expense to repoint a building. As stated above, laboratory analysis of the original mortar is recommended to determine the appropriate repointing mortar mix.

(d) Fasteners. The historic shutter hold-opens, door hinges and other fasteners that are historically significant should remain in place, as long as they are not rusting and damaging the surrounding masonry. Other miscellaneous unused fasteners and attachments should be removed and the resulting hole patched. All holes should be patched using a core dutchman.

(e) Soiling. The surface soiling is not causing damage to the stone. The airborne pollutants would clean off of the stone fairly easily using an acid based stone restoration chemical cleaner, or a light abrasive cleaning method. The rust stains should be removed using specialized stone restoration stain cleaning materials. Although cleaning will be required at areas where repointing occurs to remove the mortar haze from the surface of the stone, the cleaning should be light enough to leave the patina on the stone. Aggressive cleaning is not required nor recommended.

Component: 1847/1913 Building – Slate Roof & Flashings

Description

The roof is a steel-framed gable with a 170-foot-long monitor centered on the 200-foot-long ridge of the main roof. The roof is sheathed with wood tongue-and-groove planks and covered with black, non-fading slate. It is assumed that the slate roof, copper gutters, downspouts and flashing were installed during the 1913 roof reconstruction and have not been replaced since that time. There are six wood skylights on each slope, installed at intervals between 1927 and the 1960s. There is a door from the rigging loft to the east extension roof that is cut into the roof. It has a flat roof covered with rolled roofing. There is a hipped dormer on the west elevation, covered with slate. There is a copper gutter that runs the full length of the west elevation, and a short length of the east elevation until it meets the east extension roof. The gutter is drained by four downspouts on the west elevation and one on the east. The monitor is also steel framed and contains pivoting windows for the full length of the monitor. The monitor structure is sheathed in galvanized sheet metal on the exterior. The monitor was constructed in 1913 and the galvanized trim on the exterior is assumed to be from the same date. There are no gutters on the monitor roof. There is a copper ridge on the peak of the monitor and the ridge of the main roof that is not intersected by the monitor.

Significance

This roof, constructed in 1913–1914, has been on the building longer than the original gable roof with multiple skylights on each slope. The monitor is a distinctive feature of the building, and has gained historical significance in its own right. The roof is the only change from the 1913–14 rebuild that is visible on the exterior of the building.

The fact that the original gable roof configuration with multiple skylights was not reproduced suggests that there may have deficiencies with the original roof. It is possible that the multiple skylights provided inadequate ventilation, or were difficult to keep from leaking. The installation of the monitor was probably an attempt to address these issues. The addition of skylights in the 20th century points out that the monitor may not have provided adequate ventilation either.

Fig. 11 *The slate roof, installed in 1913–14, has been on the building longer than the original gable roof.*

Conditions

(a) Slate. The slate is relatively intact in locations where it is not surrounding the numerous penetrations or terminations through the roof. Where the slate intersects the gutters, monitor or skylights, there has been extensive remedial work to stop leaking. The slate in these areas has been covered with bituminous material and repairs have resulted in a high percentage of broken slate. Due to the numerous penetrations through the roof, there are few areas of undisturbed slate tiles. Slate typically has a life expectancy of 75-100 years if properly installed and maintained. Assuming that the slate was installed in 1913, it is 90 years old

Fig. 12 & 13 *East roof slope (left) with original copper gutter coated to meet flat roof of addition. Copper gutter of west roof slope (right) shows streaking, indicating advanced deterioration of material.*

Fig. 14 *Many of the wood-framed skylights are actively leaking. Note the loss of paint and patched metal flashing.*

and reaching the end of its expected life span. If extensive work is performed on the roof, the cost to salvage and work around the existing slate may not be justifiable (Fig. 11).

(b) Gutters. The copper gutters are streaking and have been patched with tar-based materials in the past, likely in an attempt to patch holes and stop water infiltration. The expected life span of copper sheet metal materials is 50–75 years. All of the metal elements on the building have exceeded this time frame and are experiencing deterioration consistent with normal wear. The copper gutter along the east elevation, where the east extension roof intersects the main building, is lined with a heavy layer of bituminous sheet membrane. A couple inches of water typically sit in the gutter until it evaporates (Fig. 12 & 13).

(c) Downspouts. The downspouts were 4" square copper originally, but have been replaced with round corrugated aluminum or galvanized metal.

(d) Flashing. There is metal flashing at the roof to parapet intersection and the main roof to monitor. This flashing is original to the 1913 rebuild and is experiencing deterioration consistent with normal wear. The flashing from the monitor to the roof is in poor condition and has been repaired with rolled roofing, roofing cement and other temporary materials. This area is patched as new leaks appear.

(e) Ridge. There is a formed copper ridge the length of the monitor roof and the ends of the main roof that are not covered by the monitor. The ridge is original to the 1913 rebuilding and is in fair condition. The ridges should be replaced if major work is undertaken on the roof.

(f) Skylights. The skylights are wood framed and many of them are actively leaking around the perimeter, or due to missing glazing putty. The wood is in poor condition and they are not high enough quality to warrant restoration (Fig. 14).

(g) Dormers. The dormer on the east elevation is in fair condition (Fig. 15). Most of the asbestos shingles are gone from the diagonal sheathing.

Fig. 15 *The east elevation dormer is in fair condition.*

Fig. 16 *West elevation dormer. Note temporary repairs made to metal flashing.*

The rolled roofing is in fair condition and should be replaced as part of any roof work completed on the main roof. The west dormer (Fig. 16) is in poor condition. The paint is peeling and missing from most of the wood siding. The roof flashing is in poor condition and has been patched repeatedly to stop leaking. The slate roof is missing some tiles. The windows are in fair condition and require restoration and painting.

(h) Monitor Metal Sheathing. The paint is missing from many areas of the galvanized metal sheathing on the monitor. The underlying metal is rusting and it is in poor condition (Fig. 17).

(i) Monitor Windows. The monitor window sash were replaced in the 1970s. The windows are in poor condition and are currently fixed in place. The original operating mechanism, which consists of a gear mechanism that operates a series of bars and levers to open the pivot windows, is still in place. (Figs. 18 & 19)

Fig. 17 *Monitor. Detail of wood windows and metal trim. Note rusting of galvanized metal and loss of paint on wood and metal.*

Fig. 18 & 19 Monitor interior. Operating mechanism for window sash.

Treatment Recommendations

(a) Slate. The slate is relatively intact in locations where it has not been disturbed for repairs. Installing new gutters and flashing around skylights and the monitor would require the removal of approximately 2' of slate surrounding the replaced element. With this disruption, there would be few areas on the roof that remain undisturbed. The slate on the roof is almost 90 years old and it is not advisable to salvage the slate for reuse. Replacement of the slate with new slate to match the original in color, texture and size is recommended.

(b) Gutters. Replacement of the copper gutters is recommended. These gutters should be fabricated in 20-oz. copper and fabricated to replicate the 1913 profile. A single ply, rubberized membrane should be installed under the gutter to provide an additional water infiltration barrier. As part of the gutter work, the wood nailer that is fastened to the cornice stones with rusting bolts will have to be replaced. The copper gutter along the east elevation, where the east extension roof intersects the main building, should be replaced when the west gutter is replaced. It should be pitched adequately to drain to downspouts.

(c) Downspouts. The corrugated downspouts should be removed and replaced with 4" square copper. The downspouts should be tied into the cast iron drainage boots at grade.

(d) Flashing. All of the flashing around the monitor, skylights, dormers and parapet is in poor to fair condition and should be replaced as soon as possible. The replacement material should be 20 oz. copper with a single ply, rubberized membrane under the flashing.

(e) Ridge. As part of any comprehensive roof work, the ridge should be replaced. It should be fabricated in 20-oz. copper to match the 1913 profile.

(f) Skylights. The skylights should be replaced. The skylights should be designed to shed water more effectively than the current design. They should be easily opened from the interior to provide ventilation to the lower parts of the space. The flashing should be replaced as part of the roof work.

(g) Dormers. The east dormer should be reshingled as part of the east elevation work. The shingles used for the east extension should be used for the dormer. The roof should be replaced with either rolled roofing or EPDM single ply membrane roofing as part of the main roof work. The west dormer siding should be repaired as necessary, prepared and painted. The windows should be reglazed where necessary and painted. The flashing and slate should be replaced as part of the main roof work.

(h) Monitor Metal Sheathing. The galvanized metal sheathing should be replaced as soon as possible to provide a weather tight enclosure. The replacement material should be a coated sheet metal, to eliminate the need to keep the surface painted. Lead-coated copper or terne-coated stainless steel should be considered.

(i) Monitor Windows. The windows should be replaced to match the 1913 drawings. The operating mechanism should be restored to make the pivot windows operational to provide ventilation to the upper portions of the space.

Fig. 20 *Detail of asbestos shingle siding and window condition*

Component: 1943 East Extension—Wood-Framed Walls and Asbestos Siding

Description

The east extension is wood framed with asbestos shingle siding and a flat built-up roof.

Significance

The 1943 extension is significant as one of the remaining World War II buildings within the Navy Yard. The structure itself is fairly mundane, but the WWII era was one of the most significant and busy times in the Navy Yard. The structure should be preserved as a significant component in the Yard, and as a significant component in the evolution of Building 24.

Condition

(a) Structure. The structure of the 1940s extension appears to be in sound condition.

(b) Siding. The asbestos siding is deteriorated to the point of failure. Shingles are falling off of the building in many locations (Fig. 20).

(c) Sheathing. In numerous areas large areas of siding and building paper are missing, exposing the underlying wood sheathing. The underlying wood sheathing must be inspected upon removal of the siding to determine if there is deterioration.

Treatment Recommendation:

(a) Structure. No action required at this time.

(b) Siding. The asbestos siding must be removed by a firm specialized in asbestos removal and the debris disposed of in a certified landfill. New cement shingles, to match the size and texture of the asbestos shingles, should be installed. All new flashing at the window and door openings should be replaced, and coordinated with the window work to ensure proper installation of the flashing.

(c) Sheathing. When the underlying wood sheathing is exposed, a thorough examination of the condition should be conducted. All deteriorated wood sheathing should be replaced with sheathing to match the original in material and thickness.

Component: 1943 East Extension—Built-Up Roof

Description

Flat roof with built up roofing material.

Significance

There is no inherent significance in the roof structure or material. Whatever material is used to cover the roof, it should remain flat to maintain the two story, utilitarian character of the extension.

Fig. 21 *Flat roof. North end of roof.*

Fig. 22 *Flat roof. South end of roof.*

Conditions

The built-up roof on the addition may be the original 1943 roof. It is in poor condition and has been leaking over many years (Figs. 21 & 22). Repairs are made as needed to stop leaks. The roof is currently used to store rope and other materials, making a thorough review of conditions difficult. The NPS must determine if this use will continue after re-roofing the addition. The type of roofing specified will be determined based on the intended future use.

Treatment Recommendation

The flat roof requires replacement as soon as possible. If the roof is no longer used to store coils of rope, a single ply membrane should be installed. All of the flashings must be replaced, with particular emphasis on the flashing details where the addition meets the original building.

Component: 1943 East Extension—Windows

Description

The current windows were fabricated and installed in 1991 (Fig. 23). The Section 106 review of the proposal states that the windows much match the original in detail. The current windows replicate the 8-over-8 sash configuration of the original 1943 windows.

Significance

The current windows are not significant. Any future replacement windows should replicate the original 1943 window configuration and details.

Fig. 23 *Typical window on the 1943 East Extension*

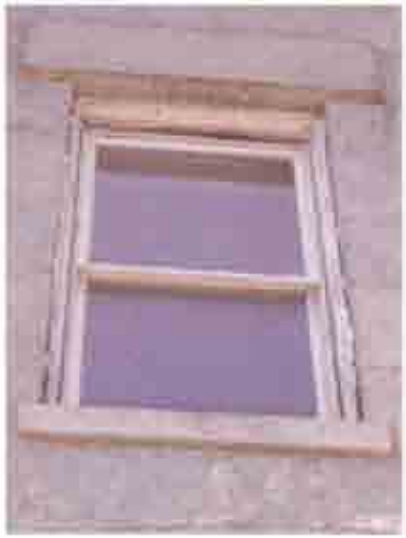


Fig. 24 *Typical window on the 1847/1913 Building.*

Conditions

The windows in the extension are wood with true divided lites, 8/8 sash with ropes (or chains) and pulleys for operation. Many of the ropes are broken or missing. The size of the sash makes opening the windows without the weights difficult. The windows are generally in fair condition, with gaps around the perimeter allowing air infiltration.

Treatment Recommendation

The quality of the windows is too poor to warrant restoration of the windows. Minor repairs, including trim installation and caulking, would result in a reduction in the air infiltration, and replacement of broken cords would allow for easier operation of the windows. The windows should be replaced within the next 10 years.

Component: 1847/1913 Building—Windows

Description

The main building windows were originally 12/12 sash. Some of the sash were replaced pre-1913 with 2/2 sash at offices. In 1913 the sash were replaced with 1/1 wood sash. The current windows and frames were installed in 1989–1990 and are 1/1 wood sash with vinyl jamb liners (Fig. 24). The windows are inexpensive, prefabricated units that were not custom made for the openings. There are a few windows on the building that were not replaced in 1989–90. The elevator shaft windows were installed in 1943.

Significance

These windows are not significant. When the windows are replaced they should be replaced with 1/1 sash to replicate the appearance of the 1913 rebuild. There are window drawings from the 1913 rebuild that show the sash details.

Conditions

The windows in the main building are poor quality, they fit loosely in the openings, causing the sash to rack and twist. Most of them are difficult to reach, making their operation even more difficult. Many of the windows do not have interior trim, increasing the probability of air infiltration. The exterior wood trim varies around the building.

The elevator shaft windows are in poor condition. Many openings have been covered with plywood or are missing glazing. There are many openings that allow pigeons to enter the shaft.

Treatment Recommendation

The windows are only approximately 13 years old. The wood is generally in fair condition, with minimal wood rot apparent. The windows could perform adequately for the next 5–10 years. Due to the original low quali-

ty of the windows, restoration of them is not a viable option. Replacement within the next ten years is recommended. There are some measures that could be undertaken to make the openings more weather tight until they can be replaced. They could be caulked to decrease the amount of air infiltration and plexiglass coverings installed during the winter months to decrease the amount of cold air into the offices. The question was asked if permanent interior storm windows could be installed on the existing windows to address the air infiltration issue. This option is not recommended, as interior storms should be designed as part of the entire window opening. When new sash are fabricated for the openings, interior storms should be designed as part of the new window system.

The elevator shaft windows should be replaced immediately to stop water infiltration and pigeon access. An assessment should be made to determine where louvers should be placed to allow ventilation of the shaft.

Fig. 25 The main service door, with roll-down door inside.

Fig. 26 The northernmost door on the west side was replaced in the 1990s.

Component: Doors

Description

The 1900 photograph shows the openings with multilight transoms and double wood panels hung on pivot hinges. Some of the wood panels had lights cut into them, others had a small door let into the wood panel. The doors appear to have been salvaged or replicated for the 1913 rebuild. Currently, the main service door retains the wooden outer doors from 1847/1913, with a roll-down door inside (Fig. 25). Several of the doors have been replaced with sidelights and 3' wide doors. The pivot hinges remain in place at the granite door jambs. There are doors from various time periods on the building. Three of the original openings have been infilled with brick and a window on the west elevation, and altered to accommodate access to the extension on the east elevation. This leaves only four door openings on the west elevation of the building. The northern (Fig. 26) and southern most doors were replaced within the last ten years with a sidelight, transom and door configuration. The doors on the east extension are from various time periods and do not have a unifying appearance.

Significance

The double panel doors are significant as the original configuration for the 1847/1913 openings. These are the only doors on either building which are of any significance.

Conditions

The doors that have not been replaced recently are in poor condition. When they are replaced, they should replicate the 1913 rebuild.

Treatment Recommendation

The configuration of the doors should be determined based on the current use of the building. Any changes made should be in keeping with the 1913 rebuilding.

C. Structural Conditions

General Description of Structural Deterioration and Distortions

Visible distortions and step cracking are evident along the east and west granite and brick walls of the 1847/1913 building. There are cracked and sloping lintels due to the settlement of the granite wall. There are shifted cornice stones on the south end of the west elevation, and spalled cornice stones. There are cracks on the interior cast concrete columns, beams and slabs.

Possible Causes of Structural Deterioration and Distortions

Information from the Navy archives, visual and measured observations of the deterioration and distortions, load calculations and excavated test pits have revealed the history of the behavior of Building 24.

The presence of major engineering works (especially Dry Dock No. 1) on the site in the early 1800s suggest that the site was neither rockbound at one extreme nor marshy at the other extreme. It was (and is) a site that is probably underlain with a combination of sandy-silt deposits and clay deposits. These materials are competent to support significant structural loads provided they are on properly proportioned footings. However, test pits made along the west wall found that the exterior walls are actually supported on closely spaced wood piles (see Wood Pile information at the end of this section); the bottom of the granite foundation wall is about 5'-6" below the present pavement. It is unknown whether the water table in 1847 was constantly at or above this level.

The 1913 drawings show that the interior foundations for the new columns (which are actually built up structural steel members encased in concrete) were originally designed to be seven feet square. Changes annotated on the drawings a year later show the footings in the center bays of the building being increased to eight feet square and at the south end to nine feet square. An engineering analysis found that the bearing pressure from the total dead and live load is less than two tons per square foot under the seven foot footings and only one ton per square foot under the nine foot footings. The higher pressure is indicative of a loose sand or stiff clay soil while the lower pressure is associated with a compressible, medium clay soil (see the current edition of the Massachusetts State Building Code, Table 1804.3 for a listing of presumptive bearing pressures for different types of soil). Excavations made after completion of the initial drawings or during site preparation may have discovered a changing soil condition as the site approached the shore. The drawings also show the bottom of the footings to be nearly seven feet below the floor. This suggests that excavations determined that this was the best or most competent level for placing the foundations and the overlying materials were too loose and soft or too variable.

The designers of the 1913 work did not appear to be aware of the pile foundations supporting the exterior walls. Therefore, the interior footings were placed on compressible soil materials even as the existing exterior walls were rigidly supported on piles.

The central section of the exterior west wall probably started to settle during the 1940s or 1950s. Concern about the continual movements and increasing cracking in the walls led to a program of measurements between 1953 and 1961. The observed settlements in the exterior walls seems to have been associated with the by-then-realized settlements of the interior column footings. Measurements were made at the underside of the second floor beams at the east and west exterior walls and at the interior columns; however, these measurements were made only in the center bays opposite the most egregious cracking in the exterior walls. The measurements were recorded on Drawing 24-90.

Using Drawing 24-90 as a reference, measurements were made at the same locations on June 4, 2002 using a laser level. Measurements made

Fig. 27 *West elevation, fired door opening from the north. Note step cracking from the left of the door to the lintel of the right window. Door lintel is out of level.*

in the 1953–1961 period and repeated on June 4, 2002 confirmed that the 1913 interior columns settled relative to the 1847 exterior walls. The columns at the north end settled between 1-1/2" and 2" while the columns in the central and south thirds between 3" and 3-1/2". Although there are variations in the recorded measurements due to level errors, it appears that the interior columns have remained more or less unchanged since the 1953–1961 readings.

The June 4, 2002 survey was made beyond the limits of the 1953–1961 measurements all the way to the north end and a one bay further south. The east wall appears to be relatively lower at both the north and south ends than at the center bay, the highest point is the door into the addition. This is exactly opposite the settlements of the west wall, which is higher at the north and south than at the center. Measurements found that the settlement at the central section of the west wall is still active. The cause of this settlement was observed in one of the test pits and found to be the crushing of rotted piles. The piles in another test pit where the exterior wall had not settled were found to be intact.

Because there were no measurements made in 1953–1961 at the north and south ends of the east wall, it could not be determined whether settlement is active at each end. However, measurements did find that there is active movement at the door opening into the addition.

Specific Existing Structural Conditions and Treatment Recommendations

Component: 1847/1913 Building—Exterior Wall Settlement

Condition

The most noticeable distortion is the settlement of the exterior masonry wall on the west side from the fifth bay (or window) to the ninth bay (or window), counting from the north end of the building. Between the fifth and sixth bays, wide horizontal step cracks (Figs. 27, 28 & 29) have developed through the 20-inch-thick wall at the second story. At the ninth bay, the second story window head and sill and the lintel across the first floor door opening abruptly slope downward. The three granite courses between the door lintel and the window sill also shift abruptly. The 11-foot-long granite door lintel has cracks consistent with the observed distortions. The lime in the mortar at these locations has been dissolved by water infiltrating through the cracks; only a fine sandy powder remains.

A wide step crack also occurs in the ninth and tenth bay of the second story on the east side of the building and the door lintel underneath is also sloped and cracked. The pattern of cracking was difficult to observe on the east side because most of the wall is concealed by the wood-framed addition or by security cages inside the building. However, cracking that was observed had the same dramatic character as the cracks on the west side.

The displacement at the step cracks was only horizontal, being 1 to 1-1/2 inches wide in the worst locations. This indicates that the head joints pulled apart but the bedding joints only slipped without any vertical displacement. The open head joints indicate that the wall plane on one side

Fig. 28 *West elevation step crack detail. Continuation of crack into brick infill panel.*

Fig. 29 *Step crack at west exterior wall. Interior location of Fig. 28.*

of the crack rotated relative to the plane on the other side of the crack. That is, settlement at the south end of the central section of wall caused it to pivot but not settle at the location of the cracks.

Cause

The 1847 exterior walls are cracking and rotating as their supporting wood piles are rotting at the top and crushing under the weight of the granite block foundations. The bottoms of the granite foundations are about a foot or two above the bearing strata that supports the interior spread footings. At the same time, the rotting piles appear to be one foot or so above the permanent water table, at least in one of the test pits. However, the piles appeared to be adequately submerged in the other two test pits.

Treatment Recommendation

The distortions seen in the exterior walls are due to crushing of the tops of rotted piles. Where the walls are not distorted, the piles are probably intact. However, the large openings in the joints allow water to infiltrate and wash out the weak, lime-rich mortar in the masonry. While the cause of the wall distortion has been determined by the discovery of rotted piles (see Exploratory Test Pit description below), it is not clear why the water level varies along the walls. An understanding of the water levels and therefore which piles are susceptible to rot in the future could be enhanced by drilling several borings and installing observation wells.

To confirm whether the present conditions are stable, crack monitors were attached across ten of the cracked joints. These monitors will be observed periodically for at least a year. This observation will occur over a year in order to distinguish annual thermal movements from any actual non-reversible settlement movements.

After verifying that the present conditions are stable, repoint minor cracks on the exterior granite surface. At the severely distorted locations, dismantle small areas of the masonry and reassemble them to blend the distortions smoothly and to reduce the width of the large joints.

Component: 1847/1913 Building—Cornice Stone Distortions

Conditions

The cornice stones are displaced horizontally and at the southwest corner (Figs. 30 & 31)). One or two of the stones have twisted relative to each other. This movement apparently occurred after the 1913 work and steel Z members (Figs. 32 & 33) were added under the cornice soffits in the 1920s in order to reinforce them. Information found in the Navy archives indicated that the displacements were noticed and measured in 1919. A closeup view of the Z member revealed large "keeper" washers that prevent the stones from moving outward any further. The Z members are anchored to the building with tie-rods that span across the entire width of the building.

Today, the Z members are heavily corroded and built up with rust scale. Rust-jacking has led to distortions in the Z member flanges, resulting in further pressure on the cornice stones. Visually, these distortions appear as uncontrolled horizontal and vertical waves and abrupt steps.

Cause

Cracking in the concrete work indicates that the seven foot square footings at the north end of the building were conservatively designed but the nine foot square footings at the south end were still insufficient in area. The 1913 column foundations settled significantly under the dead load of the building starting from the third pair of columns (from the north end) and running to the last set at the south end.

Clay compresses under load in a time dependent manner. That is, it does not compress instantaneously when load is applied but rather compresses gradually under the load pressure. The rate of compression is greatest at the beginning of the load application and the rate declines with time until it finally stabilizes and stops. In general, the most noticeable settlement due to compression of clay occurs within a few months after the load itself stabilizes. However, additional small settlements may occur due to long term creep and may take years to stabilize.

Fig. 30 *West elevation cornice, looking north. Note dip in gutter level and rusted Z channel.*

Fig. 31 *West elevation cornice, looking south. Note dip in cornice stone and rusted Z channel.*

Fig. 32 *West elevation cornice stone. Note rust jacking at Z channel*

Fig. 33 *Typical condition where Z channel tie rods pass through exterior wall*

The settlements of the 1913 footings were tolerable relative to each other but significant relative to the rigidly supported exterior walls. As the footings and columns settled, they pulled the center bay of the floors and roof downward. The simple concrete beams on the exterior bays rotated to accommodate the movements, resulting in some cracking at the supports. However, the lower ends of the structural steel rafters had to splay outward as the upper ends dropped. Bolted down to the cornice stones, the rafters simply moved the stones outward. Based on observed gaps and cracking in a concrete topping at the edge of the third floor, it appears that the distortion in the roof was not symmetric. More distortion occurred on the east side than on the west side and little or no distortion was seen in the first two bays at the north end. The most extreme settlement occurred between the last pair of columns and the south end wall, where the third floor and the roof ridge visibly slope and the rafters are splayed out on both sides of the building.

Because the foundation settlement occurred over a period of time, personnel observing the horizontal movement of the cornices some time after construction was completed may not have associated the horizontal displacements of the cornice stones with the vertical settlement of the interior columns. A 1919 record of measurements found in the archives confirmed that the cornice movements had occurred at that time, but the observers probably assumed that the rafters were exerting the type of horizontal thrust associated with a gable roof, where opposing rafters lean against each other at the ridge rather than being supported by a ridge beam. Therefore, a makeshift remedy was installed to arrest the lateral movements of the rafters. Steel Z members were bolted to the face of the building with tie-rods that traversed the width of the building. They appear to have had the dual purpose of restraining the cornice units vertically and horizontally. By the time the Z members were installed in the 1920s the movements had probably stabilized, thereby demonstrating a successful solution to the cornice displacement.

Although the column footings have long stopped settling, the corrosion attacking the Z members continues to exert an active rust-jacking pressure on the cornice units, trying to lift or twist them while the rafters and

their connections resist the pressure. The one or two units that are twisted out at the southeast corner seem to have sheared off the keeper attached to the Z member.

Treatment Recommendation

The interior columns settled over a period of time shortly after they were built and are the primary cause for roof distortions and cornice movement. This condition has probably been stable since the 1920s. With respect to the distortions in the roof plane, ridge line and the interior settlements in general, no further work is necessary, primarily because it would be extremely difficult if not impossible to re-level these elements. Because the rafters are connected to and bear on the cornice stones, it may not be possible to move the stones back into their original position. However, their joints should be repointed and they should be covered with new flashing and gutters, using stainless steel connections.

Fig. 34& 35 *Typical construction shrinkage crack in concrete slabs (left), and vertical crack at beam-to-column intersection (right).*

The cornice stones are subject to active forces due to the corrosion in the steel Z members that are supposed to contain them. With respect to the cornices, removal of the Z members and their tie rods is recommended.

Component: 1847/1913 Building—Floor Slab, Beam and Column Cracks.

Conditions

(a) Cracks in Floor Slabs. At the center of almost every bay, there is a straight crack that travels across the width of the building (Fig. 34).

(b) Cracks at beam-column intersections. At some of the beam-to-column intersections, there is a vertical crack between the interface of the column and beam and an associated horizontal crack along the interface between the bottom of the beam and top of the supporting bracket (Fig. 35).

(c) Spalling on Columns. At the bottom of several columns the concrete is spalled. Similarly, the bottom of the third-floor beam between the fifth and sixth window on the south side (just above the large step crack) is spalled where it enters the masonry wall.

Cause

(a) Cracks in Floor Slabs. The straight-line cracks at the midspan of most bays are construction joints where the day's concrete placement was stopped.

(b) Cracks at beam-column intersections. The cracks at the beam-to-column faces and, in the last east bay, the joist-to-beam faces are due to the tension induced on the bottom of the beam or joists as the columns settled relative to the exterior walls. To some extent, the beam-to-column crack is induced at this location because the beams are interrupted by the steel columns passing through the floor.

(c) Spalling on Columns. The spalling at the bottom of the columns and at

the end of one beam (that could be seen) is due to moisture penetrating the concrete and causing the steel to corrode. The expanding steel splits the concrete and causes it to fall off. The moisture at the bottoms of the columns is probably due to a moist soil that affects the steel in a manner similar to rising damp in brick. The moisture in the one beam is due to water infiltrating the cracks at the exterior wall and collecting around the end of the beam.

Treatment Recommendation

(a) Cracks in Floor Slabs. These cracks or joints are benign and have no structural significance.

(b) Cracks at beam-column intersections. These cracks are simply evidence of the column settlement but otherwise have no structural significance.

(c) Spalling on Columns. The spalling should be monitored. A test probe to examine the amount of rust at the steel column is recommended.

D. Wood Pile Conditions

Component: 1847/1913 Building—Wood Piles

Description

Historical records of the Charlestown Navy Yard indicate that the footprint of Building 24 is located in the zone of fluctuation between high and low tides prior to reclamation of the site by filling during the development of the Navy Yard. Historical records also indicate that the existing ground surface at Building 24 is likely underlain by a thickness of granular fill overlying an intermittent deposit of organics. The fill and organic deposits are believed to be underlain by a deposit of stiff marine clay overlying a deposit of glacial till which is plastered directly on the bedrock surface. Groundwater levels would be anticipated to be trapped or "perched" on the surface of the relatively impervious organic and/or marine clay deposits, and are anticipated to be influenced by tidal fluctuations.

Cause

Without describing the complex process that result in the deterioration of untreated wood piles, it is important to note that untreated wood piles (as is the case for all untreated wood) deteriorates over time when exposed to free oxygen. Hence, it is imperative that untreated wood piles remain below the groundwater level for their entire service life. When exposed to the air above the groundwater level, decomposition begins. Resubmersion of the piles below the groundwater level halts the deterioration process but, of course, does not restore damage that had been incurred by the piles while the groundwater level was below the top of the piles.

The water table was at a different elevation in each of the three test pits excavated along the west wall. It could not be determined whether the water elevation is affected by tidal variations, is permanently suspended water in impermeable clay, or is being drained away by subsurface pipes, tunnels and washouts.

Conditions

On April 18, 2002, the NPS provided a backhoe at the building to perform a test pit excavation along the west wall. The test pit was requested by Goody Clancy and Ocmulgee Associates to determine the condition of the foundation wall, the underlying soil conditions, and possibly to expose the bottom course of stone to determine whether there are wooden piles supporting the foundation. This test pit is identified as Test Pit No. 3 on Existing Condition Drawing A1.0.

At a depth of approximately three feet from the surface, a brick wall was uncovered that prevented further excavation. The NPS Archaeologist was called to determine the significance of the structure. During research for this report, an 1873 drawing (C3) was found showing a scale platform in this location. This brick wall may have been associated with this structure (Fig. 36).

Fig. 36 *During test pit excavation on Aug. 18, 2002, a brick wall was found at a depth of three feet, preventing further digging.*

A wood tunnel, identified in NPS drawings, runs parallel to the west wall of the building. It appears to be approximately 5' from the building edge. The tunnel is shown on the drawings as 46" by 56" and constructed of wood. It was originally used as a drain for water pumped from the dry dock. It is no longer used for that purpose by may still function to collect groundwater. This will be kept in mind for future excavations.

It was high tide at the time of the excavation and the water was approximately three to four feet below grade. The granite foundation wall that was exposed revealed fairly uniform cut block. There were two visible 2" steps that widened the foundation wall, as would be expected in a load bearing masonry wall. The underlying soil included large granite paving stones, areas of ash fill and silty gravel.

On June 4–5, 2002, two test pits were excavated to expose the granite footing and the tops of the wooden piles along the exterior of the west wall. Test Pit #1 was excavated in a location of significant cracking of the wall above. Test Pit #2 was excavated in a location where there was no evidence of structural failure and where the wall above appeared to be stable. The two locations were selected to determine if there were rotting piles at the cracked wall and sound piles at the uncracked wall. McPhail Associates, geotechnical engineers, were added to the team to inspect the pilings and to help design the most appropriate repair method.

Fig. 37 *Granite footing stones were discovered to have crushed the tops of each of the two wood piles discovered in Test Pit No. 1 during excavation in June 2002.*

Two wood piles were observed in Test Pit No. 1, located along the center portion of the west wall, in an area of significant cracking of the wall above. Both of the piles were completely deteriorated and the granite footing stones had crushed the pile tops (Fig. 37). This deterioration and crushing caused differential settlement of this section of the wall relative to the north and south ends of the wall. Groundwater was observed entering Test Pit No. 1 at a depth of about 6.5 feet below the existing ground surface, which was 13 inches below the bottom of the granite blocks (and the tops of the wood piles). The two wood piles displayed significantly sounder wood approximately 10 inches below the top of the piles.

Test Pit No. 2 was located along the southern end of the west wall, in an area where the exterior wall did not display signs of settlement. Five (5) wood piles were exposed in this excavation and all were in good condition and did not exhibit indications of wood deterioration. Groundwater was observed entering Test Pit No. 2 at a depth of about 5.5 feet below the

Fig. 38: *Groundwater was observed entering Test Pit No. 2 at a depth of about two and a half feet.*

existing ground surface, which was approximately coincident with the depth of the wood piles (Fig. 38).

Based upon these observations, it appears that the settlement of the center portion of the west perimeter wall is a result of the deterioration of the underlying wood piles. Although no explorations were performed along the east perimeter wall, the similarities in wall performance would suggest that a similar condition may well exist at that location as well.

Treatment Recommendation

A subsurface investigation consisting of several shallow soil borings and the installation of several groundwater observation wells is recommended to document the existing subsurface soil and groundwater conditions. Following the above additional documentation, it is apparent that remedial work will be necessary to repair the deteriorated tops of some of the wood piles.

Repair of the piles includes cutting off the deteriorated tops of the piles such that only sound wood remains. Based upon the field observations, it is anticipated that this will require removal of approximately the top 3 foot section of the piles. A hydraulic jack is then interposed between the top of the cut pile and the granite pile cap. Two vertical steel channels are then positioned on either side of the jack. The bottom portion of each pile is then preloaded by jacking the design load into the pile with the hydraulic jack, followed by wedging the steel channels into place with steel wedges to "lock-in" the loading. The jack is then removed and the steel channels are encased in concrete resulting in a concrete and steel top on each repaired wood pile. This process is repeated until the deteriorated wood piles are repaired and support the entire length of the exterior walls.

E. Hazardous Materials Information

ATC Associates, Inc. prepared a Limited Hazardous Building Material Survey of National Park Service—Charlestown Navy Yard Building 5, Building 24, Commandant's House. The findings for Building 24 are summarized below.

The following materials were found to contain asbestos:

- Roof – Flat Roof Main Field
- Roof – Flat Roof Flashing
- Roof – Flat Roof Flashing Sealant
- Roof – Slate Roof Sealant
- Roof – Slate Roof Flashing
- Siding – Asbestos-Cement Shingles

Appendix A | Building Chronology Spreadsheet

Fig.	Date	Source	Image/Information	Drawing/Photo View / Written Document Description	Noted Items
	1843	Black/Bearss	P. 10: In May, 1843, appointment of Naval Constructor Samuel M. Pook. Born in Boston, August 15, 1804.	Pook born August 15, 1804. Educated in local public schools.	
	1843	Black/Bearss	P. 10: Autumn 1843 Alexander Parris and his clerk were discharged	Parris had designed and overseen construction of many of the yard's buildings. Their services were no longer needed.	
	1845	Black/Bearss	P. 11: November 21, 1845 – Commandant Foxhall A. Parker assumed command of the yard.		
	1845-49	Black/Bearss	P.35: Mexican War	▪ Naval strength increased during this period. ▪ "volume of activity exceeded the yard's useable wharfage" ▪ "In the naval appropriations bills of 1847 and 1848, the Boston Navy Yard received increased funding for plant improvements." The carpenters and joiners shop was one of six new structures erected with that funding.	
	1846	NA	Letter from Foxhall A. Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, Washington, DC: Boston Naval Shipyard, Letters Sent to the Bureau of Yards and Docks – Feb. 13, 1846-Sep. 4, 1847. Letter dated October 10, 1846	▪ Extensive letter of "Annual Report and Estimates for this yard for the year commencing on the 1st July 1847 and ending 30th June 1848" ▪ Page 4 states "A report showing such improvements according to the approved plans of the yard embracing such objects as have heretofore been reported which have not been authorized – An estimate was sent last year for a Rigging Loft Sail Loft & Cordage Store on site No 24. 200 by 65 feet three stories high – the probable cost of which will be" $63,231.69. (Site 24 does not appear to be Bldg. 24) ▪ Page 5 states "Estimates for a proposed Joiners Shop. Carpenters work shop & Rigging loft to be built near the Dry Dock No 54. The building to be of granite (edged with ashlar similar to the Rope walk) to be 200 ft long 70 ft wide. Probable cost of materials $25,631.00, probable cost of labor $14,354.00, Total. $39,985.00" ▪ Page 10 "Of the objects embraced in this report which are not on the approved plan I wish to observe that the building for the - Joiners Shop – Carpenters Work Shop & Rigging Loft near the Dry Dock is much wanted, it will be near the place where most of the repairs of ships are made. Much time & expense would be saved in the transportation of materials to and from the Dock."	
	1846	NA	Letter from Foxhall A. Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, Washington, DC: Boston Naval Shipyard, Letters Sent to the Bureau of Yards and Docks – Feb. 13, 1846-Sep. 4, 1847. Letter dated Nov. 7th 1846.	Sending drawings for proposed new buildings, including "I enclose a Plan for this Building – and also for several other works which were included in the Estimates sent to the Bureau on the 20th Oct. last vis: for a Stable – Timber Shed & - Maint Shop – Carpenter & Jointers Shop & Rigging Loft – Plumber & Blacksmiths shop –"	
	1847	NA	Letter from Foxhall A. Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, Washington, DC: Boston Naval Shipyard, Letters Sent to the Bureau of Yards and Docks – Feb. 13, 1846-Sep. 4, 1847. Letter dated April 10th 1847.	"The estimate for materials for the Carpenter & Joiners Shop & Rigging Loft, will be forwarded as soon as the plan can be correctly drawn & the proper dimensions & quantity of the material accurately retained(?)".	

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
	1847	NA	Letter from Foxhall A. Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, Washington, DC: Letter from Foxhall A. Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, Washington, DC: Boston Naval Shipyard, Letters Sent to the Bureau of Yards and Docks – Feb. 13, 1846-Sep. 4, 1847. Letter dated April 17th 1847.	"I herewith enclose the Naval Constructors estimates of materials necessary for building the Carpenters & Joiners Shop & Rigging Loft- and Blacksmiths & Plumbers Shop".	
	1847	NA	Letter from Foxhall A. Parker, Commandant to Joseph Smith, Chief of Bureau of Yards and Docks, Washington, DC: Boston Naval Shipyard, Letters Sent to the Bureau of Yards and Docks – Sep. 6, 1847-May 17, 1849. Letter dated October 3, 1847.	"The muster Bell at this yard is broken and we shall be compelled to get a new one. The Belfry at the Ship House is rotten, and the House itself not very strong. I propose (with the approbation of the Bureau). To erect a Belfry on the new Carpenters & Joiners Shop work building".	
C-1	1847	CNY	Drawing 24-5 (607?) paper: "Plan and Elevation of Work Sh(op) to be Built at the U. S. Navy Yard Boston."	No date, but must be 1847.	Shows wall plan, end elevation and side elevation. Numbered in red pencil with stone sizes. Must be contractor's drawing.
	1847	CNY	Drawing 24-7 (609 A 106) paper: No Title	No Date, assumed to be 1847. Shows "Riggers Loft Floor" and "Joiners Loft Floor"	Floor framing plans. Pencil notes with number and dimensions of beams. Assumed to be contemporaneous with original construction.
	Summer 1847-June 1849	Black/Bearss	P 50: Construction of Carpenters and Joiners' Shop, plans by Naval Constructor Samuel M. Pook.		Design is attributed to Billings. The building was constructed prior to Joseph Billings' appointment as civil engineer.
B-1	1851	Black/Bearss	P. 74: "View of the Dry Dock at the U. S. Navy Yard, Charlestown, Mass." From *Gleason's Pictorial Drawing Room Companion*, vol. I, No. 7, June 14, 1851.	Looking south from Dry Dock, showing north end, mostly roof.	▪ Multiple skylights ▪ Double chimney on south end
	1852	Black/Bearss	P. 77: Under "New Buildings and Other Structures" there is a description of a "sail loft and cordage storage" identified as Building 24.	This is likely Building 33, which was built on Lot 24.	
	1853	Black/Bearss	P.89: President Franklin Pierce persuaded Congress to appropriate funds for building six large, steam powered, screw driven frigates.	CNY received assignment for building the frigate that became Merrimack. Increased appropriations for new structures and improvements at the navy yard occurred between the years of 1852-55.	
	July 1853	Black/Bearss	P. 89: Joseph Billings was appointed to the newly formed position of civil engineer.	"The Bureau of Yards and Docks announced that Billings was to have charge of all buildings, docks, wharves, and other structures." "No longer would the naval constructor be involved in designing buildings and drafting their plans."	
	August 1853	Black/Bearss	P. 115: "PLAN OF THE U. S. NAVY YARD, BOSTON, MASS., SHOWING THE LOCATIONS OF THE IMPROVEMENTS RECOMMENDED IN	Plan showing Building 24 in location. Name of building is illegible.	Shows Bldg. 24 floor plan, without north addition visible in 1900 photographs.

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
			THE ANNUAL REPORT TO THE BUREAU OF YARDS AND DOCKS"		
	1854	Black/Bearss	P 90: "Two months later (than March 1854), Naval Constructor Pook was detached and ordered to Washington."		
	1856-60	Black/Bearss	P. 124: "During the period 1856-1860, improvements and other changes were made in existing buildings of the yard. The carpenters' and joiners' shop was altered to provide a room for the storage of tools and items used in connection with the dry dock. That shop also received a new turning lathe."		
B-2	1857	Black/Bearss	P. 129: "View of the Interior of the United States Navy Yard, Charlestown, Mass." From *Gleason's Pictorial Drawing Room Companion,* Nov. 29, 1857.	Looking east across yard, view of Building 24 in the distance.	▪ Muster bell on north end ▪ Double chimney on south end ▪ Skylights ▪ No addition on north end of building
B-3	1858-59	Black/Bearss	P. 139: Probably appeared in *Gleason's Pictorial Drawing Room Companion, between August 1858 and October 1859.*	Looking north into Dry Dock 1, showing north end of Building 24.	▪ Muster bell ▪ Skylights
	1861	Black/Bearss	P. 147: "The Civil War was the high point in the history of the Charlestown Navy Yard during the nineteenth century." "Subsequent to Appomattox, the Navy and its shore facilities suffered a long decline, and not until 1917 did the Charlestown yard achieve a volume of activity surpassing that of the Civil War."		
	1864	CNY	Drawing 24-1 [BOSTS 13375] (306 D 84) paper: Drawing with "foundations for the joiner's shop – Boiler, April 1864"	15' 3" x 9' 3" overall dimensions, no mention of location in or around building	No relevant information
	1867, retraced 1874	CNY	Drawing 24-6 (608 C 140) paper: Galvanizing Shop	Drawing not in file and not reviewed.	
C-2	1867	CNY	Drawing 24-8 (1054 C 202) paper: Galvanizing Shop, Navy Yard, Boston, Oct 7/67	Plans and elevations for galvanizing shop. There is a print and an original of this sheet. The original has a note "Copy July 74 J. P. B.", probably Joseph Billings.	Is the structure on the north end of the building in 1900 photo
	1868	CNY	Drawing 24-2 (346 D 96) paper: "Sketch of chimney in Rigging Loft. Navy Yard. Boston. Jan. 9th 1868"	Dimensions shown with stove. Chimney supported on roof framing, stamped "CIVIL ENGINEER'S OFFICE Navy	Shows original framing structure in the background.

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
				Yard, Boston".	
	1869	Black/Bearss	P. 226: "In 1869, the galvanizing shop of the Construction Department was located in the same structure as the rigging loft of the Equipment Department. A fire occurred in that building in February. According to the naval constructor, the fire was discovered and prevented from becoming serious only by the vigilance and promptness of the men of the galvanizing shop. The constructor inferred that men in the rigging loft, Equipment employees, had allowed old rope and other discarded materials to accumulate, which had resulted in spontaneous combustion."	It sounds like the fire was in the rigging loft (3rd floor).	
	1869	Black/Bearss	P. 234: "The yard's Construction department had joint use of a number of buildings, including No. 24, shared with Equipment and used as a storehouse and rigging loft;"		
B-4	1870	Black/Bearss	P. 251: Photo of USS *Wachusett*	View of Building 24 in the background	▪ Shows south end chimneys, skylights, and ▪ chimney on west roof slope (possibly chimney shown in drawing 24-2).
C-3	1873	CNY	Drawing 24-3 (408 A 87) paper: "Plans of Second Story and Loft of Building No. 24. Navy Yard. Boston. May. 1873. Sheet No. 2"	Plan of Second Story, Plan of Loft Loft: ▪ Rigging Loft most of floor, small offices: Paint Closet, Quarterman's Office and Closet, Spun Yarn Room, Boatswains Office and 2 Closets ▪ Second Story: Store Room with shelving takes up most of the floor plan, Room for Store Hands, Receiving Room (hatch), Sample Room, Store Clerks Office, Naval Constructor's Office, Clerks Office and Closet, Delivery Room (hatch), Draftman's Office, Time Clerks Office, Delivery Clerks Office. ▪ The vault is not in the northwest corner yet.	
C-4	1873	CNY	Drawing 24-4 (411 A 90) paper: "Plan, Section and Elevation of Building No. 24, Navy Yard, Boston, May 1873. Sheet No. 1"	North Elevation, West Elevation, east to west section, First Floor Plan.	▪ Note on plan "Build of Stone backed with Brick. Partitions of Wood. Galvanizing Shop of Brick. 1st & 2nd Stories Occupied by Construction, Loft occupied by Equipment. Roof Slated. No Gutters." ▪ End Elevation: shows chimney and monitor on galvanizing shop ▪ Front Elevation: Shows various chimneys, galvanizing

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
					shop monitor and chimney ▪ Section shows truss/framing configuration with framing member dimensions ▪ Floor plan: Galvanizing Shop, Receiving Store, Weighers Office (scale beam), Scale Platform outside building (could be foundation dug up during excavation), Carpenters Shop, Cooper Store, Boiler Room, Asst. Cosntructor, Writers (2 offices), Foreman Shipwrights, Lavatory
	July 1880	Black/Bearss	P. 299: "PLAN OF THE U. S. NAVY YARD, BOSTON, MASS., JULY 1880"		Shows Bldg. 24 floor plan, with north addition visible in 1900 photographs.
	August 1890	Black/Bearss	P. 299: "PLAN OF THE U. S. NAVY YARD, BOSTON, MASS., showing locations of the improvements recommended in the annual report to the bureau of yards and docks, august 1890"	Building identified as "Carpenters Shop"	Shows Bldg. 24 floor plan, with north addition visible in 1900 photographs.
	1890's	Black, 1988	P. 27: "During the 1890's, the clerical staff of the department, housed in Building No. 24, steadily increased in number..."	The quote is in reference to the Department of Construction and Repair, which was responsible for the work on ships.	
	1891	Black	P. 66: "In 1891, Yards and Docks workers took up the paving between Building No. 5 and Building No. 22, including a section of cobblestone, and relaid the surface with square granite blocks."		These are probably the blocks encountered during excavation for the test pits to expose the wooden piles along the west side of the building.
	1894	Black	P. 71: All buildings in the yard were wired for electrical in 1894.		
B-5	1890's	Black	P. 115: Photograph of "USS *Amphitrite* at Boston Navy Yard in the late 1890's"		▪ Shows south end of Building 24 in background ▪ Doors open, wood boards from third floor opening to ground. ▪ Looks like a blueprint drying rack extending from the second floor, western most window
C-5	1900	CNY	Drawing 24-9 (1548-B-388) tracing: "Navy Yard, Boston, Mass., July, 1900, Building No. 24, First, Second and Third Story Floor Plans, Taken from	Shows floor plan and room designations	Shows Printing Room in location of drying racks visible on exterior 1900 photos.

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
			Work"		
C-6	1900	CNY	Drawing 24-10 (1549-B-389) tracing: "Navy Yard, Boston, Mass., July, 1900, Building No. 24, Elevations and Sections, Taken From Work"	Elevations and sections showing	▪ Shows interior partitions, transom and door configurations. ▪ Galvanizing shed has monitor and chimney not in original drawing. ▪ Clearly shows truss configuration ▪ Shows four chimneys ▪ Shows "Porch A", door vestibule at southern most west elevation door. ▪ Some windows 2/2, remainder 12/12
	1900	CNY	Drawing 24-11 (1550-B-390) tracing: "Navy Yard, Boston, Mass., July, 1900, Building No. 24, Plan of Pipes and Wires for First, Second and Third Stories"	Lighting and radiator locations and runs	Shows floor plan, with galvanizing shed
B-6	1900	CNY	BOSTS 9298 & BOSTS 9585 & BOSTS 10047: Photo "Office Building and Rigging Loft, looking South-east, Boston Navy Yard, Aug, 2, 1900."	Excellent southwest view showing west and obscured north elevations.	▪ Awnings ▪ Northwest corner openings blocked in with granite (much lighter and cleaner than surrounding granite) ▪ Good view of muster bell, doors, windows, roof ▪ Identify iron structures protruding from building at second and third windows from north. ▪ Structure addition on north elevation, west side ▪ "vestibule" at southern most door on west elevation
B-7	1900	CNY	BOSTS 9298 & BOSTS 9585 & BOSTS 10047: Photo "Office Building and Rigging Loft, Looking West, Boston Navy Yard," (probably cropped. Contemporaneous with photo below and probably originally read "Aug, 2, 1900.")	Excellent northwest view showing details on the south and east elevations.	▪ Awnings ▪ 12/12 windows ▪ shows wood slats below third floor loft door opening. Explains dark swath seen in other photos ▪ good detail of doors, windows, roof chimneys, etc. ▪ Note "office building" notation, awnings at offices?
B-8	1903	CNY	BOSTS 8694: Photo "F421N28 Navy Yard Boston Mar. 2, 1903 Pier No. 1	Looking north from Pier 1 – view of roof, second floor, and	▪ Muster bell ▪ Double chimneys on south

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
				last two door openings on first floor	end ▪ Skylights ▪ Small "vestibule" at southern most door ▪ Windows may be 2/2
	1909	Black	P. 223: "As a result of the consolidation of departments in 1909, Construction and Repair shipwrights relocated from Building No. 24 to Building No. 114."		
C-7	1909	CNY	Drawing F24-11A: "Plan of Second and Third Floors"	Shows room designations	▪ Second floor used solely for office space – drafting room, printing room (moved one bay north, explains sill and jamb configurations in photographs), Clerks Room, Naval Constructor's Office… ▪ Third floor is rigging loft, with store rooms and existing department offices.
	1910	Black	P. 213: "In September 1910, most of Building No. 24, then in use as the Construction and Repair offices and rigging loft, was destroyed by fire, leading to its abandonment."		
C-8	1913	CNY	Drawing 24-12: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Foundation Plan and Third Floor Plan"	Dated April 29, 1913.	GCA has copy
	1913	CNY	Drawing 24-13: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Plans of First and Second Floors"	Dated April 29, 1913. Blue pencil note "Superseded by sheet 24-28". Shows room designations.	Second floor: court room, library, museum, board room chaplain, hall.
	1913	CNY	Drawing 24-14: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Elevations"	Dated April 29, 1913. "Revisions Dec. 17, 1913, Elevator Pent House taken out."	GCA has copy
C-9	1913	CNY	Drawing 24-15: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Sections Through Building"	Dated April 29, 1913. Revisions Dec. 19, 1913.	Section of "existing building" showing original wood truss and floor system and "section of building as rebuilt"
		CNY	No drawing or card for 24-16		
	1913	CNY	Drawing 24-17: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Sections of Roof and Floor Construction"	Dated April 29, 1913. "Superseded by Sheet 24-30"	Shows poured concrete roof details, and floor details
	1913	CNY	Drawing 24-18: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Monitor Details"	Dated April 29, 1913. Blue pencil note "Superseded by Sheet 24-31.	Detail shows poured concrete roof. Superseded by wood sheathing.

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
	1913	CNY	Drawing 24-19: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Details of Columns and Framing of Monitor End"	Dated April 29, 1913. "Revisions Dec. 24, 1913"	Steel column and framing details.
	1913	CNY	Drawing 24-20: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Details of Stairs and Elevator Well"	Dated April 29, 1913.	
	1913	CNY	Drawing 24-21: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Plans Showing Locations of Lights and Conduits"	Dated April 29, 1913.	Shows detail of wiring and section of light fixture, similar to light fixture as seen in photos.
	1913	CNY	Drawing 24-22: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Plans Showing Heating Arrangement"	Dated April 29, 1913.	
	1913	CNY	Drawing 24-23: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Details of Entrances to Stair Halls and of Entrance Adjoining Toilet Room"	Dated April 29, 1913.	Full size profiles of door casings.
	1913	CNY	Drawing 24-24: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Details of Windows in Toilet Room, Material Room and Branch Plan Room in First Floor"	Dated April 29, 1913.	Full size details.
	1913	CNY	Drawing 24-25: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Details of Double-Hung Windows in Outside Walls"	Dated April 29, 1913.	▪ Full size details of window sash showing all details. ▪ Drawing of exterior brick mold. ▪ Windows 1/1
	1913	CNY	Drawing 24-26: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Details of Iron Stair. Main Entrance"	Dated April 29, 1913.	Check in field to see if stair is extant
	1913	CNY	Drawing 24-27: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., Detail of Doors and Windows between Hall & Library"	Dated April 29, 1913.	Walls no longer in place
	1913	PW	DOD/PWD BOSTS 13347 Drawing 24-35: "Building 24 (Rebuilding) Andrew's Concrete Screed Block, Contract #1968, C. M. Leach. Concrete to be in accordance with Navy Dept. Specifications #59C2a"	Dated March 31, 1913	Shows side view and plan
B-9	1913	CNY	BOSTS 9299: Photo "NAVY YARD BOSTON BLDG 24 FROM W JULY 2 1913 24-8"	Looking southeast from Dry Dock 1. Shows fire damage to roof.	Structure on north end gone, white paint on granite.
B-10	1913	CNY	BOSTS 9299: Photo "NAVY YARD BOSTON BLDG 24 FROM N JULY 2 1913 24-9"	Looking west from Dry Dock 2, shows fire damaged roof	
B-11	1913	CNY	BOSTS 9301: Photo "NAVY YARD BOSTON BLDG 24 FROM S.E. JULY 2 1913 FIRST FLOOR 24-10"	Original framing in place. No real evidence of the fire on first floor.	Ghosting of stair at north wall. Must have been removed prior to fire.

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
B-12	1913	CNY	BOSTS 9301: Photo "NAVY YARD BOSTON BLDG 24 FROM S.E. JULY 2 1913 2ND FLOOR 24-11"	Original framing in place. Wood members charred. Looks like temporary shoring in place to hold up the 3rd floor framing.	
B-13	1913	CNY	BOSTS 9301: Photo "NAVY YARD BOSTON BLDG 24 FROM W AUG 1 1913 24-12"	Exterior photo. Demolition has started on roof.	Remnants of blueprint rack visible.
B-14	1913	CNY	BOSTS 9301: Photo "NAVY YARD BOSTON BLDG 24 FROM S AUG 1 1913 FIRSTFLOOR 24-13"	Demolition has started.	
B-15	1913	CNY	BOSTS 9301: Photo "NAVY YARD BOSTON BLDG 24 FROM S AUG 1 1913 2ND FLOOR 24-14"	Demolition has started. Looks like floor boards from the third floor passed down onto second floor. Temp. shoring in place.	
	1914	PW	DOD/PWD BOSTS 13347: "Specification No. 1968 for Reconstruction of Building No. 24 at the United States Navy Yard, Boston, Mass., Under Appropriation "Reconstruction, Building No. 24.""	Stamped with date "Mar 23 1914	COPY
	1914	CNY	Drawing 24-28: "Building 24 (Rebuilding) U. S. Navy Yard, Boston, Mass., Plans of First and Second Floors"	Dated January 29, 1914	Shows changes made to 1913 drawings
	1914	CNY	Drawing 24-29: "Building 24 (Rebuilding) U. S. Navy Yard, Boston, Mass., Second & Third Floor Framing Plans"	Dated January 29, 1914	Shows changes made to 1913 drawings
C-10	1914	CNY	Drawing 24-30: "Building 24 (Rebuilding) U. S. Navy Yard, Boston, Mass., Sections of Roof and Floor Construction"	Dated January 29, 1914	Shows changes made to 1913 drawings
	1914	CNY	Drawing 24-31 "Building 24 (Rebuilding) U. S. Navy Yard, Boston, Mass., Monitor Details"	Dated January 29, 1914	Shows changes made to 1913 drawings
B-16	1914	CNY	BOSTS 9299: Photo "NAVY YARD BOSTON BLDG 24 FROM W FEB 2 1914 M. LEACH CONT 24-15"	Construction photo, looking southwest. Roof mostly dismantled	Cornice appears to be straight, no apparent dips.
	1914	CNY	Drawing 24-32: "Profile Showing Settlement & Loads on South Test Pit for Column Foundations Bld'g 24. Feb. 4-13 '14 & Profile Showing Settlement & Loads on North Test Pit for Column Foundations Bld'g 24. Feb. 4-13 '14"	Load calculations for column footings	Explains why footing size was increased on the south end of the building.
	1914	CNY	Drawing 24-33: "Profile Showing Settlement Loads on Pit for Column #5 Foundation North Bld'g 24 Feb. 14-21, '14 & Profile Showing Settlement Loads on Pit for Column #5 Foundation South Bld'g 24 Feb. 14-21, '14"	Load calculations for column footings	Explains why footing size was increased on the south end of the building.
	1914	CNY	Drawing 24-34: "Building 24 (Rebuilding), U. S. Navy Yard, Boston Mass., Detail of 2nd Floor – Beams over Doors"	Shows detail of beams over end wall door openings. Drawing marked in blue pencil "Void	Beam offset to bear on end wall. Look in field to see what detail was employed.

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
				(not used), See revised paper tracing of same number."	
	1914	PW	DOD/PWD BOSTS 13347 Drawing 24-34: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass. Detail Showing Changes in 2nd Floor at Large End Doors"	Dated April 13, 1914	Shows side view and plan
B-17	1914	CNY	BOSTS 9299: Photo "24-16 NAVY YARD BOSTON BLDG 24 FROM W MAR 5 1914 C M LEACH CONT"	Construction photo looking NE, roof structure gone	
B-18	1914	CNY	BOSTS 9299: Photo "24-17 NAVY YARD BOSTON BLDG 24 FROM SE APR 1 1914 C M LEACH CONT"	Interior construction photo looking north.	▪ Ghosting of stairs on north wall ▪ Vault in northwest corner ▪ Cornice stones visible
B-19	1914	CNY	BOSTS 9299: Photo "24-18 NAVY YARD BOSTON BLDG 24 FROM SE MAY 1 1914 C. M. LEACH CONT"	Interior construction photo looking north	Formed pockets for columns
B-20	1914	CNY	BOSTS 9299: Photo "24-19 NAVY YARD BOSTON BLDG 24 FROM SE JUNE 8 1914 C. M. LEACH CONT"	Interior construction photo looking northwest	Formed pockets for columns
B-21	1914	CNY	BOSTS 9299: Photo "24-20 NAVY YARD BOSTON BLDG 24 FROM SE JULY 6 1914 C M LEACH CONT"	Interior construction photo looking northwest	Scaffolding being erected along west and north walls
B-22	1914	CNY	BOSTS 9301: Photo "24-22 NAVY YARD BOSTON BLDG 24 FROM SE AUG 4 1914 C. M. LEACH CONT."	Interior construction photo of third floor and roof framing looking northwest	Scaffolding in place. Most of the steel roof members in place.
B-23	1914	CNY	BOSTS 9301: Photo "24-22 (note: this is not an entry mistake, both photos were labeled 24-22 – LH) NAVY YARD BOSTON BLDG 24 FROM SE SEPT 4 1914 C. M. LEACH CONT."	Interior construction photo of third floor and roof framing looking northwest	Scaffolding in place. Most of the steel roof members in place.
B-24	1914	CNY	BOSTS 9301: Photo "24-23 NAVY YARD BOSTON BLDG 24 FROM SE OCT 1 1914 C. M. LEACH CONT."	Interior construction photo of third floor and roof framing looking northwest	Scaffolding in place. Most of the steel roof members in place.
B-25	1914	CNY	BOSTS 9299: Photo "24-23 (note: this is not an entry mistake, both photos were labeled 24-23 – LH) NAVY YARD BOSTON BLDG 24 FROM W NOV 3 1914 C. M. LEACH CONT. 1968"	Exterior construction photo looking SE, clearly taken at the same time as the other shots, possibly reproduced in 1968	▪ Framing monitor ▪ No windows in ▪ Doors not complete ▪ Slate work not complete ▪ No skylights
B-26	1914	CNY	BOSTS 9301: Photo "24-24 NAVY YARD BOSTON BLDG 24 FROM SE NOV 3 1914 C. M. LEACH CONT. 1968"	Interior construction photo of second floor	All columns and beams poured, floor poured.
B-27	1914	CNY	BOSTS 9299: Photo "24-25 NAVY YARD BOSTON BLDG 24 FROM W DEC 3 1914 C. M. LEACH CONT. 1968"	Exterior construction photo looking SE, clearly taken at the same time as the other shots,	▪ Monitor complete ▪ Windows 1/1 ▪ Doors not complete

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
				possibly reproduced in 1968	▪ No skylights
B-28	1914	CNY	BOSTS 9301: Photo "24-26 NAVY YARD BOSTON BLDG 24 FROM SE. 1ST FL. DEC. 3 1914 C. M. LEACH CONT. 1968"	Interior construction photo.	
B-29	1914	CNY	BOSTS 9301: Photo "24-27 NAVY YARD BOSTON BLDG 24 2ND FL. FROM S.E. DEC. 3 1914 C. M. LEACH CONT 1968"	Interior construction photo.	
	1914	CNY	Structural Drawings SH D1: "Building 24 (Rebuilt) U. S. Navy Yard, Boston, Mass."	N. E. Structural Co., Everett, Mass.	Structural drawings for roof rafters
	1914	CNY	Structural Drawings SH 3 "Building 24 (Rebuilt) U. S. Navy Yard, Boston, Mass."	N. E. Structural Co., Everett, Mass.	Structural drawings for roof rafters
	1914	CNY	Structural Drawings SH E1: "Masonry Plan, Building 24 (Rebuilt) U. S. Navy Yard, Boston, Mass."	N. E. Structural Co., Everett, Mass.	Masonry Plan of Rafters and Masonry Plan of Columns, shows bolting methods to footings and cornice.
	1914	CNY	Structural Drawings SH E2: "Roof Framing Plan, Building 24 (Rebuilt) U. S. Navy Yard, Boston, Mass."	N. E. Structural Co., Everett, Mass.	Structural drawings for roof rafters
	1914	CNY	Structural Drawings SH 1: "Building 24 (Rebuilt) U. S. Navy Yard, Boston, Mass."	N. E. Structural Co., Everett, Mass.	Monitor framing plans, columns
	1914	CNY	Structural Drawings SH 2: "Building 24 (Rebuilt) U. S. Navy Yard, Boston, Mass."	N. E. Structural Co., Everett, Mass.	Monitor framing
B-30	1915	CNY	BOSTS 9301: Photo "24-31 NAVY YARD BOSTON 2ND. FL. BLDG 24 FROM S.E. JAN 4 1915 C.M. LEACH CONT 1968"	Shows interior of 2nd floor. Must be right after completion	▪ Radiators ▪ Windows 1/1 ▪ Transoms and office spaces ▪ Lights
B-31	1915	CNY	BOSTS 9301: Photo "24-32 NAVY YARD BOSTON 3rd. FL BLDG 24 FROM S.E. JAN 4 1915 C.M LEACH CONT 1968"	Shows interior of 3rd floor. Must be right after completion	Radiators and heating pipes
B-32	1915	CNY	BOSTS 9301: Photo "24-33 NAVY YARD BOSTON HEMP FROM BLDG 62 ON 3RD FLOOR BLDG 24 FEB. 9 1915 FROM S.E."	Good interior shot of the building in use.	Door transoms visible from interior. Multi pane.
B-33	1915	CNY	BOST 9301: Photo "24-34 NAVY YARD BOSTON HEMP FROM BLDG 62 ON 1ST FLOOR BLDG 24 FEB. 9 1915 FROM S.E."	Good interior shot of the building in use.	
	1915	CNY	Drawing 24-35: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., 1st and 2nd Stories. Plan Showing Layout of Sprinkler System"	Dated June 10, 1915	
	1915	CNY	Drawing 24-36: "Building 24 (Rebuilding) U.S. Navy Yard, Boston, Mass., 3rd. Story (Roof) & Cross Section. Plan Showing Layout of Sprinkler System"	Dated June 10, 1915	
	1915	CNY	Drawing 24-37: "Building 24, U.S. Navy Yard,	Dated August 6, 1915	Shown in northeast corner.

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
			Boston, Mass., Plan of Proposed Location of Wash Basins"		
	1915	CNY	Drawing 24-38: "Building 24, U.S. Navy Yard, Boston, Mass., Plan Showing Supports for Rope to be Stretched"	Dated August 30, 1915	Shown at north and south ends of the Third Floor Rigging Loft. Look for evidence.
	1915	CNY	Drawing 24-39: "Building 24, U.S. Navy Yard, Boston, Mass., Plan for Lighting of Rigging Loft"	Dated September 17, 1915. Blue pencil note "Void, see plan 24-41	
B-34	1915	CNY	BOST 9301: Photo "2179 NAVY YARD BOSTON SPRINKLER SYSTEM 2ND FLOOR BLD 24 FROM W P.J. SULLIVAN CO. CONT. 2173 (?) OCT 1, 1915"		Second floor still open, no apparent use.
	1916	PW	DOD/PWD BOSTS 13347: Transmittal for "Revised plans for reconstruction of Building 24. Contract 1963 with C. M. Leach; forwarding tracings"		
B-35	1916	CNY	BOSTS 9301: Photo "2239 NAVY YARD BOSTON HALL IN BLDG. 24 FROM N.W. FEB. 8, 1916	Second floor decorated with streamers, lights, flag, etc.	
B-36	1916	CNY	BOSTS 9301: Photo "2240 NAVY YARD BOSTON HALL IN BLDG. 24 FROM N.W. FEB. 8, 1916	Second floor decorated with streamers, lights, flag, etc.	
B-37	1916	CNY	BOSTS 9301: Photo "2241 NAVY YARD BOSTON HALL IN BLDG. 24 FROM S.E. FEB. 8, 1916	Second floor decorated with streamers, lights, flag, etc.	
B-38	1916	CNY	BOSTS 9301: Photo "2242 NAVY YARD BOSTON HALL IN BLDG. 24 FROM E. FEB. 8, 1916	Second floor decorated with streamers, lights, flag, etc.	
B-39	1916	CNY	BOSTS 9301: Photo "2243 NAVY YARD BOSTON HALL IN BLDG. 24 FROM S. FEB. 8, 1916	Second floor decorated with streamers, lights, flag, etc.	
	1916	CNY	Drawing 24-40: "Building 24, U.S. Navy Yard, Boston, Mass., Drawing Showing Locker Room. For Rigger's Shop"	Dated Sept. 12, 1916	First floor, northwest corner. ▪ Refers to sinks already in place in NE corner (from 24-37)
	1916	CNY	Drawing 24-41: "Building 24, U.S. Navy Yard, Boston, Mass., Plan for Lighting and Location of Ventilating Fans in Rigging Loft"	Dated November 7, 1916 Second copy with handwritten notes. Could be "as-built"	▪ Supersedes 24-39 ▪ Shows fan and light locations. Check field.
	1916 (? No date noted)	CNY	Drawing 24-42: "Building 24, U.S. Navy Yard, Boston, Mass., Drawing Showing New Chimney Heater and Hot Water Tank"	Not dated. (Dewitt C. Webb is Civil Engineer	Shows Chimney and heater along north wall, in wash room on first floor and next to Court Room on Second Floor.
B-40	1917	www.history.navy.mil	"Photo #NH102012 Motor boat Lynx at Boston,	March 1917	Shows building in the

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
			March 1917."		background.
	1917	CNY	Drawing 24-43: "Building 24, U.S. Navy Yard, Boston, Mass., Drawing Showing Locker Room for Rigger's Shop"	Dated Aug. 7, 1917. Blue pencil note "Void see Catalogue File."	Looks like proposed extension to existing lockers in NW corner.
	1917	PW	DOD/PWD BOST 13347 Drawing 24-43: "Building 24, U. S. Navy Yard, Boston Mass. Locker Room for Rigger's Shop"	Could be drawing noted above	
	1917	CNY	Drawing 24-44: "Building 24, U.S. Navy Yard, Boston, Mass., Plan Showing Proposed Lighting Arrangement of 2nd Floor"	Dated Oct. 17	Shows room layout and designations. Ladies Toilet, Ante Room, Office, Bed Room, Smoking Room, Com. Mitchell, Post Office, Old Museum, Radio
		CNY	No drawing or card for 24-45		
	1918	CNY	Drawing 24-46: "Building 24, U. S. Navy Yard, Boston, Mass., Alteration to Fire Escape Landing at 3rd Floor"	Mar. 2 – 1918	No location on building exterior shown.
	1918	CNY	Drawing 24-47: "Building 24, U. S. Navy Yard, Boston, Mass., Drawing Showing Alteration Locations for Proposed Elevator at N-W-End"	Dated Sept. 9 1918	Two alternates shown. Neither one was built
	1918-1919	Black	P 373: Marine railway constructed at the end of Building 24.		
B-41	1919	Black	P. 375: Photo of USS *Delphy* on the Marine Railway.		Building 24 is not visible.
B-42	1919	CNY	BOSTS 8962: Photo "NAVY YARD BOSTON HEAD END OF MARINE RAILWAY CONT 2843 JAN. 6, 1919 FROM S. W. 4601"	Shows South end of building.	Original openings Dark staining under central door openings.
	1919	CNY	BOSTS 8962: Photo "NAVY YARD BOSTON MARINE RAILWAY CONT 2843 JAN. 6, 1919 FROM S. W. 4600"	Straight on view of south end of building.	Lightning protection on monitor roof?
	1919	CNY	Drawing 24-48: "Building #24, U. S. Navy Yard, Boston, Mass., Plan Showing Elevations at Bottom of Girders Supporting 3rd Story Floor Beams, Taken Jan. 25, 1919"	Dated Jan. 28, 1919	▪ Note: "Crack at back of stone cornice extends between Cols 1-14 on east side and between Cols 5-14 on west side. The crack is _" to 2 _" in width, 1-6" deep." ▪ Copy for Wayne King
	1919	CNY	Drawing 24-49: "Lighting for Winch Room"	8-25, 1919 Drawing not in file and not reviewed.	
		CNY	No drawing or card for 24-50		
		CNY	No drawing or card for 24-51		
B-43	1919	CNY	BOSTS 8962: Photo "NAVY YARD BOSTON SITE OF ROADWAY OVER MARINE R. W.	Good, clear shot of southwest corner of building, showing	▪ Roller door at south end, west door?

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
			CHAINS ALLOT 9202-16 DAY LABOR FEB. 28, 1919 FROM S.W. ~~4729~~ 4804 (handwritten)"	entire south end.	▪ Good partial view of southern most west elevation door ▪ South window, first floor, east side, altered with angle iron
B-44	1919	CNY	BOSTS 8962: Photo "NAVY YARD BOSTON MARINE RAILWAY CONT 2343 ROLLERS FOR CRADLE MARCH 3 1919 ~~4732~~ 4803 (handwritten)"	Shot of the marine railway rollers. Limited view of building in background.	Shows the first floor window sill lowered (as part of the marine railway construction).
	1919	PW	DOD/PWD BOSTS 13347: Handwritten sheet entitled "Test Readings for Spreading of Outer Walls Bldg #24"	May 19, '19 by Ed Phelps	▪ Note: "Marks on Cols within the Building were checked and no appreciable settlement was found to have taken place" ▪ Shows readings taken on Jan. 31, 19. - COPY
B-45	1919	CNY	BOSTS 8962: Photo "NAVY YARD BOSTON TEST OF MARINE RAILWAY CONT 2843 CRADLE IN WITH U.S.S. GREBE & U.S.S. ACUSHNET JUNE 10, 1919 FROM E. 5080"	Shows south end of east roof slope	▪ All monitor windows open ▪ Lightning protection (?) visible on north end or roof
	1919	PW	DOD/PWD BOSTS 13347: Handwritten plan entitled "Check Levels on Col's Bld #24 Boston Navy Yard"	Readings taken Jan. 17 '21 by E. S. Phelps Insp.	Note: "Figs indicate total amt of settlement since Jan. 1919" - COPY
	1921	PW	DOD/PWD BOSTS 13347 Drawing 24-50: "Building 24. Plan showing Settlement of Columns"	January 19, 1921	▪ Note: "Figs indicate total amount of settlement since Jan. 1919. Readings taken Jan. 17, 1921" ▪ Shows elevations taken at beams - COPY
	1921	PW	DOD/PWD BOSTS 13347 Drawing 24-50: "Levels on underside of Rein. Concrete Beams 2nd Floor Bld'g #24"	March 22, 1921	Pencil notations of elevation on that date
	1921	PW	DOD/PWD BOSTS 13347 Drawing 24-51: "Navy Yard, Boston, Mass, Building 24, Levels on underside of reinforced Concrete Beams 2nd Floor B'ldg. #24"	April 21, 1921	Shows elevations taken at beams - COPY
	1921	CNY	Drawing 24-52: "Building No. 24. U. S. Navy Yard, Boston, Mass., Diagrams Showing Settlement of Building"	Dated Aug. 14, 1921	▪ Elevations taken between Jan. 20, '19 and July 19, '21 showing settlement of columns. ▪ Copy for Wayne King
C-11	1922	CNY	Drawing 24-53: "Building 24, U.S. Navy Yard, Boston, Mass., Plan Showing Method of Repairs at Coping of Building"	Dated March 22, 1922 Original copy in maintenance file	Shows elevation and section of Z channel and tie rod system
	1927	CNY	Drawing 24-54: "Navy Yard, Boston, Mass., Building No. 24. Skylights for Rigging Loft. (Third	June 2, 1927	▪ Shows two dormers per roof slope.

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
			Floor)"		▪ Construction details shown. ▪ Four long panes with overlapping glass (similar to greenhouse glazing)
B-46	1930's	Black	P. 443: Aerial photo of Navy Yard in the 1930's	Showing the marine railway and building 24.	New roof configuration with monitor Skylights are not visible.
	1933	PW	DOD/PWD BOSTS 13347 Drawing 24-55: "Building 24 First Story Office Lighting"	Approved Aug. 2, 1933	Shows 200 w Glassteel diffuser
	1934	CNY	Drawing 24-56: "Building 24, U.S. Navy Yard, Boston, Mass., Second Story Lighting Improvements"	Tracing dated Jan. 5, 1934	
	1934	CNY	Drawing 24-56: "Building 24, U.S. Navy Yard, Boston, Mass., Second Story Lighting Improvements"	Dated Sept. 12, 1916 Tracing dated Jan. 5, 1934	
	1934	Black	P. 475: "Map of U. S. Navy yard Boston, Mass. Showing Conditions on June 30, 1934"	All buildings are located on the plan by their number	▪ Note next to building 24 says that it is a Production Department building ▪ Notes that it is the "Riggers, Laborers, New Work Office"
	1935	CNY	Drawing 24-57: "Rigging & Sail Lofts, Building Number 24, Navy Yard Boston"	Dated Aug. 2nd 1935, traced from a drawing dated June 30, 1921. Pencil note "1 print of this sheet given to carpenter Nov. 6- 1935"	Shows second floor partition with pivoting windows
B-47	1936	CNY	BOSTS 9302: Photo "223-36 Mar 27-36 Constitution" in pencil on back	View of interior, first or second floor space?	
B-48	1937	Black	P. 499: Photograph of the Ralph Talbot in Dry Dock No. 1, July 1, 1937.	The shot is looking south and shows the north and west elevations of Building 24.	▪ Four skylights visible. ▪ Large door openings on north elevation, similar to south
C-12	1939	CNY	Drawing 24-58: Public Works Officer Drawings "Navy Yard, Boston, Mass., 1st, 2nd, & 3rd Floor Plans"	Floor plan with room designations Two copies	▪ First Floor: Locker Room, Store room, Fuel Bin, Block and Rope Stowage, Laborers Lobby, Material and Tool Rooms, Stowage, Tool Room, Lockers & Office, Marine Railway Head House, Clerks & Files, ▪ 2nd Floor: Inspector Naval Material, Files, Janitor, Inspectors, Stock, Sailmakers Office, Sail Loft, Sailmakers, Riggers, Storeroom, Clerks, Chief Radio Electrician Inspector, Ass't I. N. M., Stock,

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
					Inspector Naval Material, Ante Room, Womens Toilet, Mens Toilet, Vault ▪ Third Floor: Riggers Loft, Stock Room(s), Office, Locker, Toilet
B-49	1940	Black	P. 507: Aerial shot of Boston Navy Yard in June 1940.	Shows Building 24 and the marine railway without a ship in it.	Skylights visible on west roof
	1942	PW	DOD/PWD BOSTS 13347: Handwritten calculations entitled "Building #24"	7-24-42 on 4x6 sheets, July 29, '42 on 8 _ x 11 sheets	
	1942	CNY	Drawing 24-59: "Building No. 24 East Extension, Sub-Surface Plan Existing Condition"	Last revision dated 11-10-42	Shows east elevation of Building 24
	1942	CNY	Drawing 24-60: "Navy Yard, Boston, Mass, Building No. 24 Foundation Plan"	Last revision dated 11-10-42	
C-13	1942	CNY	Drawing 24-61: "Navy Yard, Boston, Mass, Building No. 24 East Extension, First Floor Plan"	Last revision dated 11-10-42	Shows 2nd, 3rd, 5th and 6th door openings blocked in.
	1942	CNY	Drawing 24-62: "Building No. 24 East Extension, Second Floor Plan"	Date not visible. Note "This drawing has been supplemented by Drwg #24-80 which shows revised interior arrangement. Second copy in maintenance file, Last revision dated 11-10-42	Calls for removal of chimney on north wall (24-42)
	1942	CNY	Drawing 24-63: "Building No. 24 East Extension, Roof & Third Floor Plan" revised drawing dated 12/43	Floor plan of addition Another copy in file, used as an as-built drawing for wall alterations in 1964. Original copy in separate file.	▪ Elevator and Hose Tower addition to north end of existing building ▪ Shows dormer to addition roof from 3rd floor loft ▪ Shows Material Rooms 01 & 02, wire screen partitions, and office at south end. ▪ "Asbestos Roof Ventilators"
	1942	CNY	Drawing 24-64: "Building No. 24 East Extension, Cross Section & Details"	Last revision dated Jan. 30, 43 Two copies	Shows footings, roof and window details.
C-14	1942	CNY	Drawing 24-65: "Building No. 24 East Extension, Elevations"	Last revision dated Jan. 11, 43 Original copy in separate file.	All elevations and elevator shaft. Fixed sash in elevator, 6 panel (extant)
	1942	CNY	Drawing 24-66: "Navy Yard, Boston, Mass, Building No. 24 East Extension, Second Floor Framing Plan"	Last revision dated 11-10-42	
	1942	CNY	Drawing 24-67: "Building No. 24 East Extension, Roof Framing"	Last revision dated 1-12-43. Original copy in separate file.	

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
	1942	CNY	Drawing 24-68: "Navy Yard, Boston, Mass, Building No. 24 East Extension, Grade Beam Plan"	Last revision dated 11-10-42	
	1942	CNY	Drawing 24-69: "Navy Yard, Boston, Mass, Elevator & Hose Tower, Building 24, Plans & Wall Sections"	Last revision dated 12-1-42 Superseded by 24-78	
	1942	CNY	Drawing 24-70: "Building No. 24 East Extension, North and South Stairs"	Last revision 11/10/42	No locations shown, appear to be in addition only
	1942	CNY	Drawing 24-71: "Building No. 24 East Extension, First Floor Lighting Plan"	Last revision 2-5-43	All work in addition
	1942	CNY	Drawing 24-72: "Building No. 24 East Extension, Second Floor Lighting Plan"	Last revision 2-5-43 Revision and changes on 5-20-54 also	All work in addition
	1942	CNY	Drawing 24-73: "East Extension Plumbing"	Note on card: "Superceded by P. W. Dwg. 24-82 1/26/43" Drawing not in file and not reviewed.	
	1942	CNY	Drawing 24-74: "Building No. 24 East Extension, First Story Heating"	Last revision 10/20/42 Pencil note: "VOID, See P. W. Dwg. No. 24-83"	
	1942	CNY	Drawing 24-75: "Building No. 24 East Extension, Second Story Heating"	Last revision 10/20/42 Pencil note: "VOID, See P. W. Dwg. No. 24-84"	
	1942	CNY	Drawing 24-76: "Building No. 24 East Extension, Alternate "B" Foundation Plan"	Last revision 11/10/42 Pencil note: "Void, Use spread footings. See Drg 24-60 ABS. 11/10/42"	
	1942	CNY	Drawing 24-77: "Building No. 24 East Extension, Alternate "C" Foundation Plan"	Last revision 11/10/42 Pencil note: "Void, Use spread footings. See Drg 24-60 ABS. 11/10/42"	
	1942	CNY	Drawing 24-78: "Navy Yard, Boston, Mass, Elevator & Hose Tower, Building 24, Plans & Wall Sections"	Last revision dated 2-1-43 Supersedes 24-69	This drawing notes "Cut off Existing piles 2'-0" at existing building wall
C-15	1942	CNY	Drawing 24-79: "Building No. 24 East Extension, Roof and First Floor Plan"	Red pencil wall locations and dimensions with note "For As-Built Dwg. 5/6/64". Last revision date is Dec. 5, 1961.	▪ Changes to floor plan in 1964. ▪ The base drawings indicate that the first floor west openings were infilled, possibly in 1961. ▪ Wood extension (Docking Officer Work Station) built on south end, west corner. ▪ Fire stair added to addition ▪ Marine Railway Head House still labeled as such

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
C-16	1942	CNY	Drawing 24-80: "Building No. 24 East Extension, Second Floor Plan"	Last revision dated 1-30-43 Two copies	Some openings in original east wall glazed with obscure glass, 2 bricked up
	1942	CNY	Drawing 24-81: "Building No. 24 East Extension, Elevator Tower, Exterior Sliding Door"	Last revision dated 2/10 1943	Shows elevation, construction and sliding mechanism
	1942	CNY	Drawing 24-82: "Building No. 24 East Extension, Revised Plumbing"	Last revision dated 1/27/43	▪ "This drawing supersedes P. W. Drawing No. 24-73" ▪ Addition only ▪ Looks like the gutter downspouts from the original building copper gutter still ran through the building and connected to the catch basins.
	1942	CNY	Drawing 24-83: "Building No. 24 East Extension, First Story Heating Plan"	Last revision dated 2/9/43 Note: "This Drawing Supersedes P. W. Drawing No. 24-74"	
	1942	CNY	Drawing 24-84: "Building No. 24 East Extension, Second Story Heating"	Last revision dated 2/8 1943 Two copies	▪ "This drawing supersedes P. W. Drawing No. 24-74" ▪ Addition only
	1942	PW	DOD/PWD BOSTS 13347: Handwritten Notes regarding "Bldg. #24 East Extension. Soil Bearing Test, in Pits for Footings F-12 and B-11"	Nov. 4, 1942 by A. E. Titus	Detailed description of soil bearing capacities for extension - COPY
	No date	PW	DOD/PWD BOSTS 13347 Drawing 24-85: "Building 24 First Floor Toilets, Ventilation"	No date on drawing, two copies, one blueline and one print	Shows fans out east side of building
	1943	PW	DOD/PWD BOSTS 13347 Drawing: "One Electric Freight Elevator, Blg 24 Navy Yard Boston"	Stamped on back: 30 Jan 1943	Shows plans, elevations and calculations for elevator.
	1943	PW	DOD/PWD BOSTS 13347 Drawing: "U.S. Navy Yard, Building #24 Extension, Charlestown, Mass., "Automatic" Sprinkler Corp. of America"	First and second floor plans, dated Feb. 7, 1943	▪ Must be prints referenced below. ▪ Shows risers and plans.
	1943	PW	DOD/PWD BOSTS 13347: Transmittal from Public Works Officer to Thos. O'Connor & Co., Inc.	Contract #N0y-4741 Regarding Building #24 sprinklers, references enclosed prints	
	1943	PW	DOD/PWD BOSTS 13347: Inspector's Report, Subject: "Test of the F. S. Payne Company's elevator in Building 24" and "Specifications for a freight elevator in Building 24, Navy Yard, Boston, Mass."	Report stamped 6 APR 1943	
	1944	CNY	Drawing 22378: "Rigging Loft, Bldg. No. 24 2nd. Floor Arrangement of Equipment"	Mar 8, 1944	Shows use "Painter's Lockers, Life netting, dip ropes, bow mats, boat fenders, mis. Small rope work, cargo net area, cargo net working area, life raft working area, store room, training and

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
					test, shop stores cage, women's toilet, port. Diving equip (stored in vault), blueprint room, riging loft office, sandblasters lockers."
	1944	CNY	Drawing 13890: "Rigging Loft, Bldg. No. 24 – 3rd Floor Arrangement of Equipment"	Mar 8, 1944	▪ "Leather Work Life Lines Ridge Ropes, grinder, Working area for Ladders, Boat Gripes, etc., Fenders, Heavy wire splicing area, Antennas-Whistle Pulls, Storage for Sludge Barge Material. ▪ Machinery identified by number.
	1944	PW	DOD/PWD BOSTS 13347: Memorandum regarding "Hot Water Service for Building No. 24, Report of Investigation 23 Dec. 1944"	29 December 1944	
	1946	PW	DOD/PWD BOSTS 13347: Drawing "Boston Naval Shipyard, Building No 24, Elevators	Approved 1946	▪ shows capacity, speed, total travel, car size, make (Payne) ▪ doesn't state if it is a new elevator or work on existing
B-50	1948	CNY	BOSTS 8964: Photo "789-48. NY2. 6/10/48. CONTR. #NOy 15259. View showing completed repairs to Marine Railway No. 11."	Shows chain hoist machinery	▪ Crack visible in brick wall beyond machinery ▪ Find out location of machinery
	1949	CNY	Drawing 24-86: "Building 24 Ventilation of Locker Room"	Aug. 25, 1949	
	1950	CNY	Drawing 24-87: "Building 24 Reinforced Lintel at Main Entrance on. D. D. No. 2 Side"	4-19-50 D. D. is Dry Dock, but it's the drydock #1 side, not #2, shown as such on site plan	"NOTES 1. Cut and level tops of granite wheel guards as shown. 2. 12" WF I Beam shall be placed under broken granite lintel and by means of Hydraulic jack lifted until lintel is level. Then side struts to be placed, secured and welded. 3. All Welds to be _ fillet and continuous."
	1952	CNY	Drawing 24-88: "Building no 24, Skylights Over Painters' Locker Rooms"	Dated 8-1-52	▪ on flat roof of addition ▪ Were these ever built?
	1953	PW	DOD/PWD BOSTS 13347: Memorandum regarding "Crack in column, Bldg. 24, BNS"	1 June 1953	See transcription for details
	1953	CNY	Drawing 24-89: "Riggers Loft – Building 24 Annex, New Firestair Egress"	Dated 12-24-53	Shows interior fire stair. Was this superseded by exterior wood stairs?

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
	1954	CNY	Drawing 24-72 (Copy of earlier drawing): "Building No. 24 East Extension, Second Floor Lighting Plan"	Revision and changes on 5-20-54 to the 1942 drawings	All work in addition
	1954	CNY	Drawing 24-90: "Building 24, Elevations Underside of Concrete Beams"	June 1953	Shows elevations taken at underside of concrete beams on June 4, 1953, April 26, 1954, April 28, 1954, June 1, 1954, April 20, 1959, Dec. 7, 1959 and Jan 18, 1961.
	1954	CNY	Drawing 24-91: "Riggers Loft – Bldg. #24, Monorail"	Dated 5-19-54	Work in addition
	1958	PW	DOD/PWD BOSTS 13347: "Public Works – Job Order/Estimate for Expansion of P. P. & C. Office"	4-21-58	Minor interior upgrades to electrical, painting
	1958	PW	DOD/PWD BOSTS 13347: "Public Works – Job Order/Estimate for Expansion of P. P. & C. Office - Modification"	5/19/58	Minor interior upgrades to electrical, painting
B-51	1950-60	CNY	BOSTS 8704: Photo – no title or markings	Looking north from pier 1 to Dry Dock 1 and marine railway	▪ Dormer on west roof ▪ Windows appear to be 2/2 ▪ Cornice and gutters appear to be straight, no obvious dip ▪ May be a shed on the south end, where shed is currently
	1961	CNY	Drawing 24-79 (Copy of earlier drawing): "Navy Yard, Boston, Mass., Building No. 24 East Extension, First Floor Plan"	Revision made to 1942 drawing in Dec. 1961. Note: "This drawing is supplementary to Drwg #24-61 and supersedes the interior arrangement shown on same."	Shows first floor layout and designations.
	1961	PW	DOD/PWD BOSTS 13347: Drawing showing "Bldg 24/1 Partitionetts"	Note: "Not built like these 11/30/61" No original date on drawings	
	1961-69	PW	File Folder: DOD/PWD Design Division (Code 440), A. Completed Design Projects, 253 – Modify Lighting, Building 24/1, BNS, 1961-1969	▪ Shows lighting changes to building. ▪ References drawing 24-79, December 1961	
	1962	PW	DOD/PWD BOSTS 13347: Memorandum regarding "Hot water in cold water supply pipe, Bldg. 24, BNS; report on"	11 October 1962	Report of investigation into problem with water lines.
	1964	CNY	Drawing 24-63: "Building No. 24 East Extension, Roof and Third Floor Plan"	Red pencil wall locations and dimensions with note "For As-Built Dwg. 5/6/64"	Changes to floor plan in 1964.
C-17	1964	CNY	Drawing 24-79: "Building No. 24 East Extension, First Floor Plan"	Red pencil wall locations and dimensions with note "For As-Built Dwg. 5/6/64". Last revision date is Dec. 5, 1961.	▪ Changes to floor plan in 1964. ▪ The base drawings indicate

Fig.	Date	Source	Image/Information	Drawing/Photo View	Noted Items
				Written Document Description	
					that the first floor west openings were infilled, possibly in 1961. ▪ Wood extension (Docking Officer Work Station) built on south end, west corner. ▪ Fire stair added to addition ▪ Marine Railway Head House still labeled as such
	1964	CNY	Drawing 24-80: "Building No. 24 East Extension, Second Floor Plan"	Red pencil wall locations and dimensions with note "For As-Built Dwg. 5/6/64"	Changes to floor plan in 1964.
B-52	1964	CNY	BOSTS 8967: Photo "MARINE RAILWAY # 11 ASF 1050-2-64"	Looking north from pier 1, up marine railway. Building slightly visible	Lightning protection (?) gone from south monitor roof
		CNY	No drawing or card for 24-92		
	1966	CNY	Drawing 24-93: "Bldg. 24, 2nd Floor Additional Showers Plan Architectural"	Paper. Date Feb. 3, 1966 Drawing not in file and not reviewed.	
	1966	PW	DOD/PWD BOSTS 13347 Drawing 24-94: "Installation of New Shower Stalls Bldg. 24/2 – Painter's Locker Room, 2nd floor"	6/29/66	Beautifully drawn isometrics of drain lines and cleanouts
	1967	PW	DOD/PWD BOSTS 13347: Memorandum regarding "Alteration of Door, Bldg. 24/2; request for funding as Cost Class 28"	Stamped 18 May 1967	Requesting widening the existing wooden women's toilet door to facilitate material handling
	1967	CNY	Drawing 24-95: "Bldg. 24, Riggers Loft, Monorail Ext."	July 25, 1967	
C-18	1968	CNY	Drawing 13884: "Riggers Shop 72, Building No. 24 1st. Floor Arrangement of Equipment"	May 20, 1969	▪ Shows floor plan and room designations. ▪ Head house for marine railway still designated. ▪ Monorail shown on west side of original building ▪ "Recompression Chamber" on south side.
	1969	CNY	Drawing 24-96: "Sail Loft Bldg. 24, Third Floor, Electrical Plan"	July 28, 1969	▪ Shows cutting table, sewing machine tables, upholsterer's benches, rubber fabricating table ▪ Shows double lamp, look for extant fixtures ▪ Some of the sewing machine table configurations remain the same?
	1969	CNY	Drawing 24-97: "Sail Loft Bldg. 24, Details, Third Floor Lighting"	July 28, 1969	Shows details of two fixture types, "Reelite", and distribution

Fig.	Date	Source	Image/Information	Drawing/Photo View Written Document Description	Noted Items
	1969	CNY	Drawing 24-98: "Sail Loft Bldg. 24, Details – 2300. V., 1 θ, Panel #9, Substa. 22 for 75KVAl, Roof Bldg. 24 Extension"	July 28, 1969	
B-53	1960-70	CNY	BOSTS 8697: Photo "ASF 1082 Pier One"	Looking north from Pier 1, shows southern half of roof and third floor door and windows	▪ Shows different fenestration patterns on skylights – 2 and 4 pane ▪ Shows fenestration pattern on monitor
	1970	PW	DOD/PWD BOSTS 13347: Letter regarding "Extension of Monorail, Bldg. 24/2"	6 January 1970	Signed George Bradley
B-54	1973	CNY	BOSTS 9304: Photo "BLDG. 24 FEB. 16, 1973 ASF 1401", "ASF 1402", "ASF 1403", "ASF 1404", "ASF 1405", one with no ASF number, "ASF 1410", "ASF 1411", "ASF 1412"	Various interior shots, showing office spaces.	▪ ASF 1410 shows an exterior door lintel with a crack in the center. ▪ Shows door pattern and condition ▪ Structural steel in place under cracked lintel
B-55	1973	Black	P. 797: Photo of USS *Constitution* approaching Dry Dock 1, April 17, 1973.	Looking north from the water	Dormer on west roof
C-19	1973	CNY	Drawing: "Rigging Loft Bldg. No. 24 2nd Floor Arrangement of Equipment"	Dated 17 JUL 1973. Second floor plan with room designations	Life netting, life raft working area, store room, rigger's lockers, painter's lockers, sandblaster's lockers, shop stores, transformers, blueprint room, rigging loft office, rigging loft.
C-20	1973	CNY	Drawing: "Rigging Loft Bldg. No. 24 3rd Floor Arrangement of Equipment"	Dated 17 JUL 1973. Floor plans with designations	Working area for ladders, boatgripes, etc.; antennas – whistle pulls; storage for sludge barge material; stock room, grinders, heavy wire splicing area, etc.
C-21	1973	CNY	Drawing: "Building 24 1st & 2nd flr Pror(p)osed 2nd Alternate Constitution Suprt Argt"	Dated 10 SPT 1973. Floor plans with designations	▪ Marine railway head house still in place ▪ Shows machinery layout.
C-22	1973	CNY	Drawing: "Building 24 1st FLR, Proposed 3rd Alternate Constitution Suprt Argt"	Dated 31 OCT 1973. Floor plans with designations	▪ Marine railway head house still in place ▪ Shows machinery layout.
	1973	CNY	Drawing: "Building 24 3rd FLR, Proposed 3rd Alternate Constitution Suprt Argt"	Dated 31 OCT 1973. Floor plans with designations. Bottom of plan cut off, but can be spliced with sheet of first floor plans	▪ Marine railway head house still in place ▪ Shows machinery layout.
	1973	CNY	Drawing 24-99: "Building #24 Machine Foundations"	9/26/73	

Fig.	Date	Source	Image/Information	Drawing/Photo View / Written Document Description	Noted Items
	1973	CNY	Drawing 24-100: "Building #24 Bridge Crane"	9/27/73	Location not clear
	1973(?)	PW	File Folder: "DOD/Public Works Division, Engineering Branch (Code 423), H. (64) Building 24 Photos"	Photocopies of earlier drawings – partial copies of 1900, and 1963 "Property Record Cards"	
	1973	PW	File Folder: "DOD/Public Works Division, Engineering Branch (Code 423), H. (64) Building 24 General Info., 1973"	▪ Handwritten list (partial) of drawings. ▪ Hand drawn south elevation, minor notes about materials. ▪ Handwritten sheet noting "existing condition" and materials. Sketches of doors in 1913, and in 1973(?). Talks about "Restore exterior to 1942? Or earlier to 1913". "2/2 sash date back to 1913 drawings – 1/1 sash now in west wall", "Existing doorway with sidelites & transom at either end date back to changes of 1913 [on west wall] the five remaining doorways were not changed in 1913. The granite filled dorr & window at north end was filled in before 1909 and the space behind used for a vault. Doors below 24 light transom appear to be metal but could be wood" ▪ Continuation of previous sheet states "If east wall is exposed thenortheast corner will need to be rebuilt… masonry failure has occurred from granite cornice to below 2nd floor level – presently held in position with 3 horizontal tie-rods hooked to two "I" beams."	
	1973-74	PW	File Folder: "DOD/Public Works Division, Engineering Branch (Code 423), H. (64) Building History File, Building 24, 1973-1974"	▪ Memos on heat, power, utilities, inventory of materials on exterior of building (timber, lights, etc.) ▪ *Plan "Space Assignment Bldg 24", dated 11/8/73 showing location and layout of machinery room for the marine railway. Memo attached allocates space assignment to the USS *Constitution* Repair Facility. ▪ Memos regarding consolidation of facilities upon closure of the Boston Naval Shipyard.	
B-56	1974	CNY	BOSTS 9300: Photo, no title or designation	Color photo looking northeast	▪ Marine railway still in place ▪ Brick infill at doors
	1974	CNY	BOSTS 9305: Photo "2/26/74 New Sheetmetal Shop Building 24" on back in pen.	Interior photo	No useful information
	1974	CNY	Drawing H 80060, Sheet 1 of 3: "Fdn. For Vertical Resaw, Bldg. #24 Boston Naval Shipyard"	8-6-74	
	1974	CNY	Drawing H 80060, Sheet 2 of 3: "Fdn. For Vertical Resaw, Bldg. #24 Boston Naval Shipyard"	8-6-74	
	1974	CNY	Drawing H 80060, Sheet 3 of 3: "Fdn. For Vertical Resaw, Bldg. #24 Boston Naval Shipyard"	8-6-74	
	1979	CNY 106	File Folder: "79-001 Replace Built-Up Roofing, Bldg. 24 Addition"	▪ Section 106 review letter dated June 15, 1979. ▪ Request reviewed and approved to replace the roof on the addition. It is unknown whether this project was completed or not.	
	1982	CNY 106	File Folder: "82-004 Upgrade Navy M&R Shops, Bldg. 24"	▪ Section 106 review letter dated August 26, 1982. ▪ Upgrades of Navy R&M Shops was reviewed and approved. ▪ The form states that the proposed action will "destroy historic	

Fig.	Date	Source	Image/Information	Drawing/Photo View / Noted Items Written Document Description
				fabric, replace historic fabric in kind, add nonhistoric elements to a historic structure" ▪ Description of work includes: "Modifications would include items required to improve habitability, security and serviceability of the interior of Bldg. #24. Mod's would include: A) Temporary sheetrock/masonite partitions to establish drafting & blueprints area. B) Temporary partitions for locker room. C) Rack (wooden) for lumber storage. D) Temporary partitions & vent system for painting and finishing room. E) Modification to cement floor on 1st deck to accept new machinery. (Bandsaw, table saw, sander, drill press.) F) Installation of foundation bolts on 2nd deck to accommodate bandsaw, small plane & table saw. G) Mod's to electrical service to accommodate new machinery as required. H) Installation of rug in director's office & in drafting room. I) Painting of interior of bldg in shop area to improve habitability & improve illumination for shop personal. J) Modify first floor dect to install a 2nd radial arm bandsaw similar to unit presently installed in north west corner of main bldg. Installation will require a floor pit 6'x9'x42" deep."
	1987	CNY 106	File Folder: "87-002 Remove Stairway, Bldg. 24"	▪ Section 106 review letter dated February 12, 1987. ▪ Request for removal of interior stair in addition. Request approved.
	1990	CNY 106	File Folder: "90-004 Rehabilitate Toilet Areas, Building 24"	▪ Section 106 review letter dated May 16, 1990. ▪ Rehabilitation of toilet areas on first floor addition. Letter requests drawings and photographic documentation of existing prior to removal.
	1991	CNY 106	File Folder: "91-004 Build Office Spaces, 2nd Floor, Bldg. 24"	▪ Section 106 review letter dated September 18, 1991. ▪ Letter states that the changes have been reviewed and approved. ▪ Backup information states that the work will "add nonhistoric elements to a historic structure". ▪ Plan of proposed new offices.
	1991	CNY 106	File Folder: "91-008 Replace Windows, Bldg. 24"	▪ Section 106 review letter dated December 11, 1991. ▪ Proposed replacement of approximately thirty windows. The windows appear to the be the addition windows, not the main building windows. ▪ Asks if sash will be single glazed, and if the original or other historical glass can be used. ▪ States that "all moulding profiles need to match the original" ▪ States "The Section 106 review is now complete" ▪ "Assessment of Actions Having an Effect on Cultural Resources" form states "The windows would be constructed to duplicate existing, and the existing hardware, pulley, etc., would be re-used on the newly constructed windows. The windows would still be double hung, single glazed, 8 over 8 with weight pockets. Failure to replace these windows will subject the building to continued water

Fig.	Date	Source	Image/Information	Drawing/Photo View / Written Document Description	Noted Items
				infiltration and damage.	
	2000	CNY 106	File Folder: "BOST00-07 Enlarge HVAC Vent Bldg 24"	Section 106 review letter dated October 10, 2000. No Adverse Effect found in "Replacement of boilers in Building 24 requires the enlargement of an existing exterior vent to meet system requirements and applicable codes. Existing vent is approximately 3x2 feet in size located within a wooden door opening on the south face of the eastern addition to Building 24. This will be replaced by two new vents that will replace the panels in the door."	

Black/Bearss: Black, Frederick and Edwin C. Bearss. *The Charlestown Navy Yard 1842-1890.* Boston: Boston National Historic Park, 1993.
Black: Black, Frederick R. *The Charlestown Navy Yard 1890-1973.* 2 vols. Boston: Boston National Historic Park, 1988.
CNY: Charlestown Navy Yard Archives
CNY 106: Charlestown Navy Yard Archives, Section 106 folder
PW: Charlestown Navy Yard Archives, Public Works files
NA: National Archives: Information found in finding aide: RG 181 U. S. N. Districts and Shore Establishments. Files reviewed included:

- "First Naval Distric, Public Works Officer, Negatives and Photographs of Naval Shore Establishments 1939-1941, Charlestown Navy Yard folder – mostly aerial shots of the navy yard in 1941.
- RG 181 Naval Districts and Shore Establishments – Boston Navy Yard Letters Sent to the Bureau of Yards and Docks, 1946-1907

Appendix B | Historic Photographs

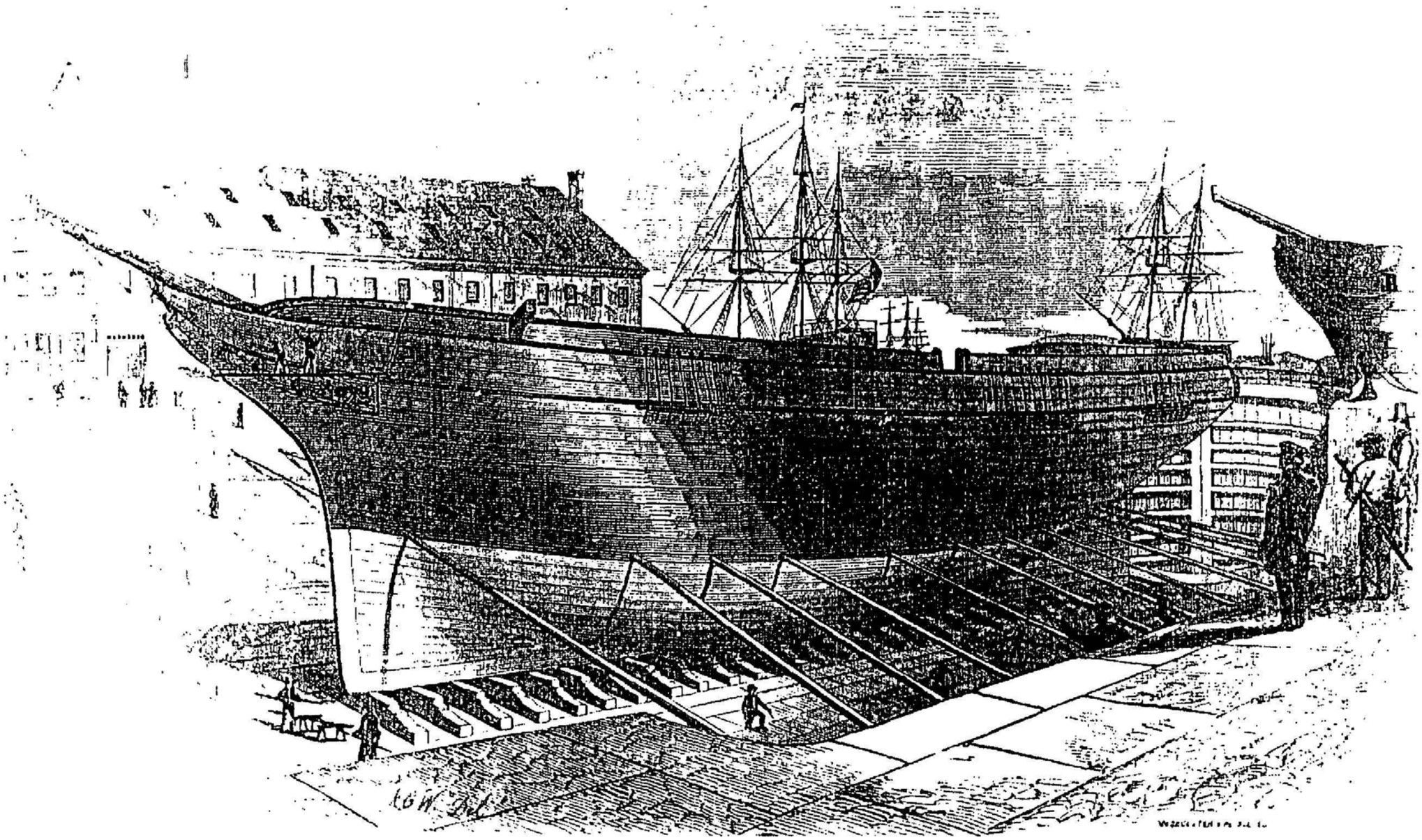


Fig. B-1 "View of Drydock at the U. S. Navy Yard, Charlestown, Mass." taken from Gleason's Pictorial Drawing Room Companion, vol. I. No. 7, June 14, 1851 (copied from Black & Bearss, 1993, p.74). Engraving looking south across the Drydock, showing the west elevation of the building. Multiple skylights and double chimney visible on the south roof.

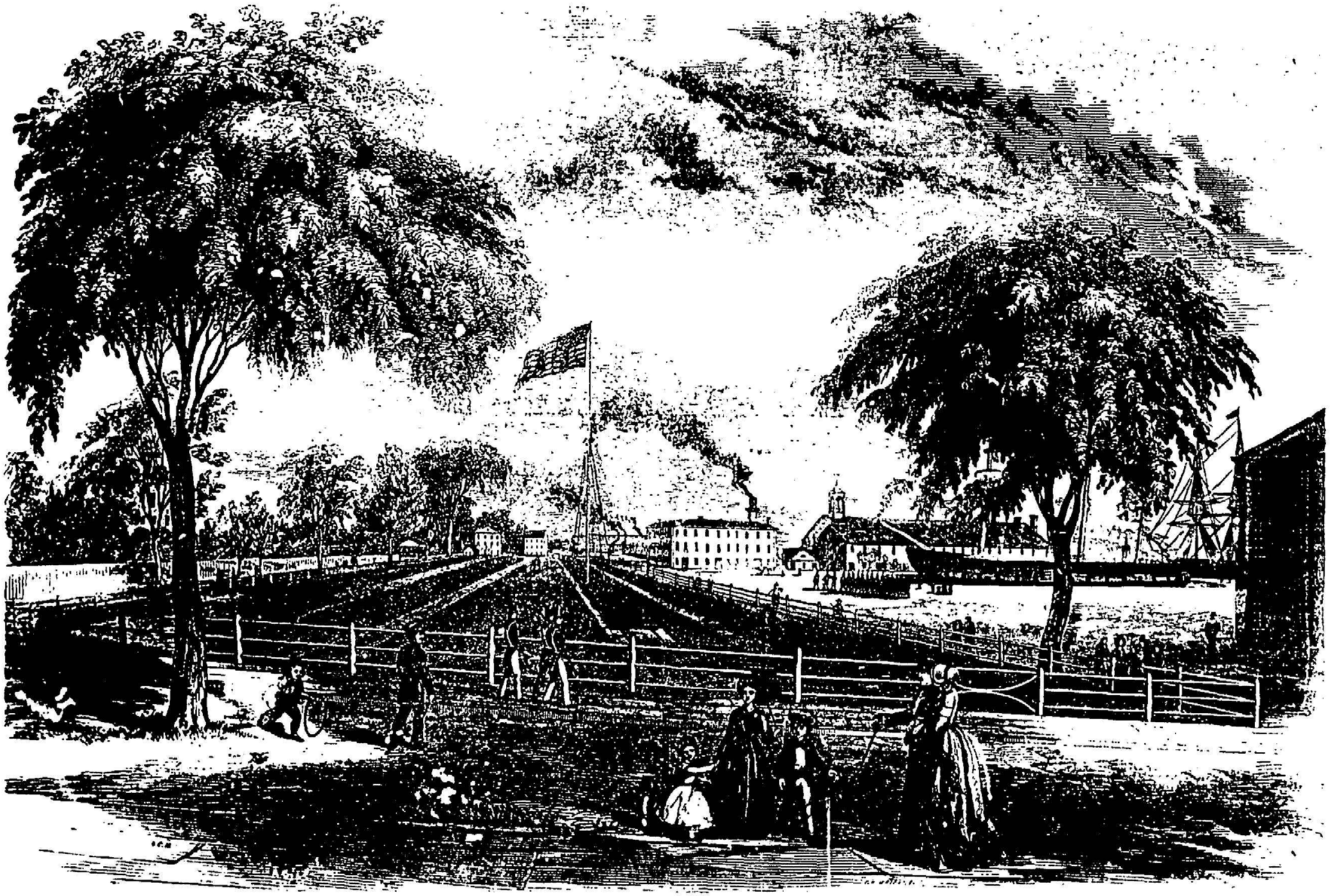


Fig. B-2 "View of the interior of the United States Navy Yard, Charlestown, Mass." From Gleason's Pictorial Drawing Room Companion, Nov. 29, 1857 (copied from Black & Bearss, 1993, p.129). Image looking east across yard, with view of Building 24 in distance. Note the muster bell on the north end, double chimney on south end and skylights.

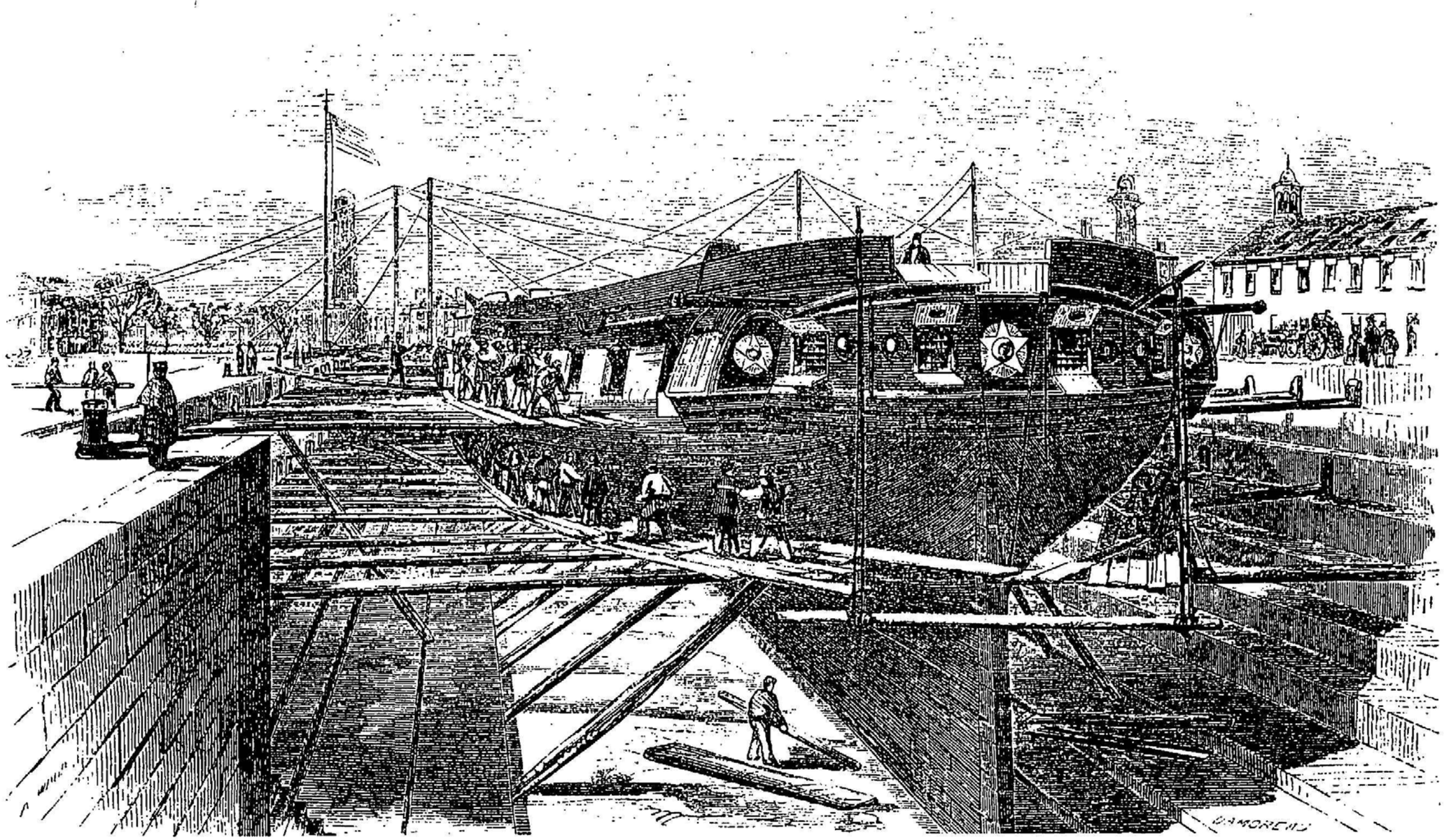


Fig. B-3 Probably appeared in Gleason's Pictorial Drawing Room Companion, between August 1858 and October 1859 (copied from Black & Bearss, 1993, p.139). Engraving looking north into Drydock 1, showing west elevation of Building 24. Note muster bell on north end and skylights.

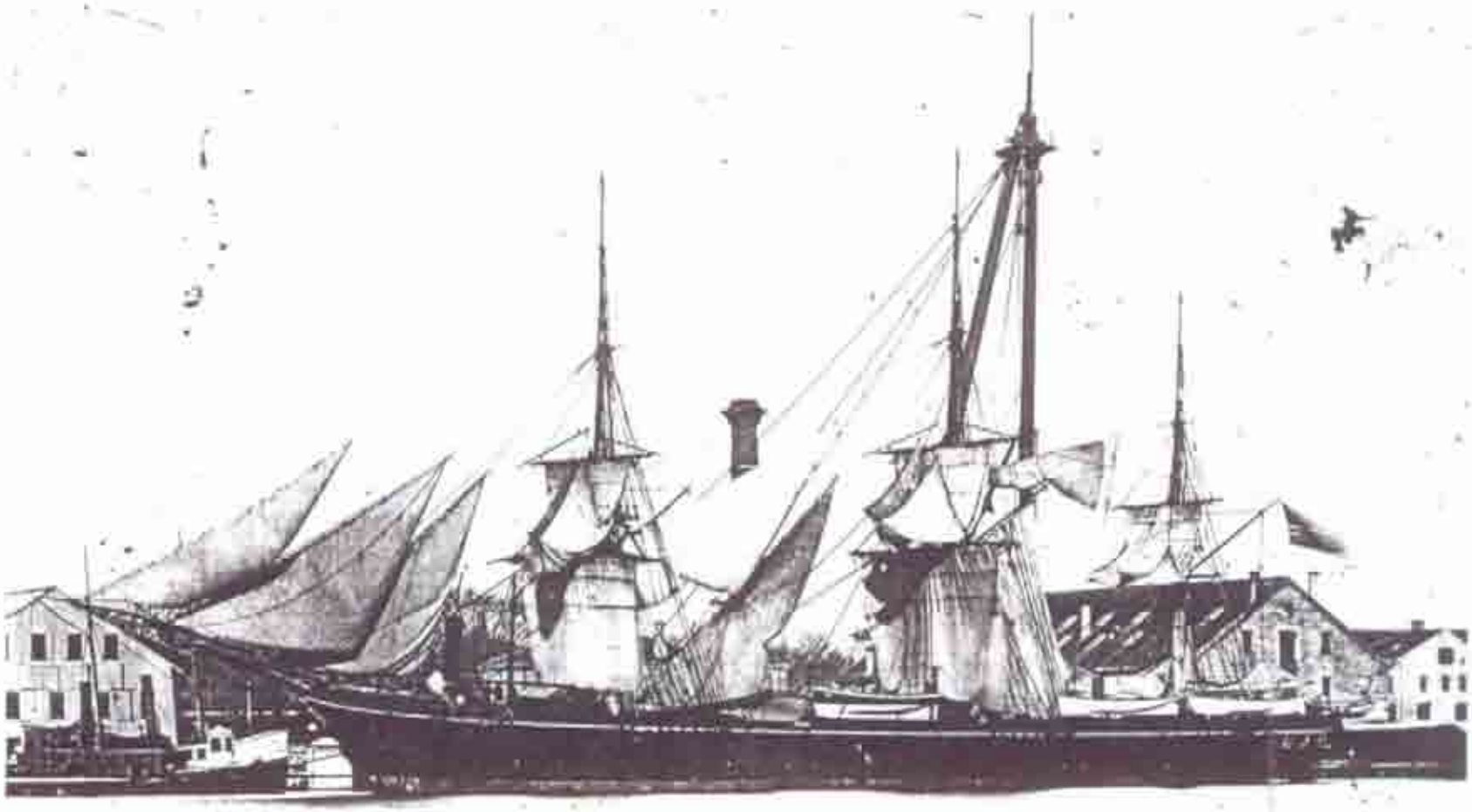


Fig. B-4 1870 Photo of USS Wachusett (copied from Black & Bearss, 1993, p.251). This is the earliest know photo of the building. Looking from the harbor to the north. A partial view of the west roof and south end of the building through the sales of the ship. Note the south end chimneys and skylights.

Fig. B-5 Photo of the USS Amphitrite at Boston Navy Yard in the late 1890's (copied from Black, 1988, p.115). Looking northwest from the harbor, showing the full south elevation and partial east elevation. Note original door panels, the pulley above the rigging loft door, wood slats from third floor opening to ground, rack (probably a blueprint drying rack) extending from the south elevation second floor, western most window.

Fig. B-6 Photo "Office Building and Rigging Loft, looking South-east. Boston Navy Yard. Aug. 2, 1900." *CNY Archives (BOSTS 9298 & BOSTS 9585 & BOSTS 10047).* Looking southeast. Shows the *entire* west and north elevations. On the north elevation note the muster bell, and galvanizing shop (with monitor and chimney not shown on the original plans for the shop). On the west elevation note the awnings on some of the second story windows (designated as offices on the floor plans), the blueprint drying racks at the second floor windows (designated as the Printing Room on the floor plans), the rain diverters over the blueprint drying racks, 12/12 windows, northwest corner door and two window openings blocked in with granite (much lighter and cleaner than surrounding granite, suggesting recent installation), "Porch A" vestibule at southernmost door, and skylights open for ventilation.

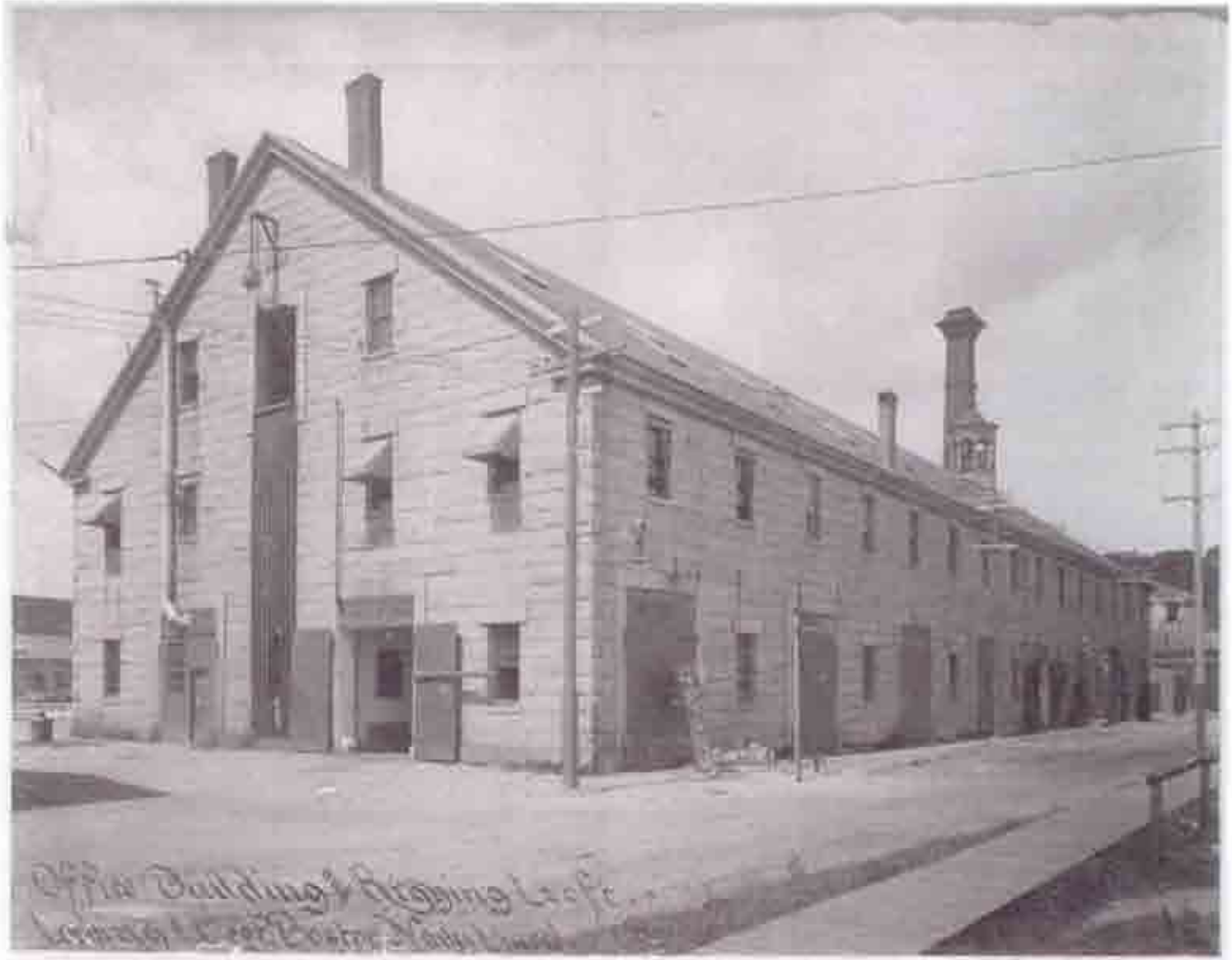


Fig. B-7 Photo "Office Building and Rigging Loft, Looking West, Boston Navy Yard." (probably cropped. Contemporaneous with photo below and probably originally read "Aug. 2, 1900."). CNY Archives (BOSTS 9298 & BOSTS 9585 & BOSTS 10047). Looking northeast. Shows the entire south and east elevations. On the south elevation note the double chimney, awnings on the second floor windows, the block and tackle above the rigging loft door, wood slats from the third floor opening to the ground floor (to protect rope and fabric from abrasion when being lowered?), the door and transom configuration. On the east elevation note the skylights, lack of a gutter along the roof line, second floor awnings, and original door and transom configuration.

Fig. B-8 Photo "F421N28 Navy Yard Boston Mar. 2, 1903 Pier No. 1. CNY (BOSTS 8694). Looking northwest from the harbor. Shows most of south elevation and second floor and roof of west elevation. No apparent changes from the 1900 photographs.

Fig. B-9 Photo "NAVY YARD BOSTON BLDG 24 FROM W JULY 2 1913 24-8". Looking southeast. Shows the building after the 1910 fire and before the demolition of the roof and interior framing for reconstruction. Note the ghosting of where the galvanizing shed was.

Fig. B-10 · Photo "NAVY YARD BOSTON BLDG 24 FROM N JULY 2 1913 24-9". Looking east. This photo is a double exposure and is hard to read. It appears to be taken after the roof demolition had begun.

Fig. B-11 Photo "NAVY YARD BOSTON BLDG 24 FROM S.E. JULY 2 1913 FIRST FLOOR 24-10". Interior photo of original wood columns and beams.

Fig. B-12 Photo "NAVY YARD BOSTON BLDG 24 FROM S.E. JULY 2 1913 2ND FLOOR 24-11". Interior photo of original wood floor system with temporary shoring in place.

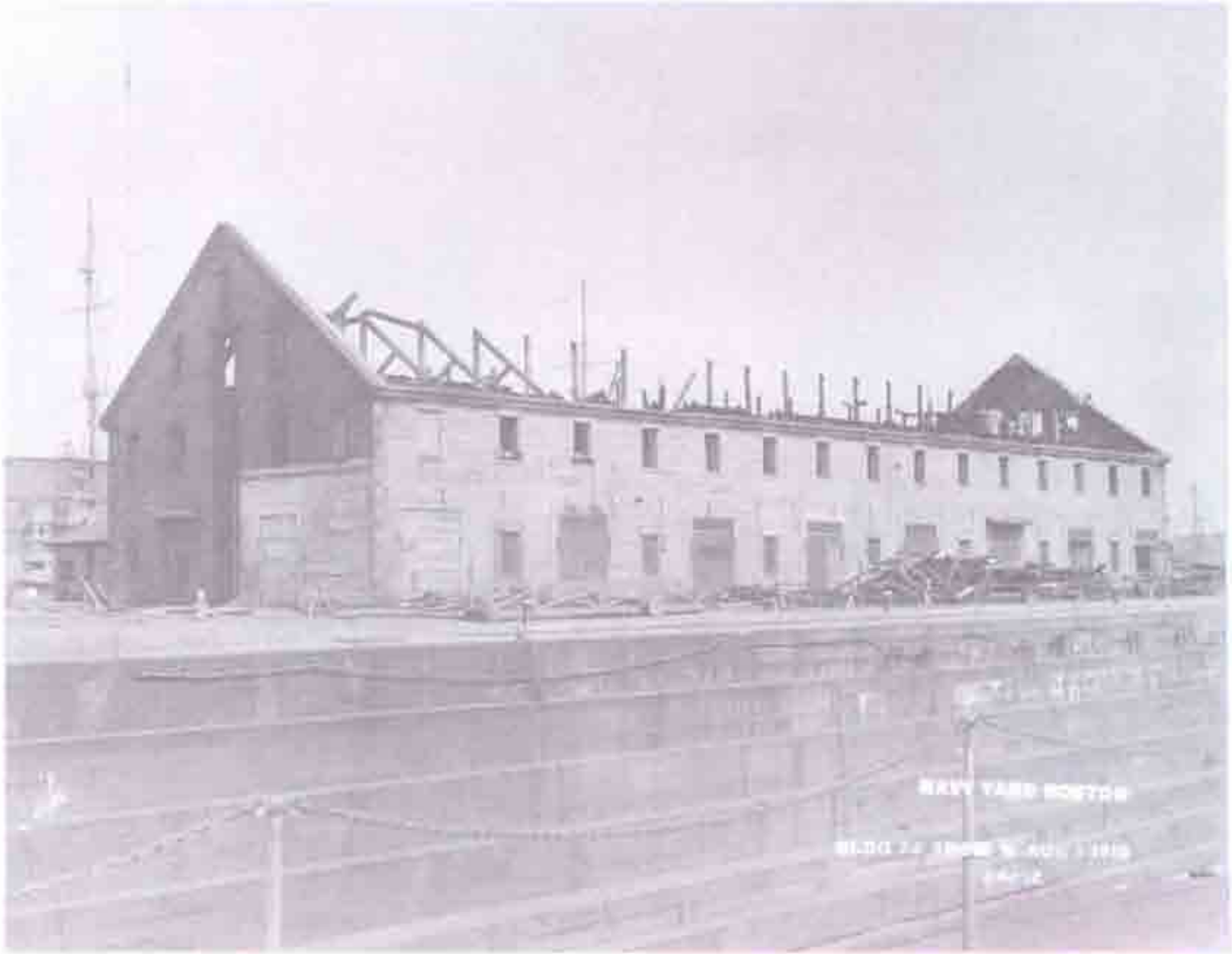


Fig. B-13 Photo "NAVY YARD BOSTON BLDG 24 FROM W AUG 1 1913 24-12". Looking southeast showing roof partially demolished.

Fig. B-14 Photo "NAVY YARD BOSTON BLDG 24 FROM S AUG 1 1913 FIRSTFLOOR 24-13". Interior showing progress of demolition.

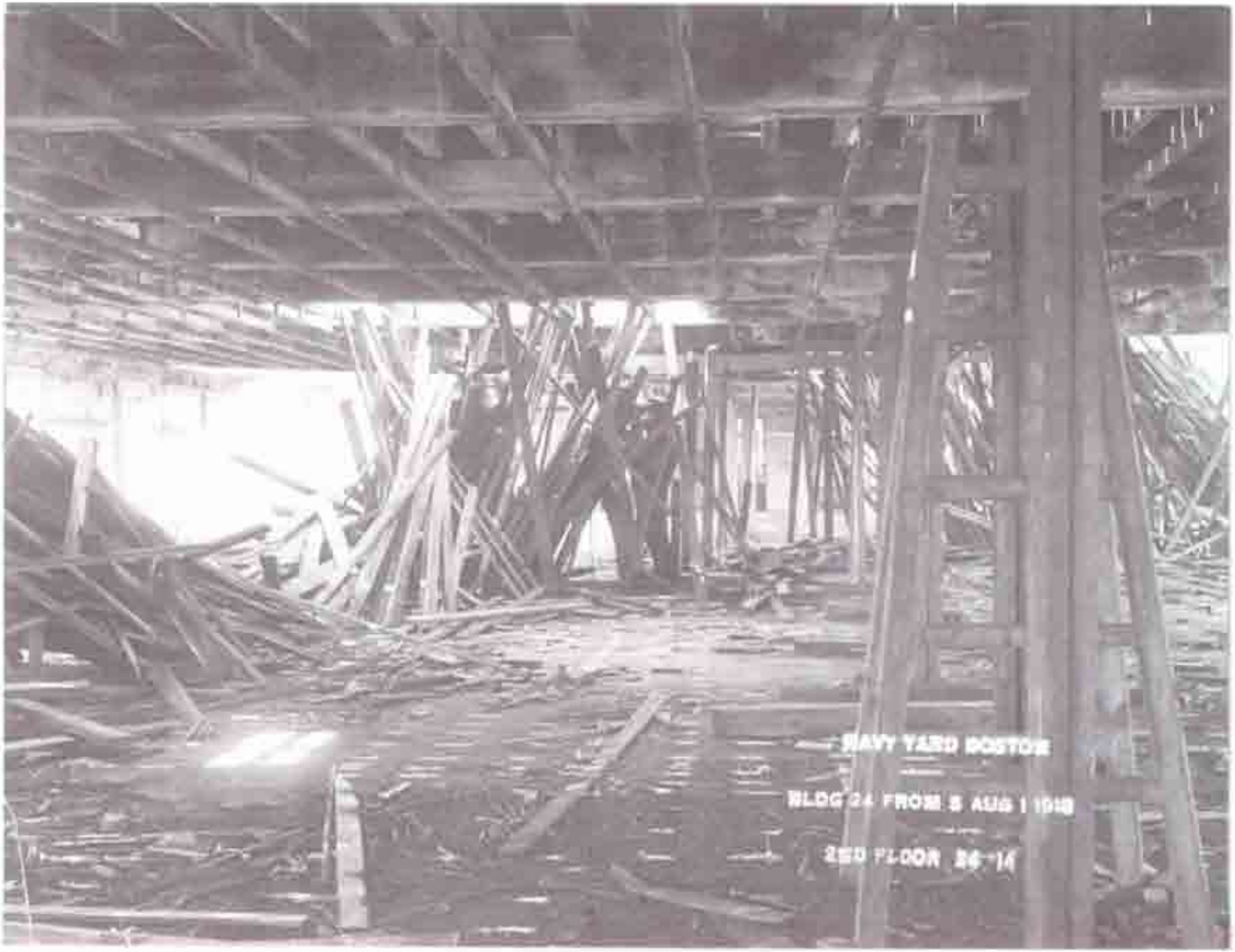


Fig. B-15 Photo "NAVY YARD BOSTON BLDG 24 FROM S AUG 1 1913 2ND FLOOR 24-14". Interior view during demolition showing temporary shoring and floor boards stacked for disposal.

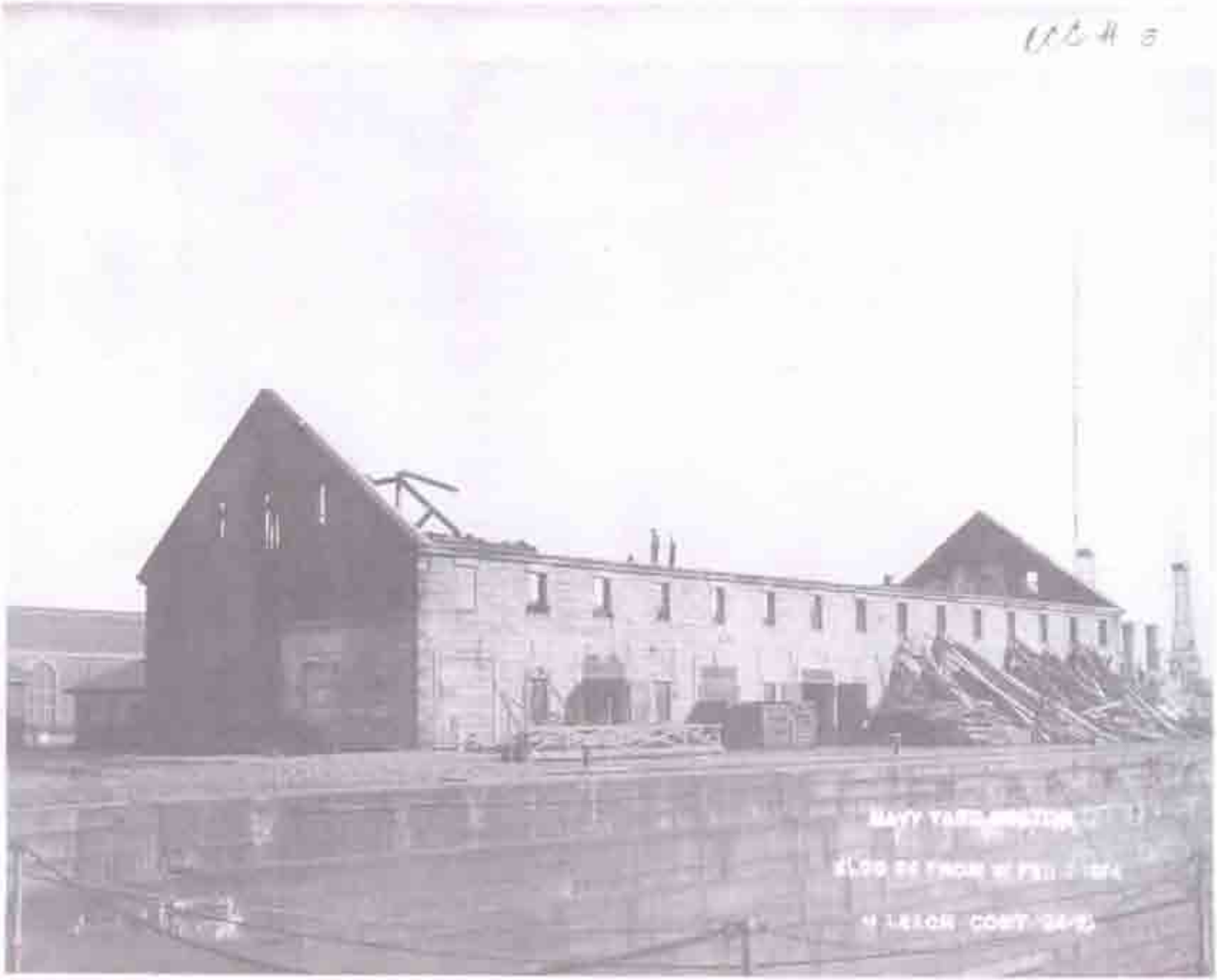


Fig. B-16 Photo "NAVY YARD BOSTON BLDG 24 FROM W FEB 2 1914 M. LEACH CONT 24-15". Exterior, looking southwest. Most of the roof framing removed.

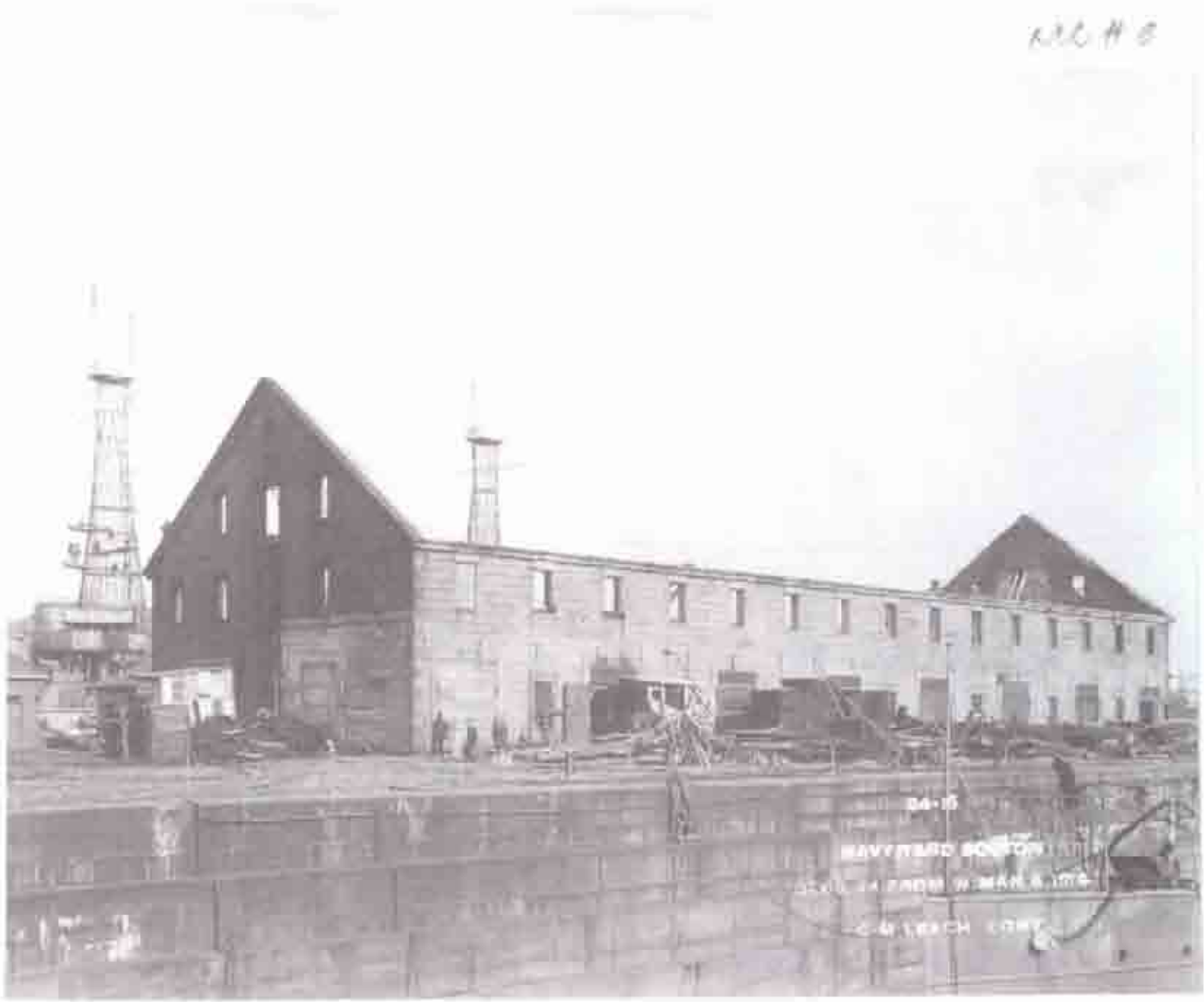


Fig. B-17 Photo "24-16 NAVY YARD BOSTON BLDG 24 FROM W MAR 5 1914 C M LEACH CONT". Exterior, looking southwest. All of the roof framing removed.

Fig. B-18 Photo "24-17 NAVY YARD BOSTON BLDG 24 FROM SE APR 1 1914 C M LEACH CONT". First floor interior, looking north. All of the roof and floor framing removed. Vault visible in the northwest corner. Ghosting of stairs along north wall.

Fig. B-19. Photo "24-18 NAVY YARD BOSTON BLDG 24 FROM SE MAY 1 1914 C. M. LEACH CONT". First floor interior, looking north. Pockets formed for column footings. Material stocked for reconstruction.

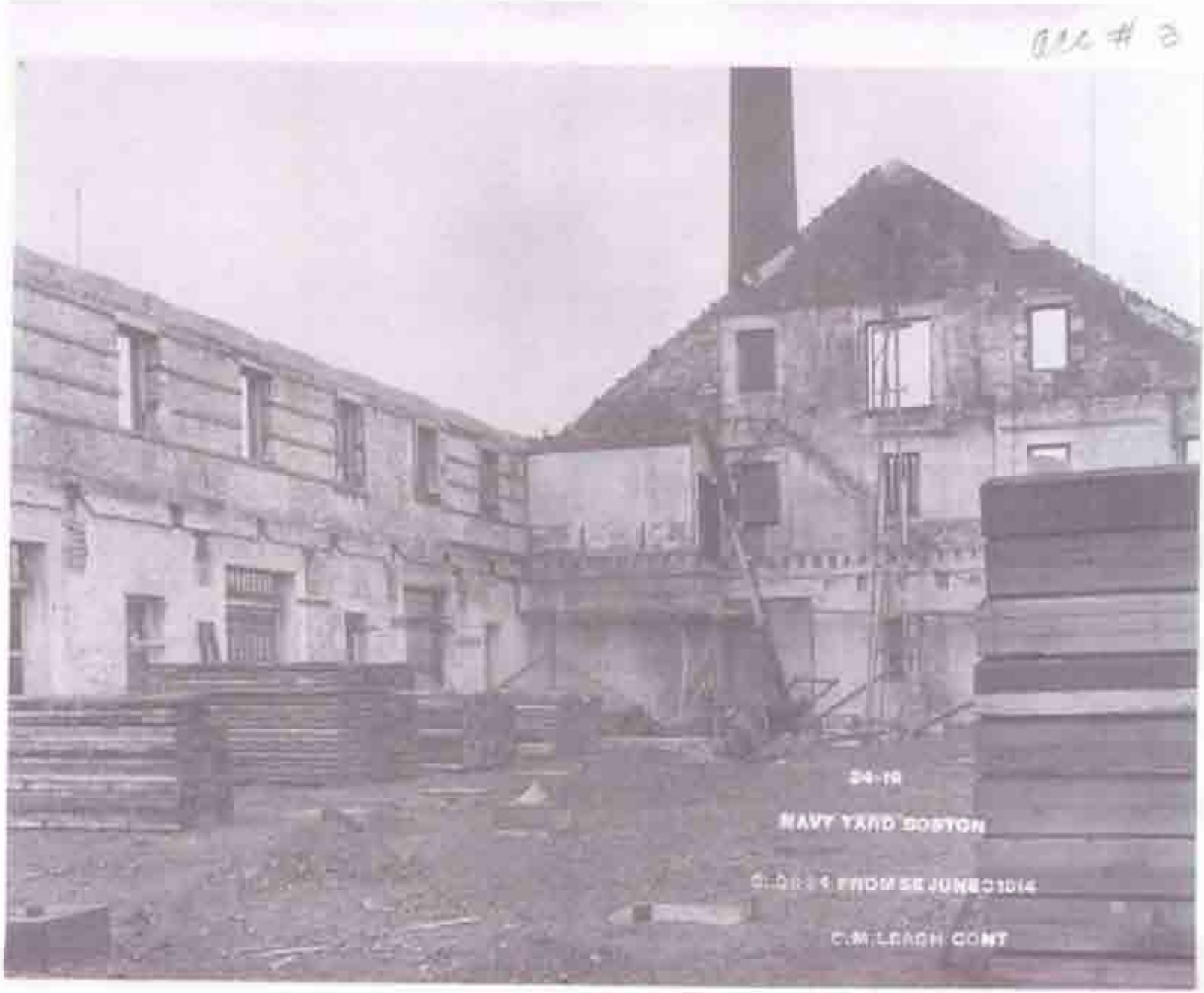


Fig. B-20 Photo "24-19 NAVY YARD BOSTON BLDG 24 FROM SE JUNE 8 1914 C. M. LEACH CONT". First floor interior, looking northwest. Materials stocked in building for reconstruction.

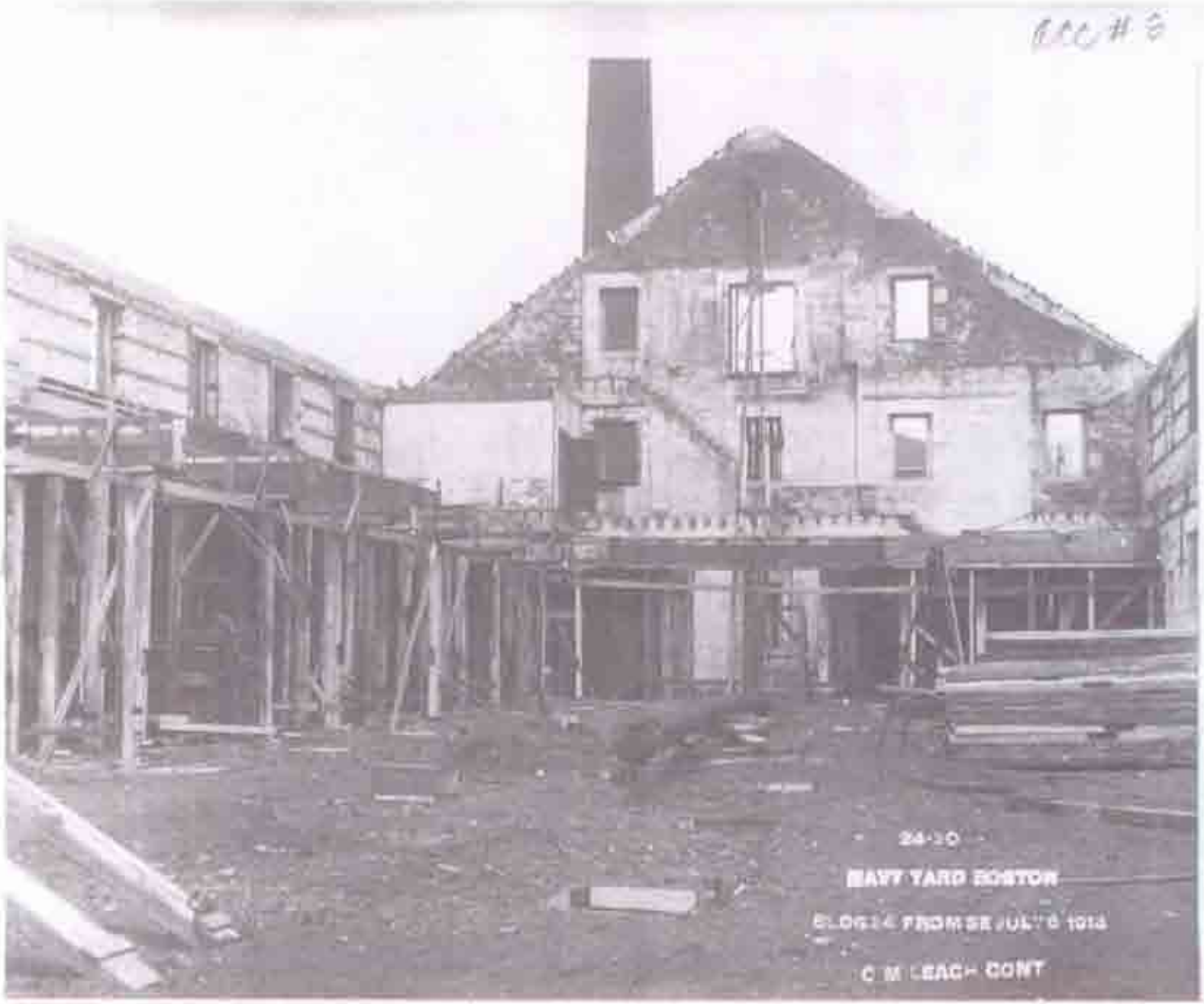


Fig. B-21 Photo "24-20 NAVY YARD BOSTON BLDG 24 FROM SE JULY 6 1914 C M LEACH CONT". First floor interior, looking north. Formwork started for poured concrete floor structure.

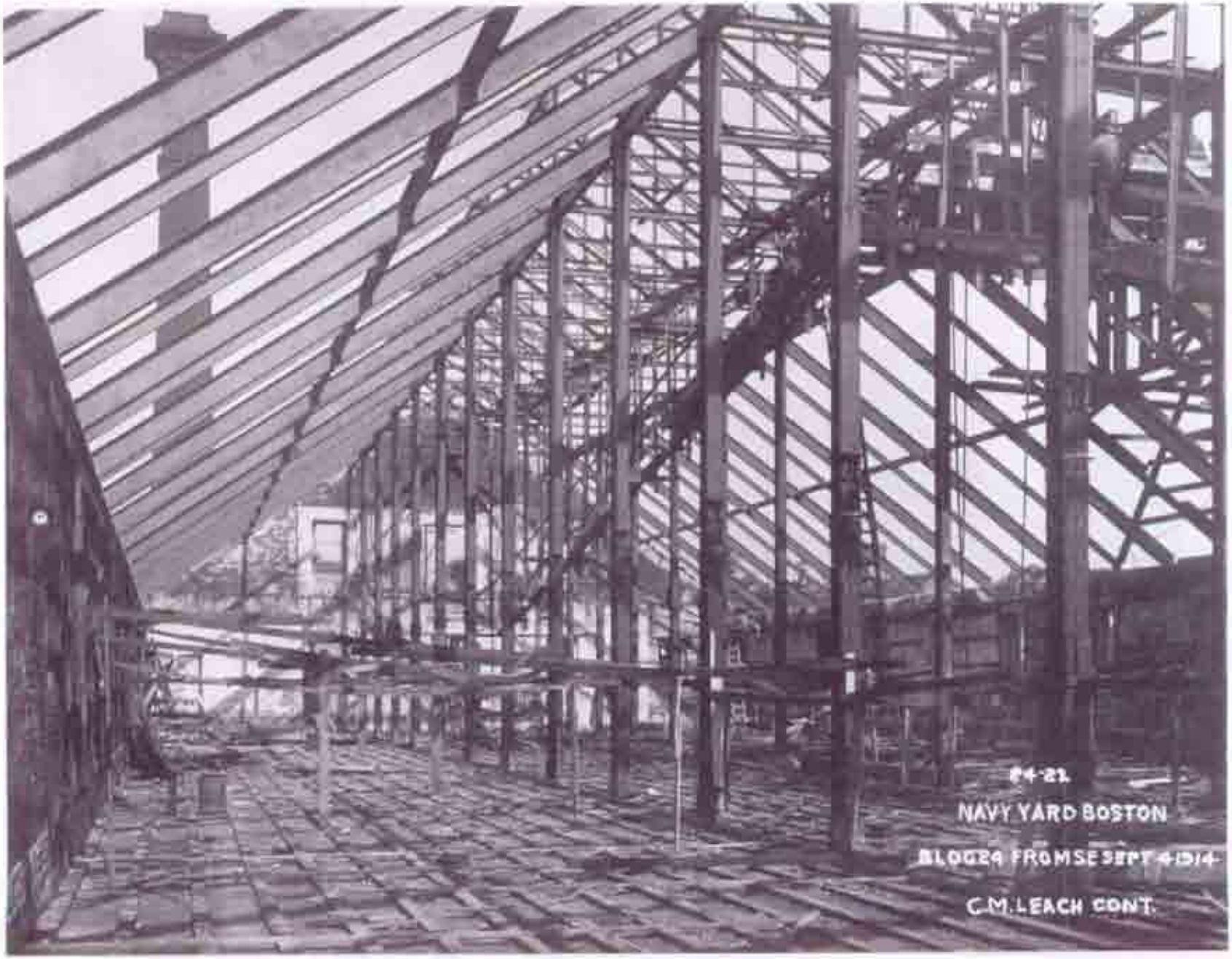


Fig. B-22 Photo "24-22 NAVY YARD BOSTON BLDG 24 FROM SE AUG 4 1914 C. M. LEACH CONT". Third floorinterior, looking northwest. Structural steel columns and roof trusses in place.

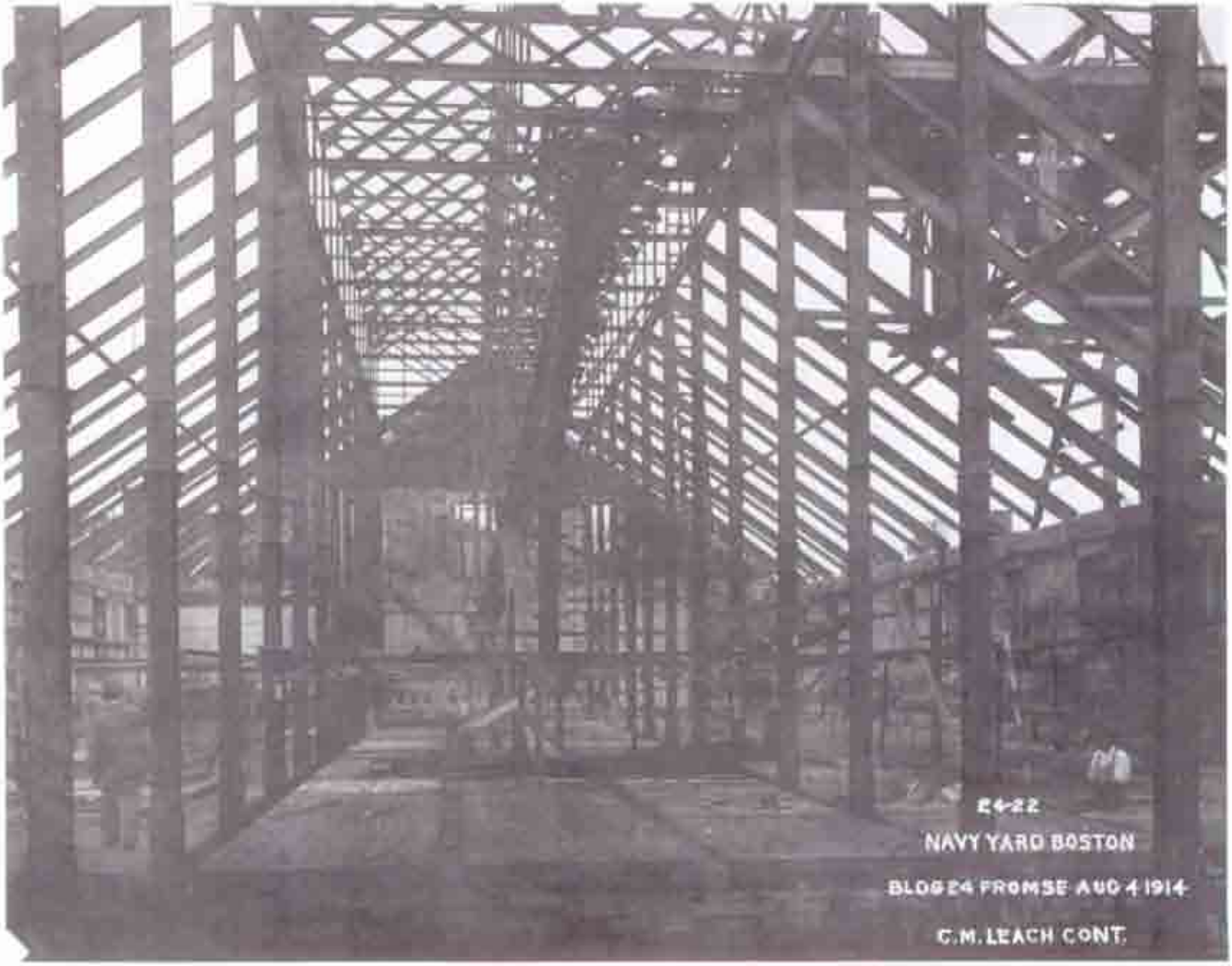


Fig. B-23 Photo "24-22 (note: this is not an entry mistake, both photos were labeled 24-22 – LH) NAVY YARD BOSTON BLDG 24 FROM SE SEPT 4 1914 C. M. LEACH CONT." Third floor interior, looking north. Structural steel columns, roof trusses and monitor framing in place. Floor is formed for concrete pour.

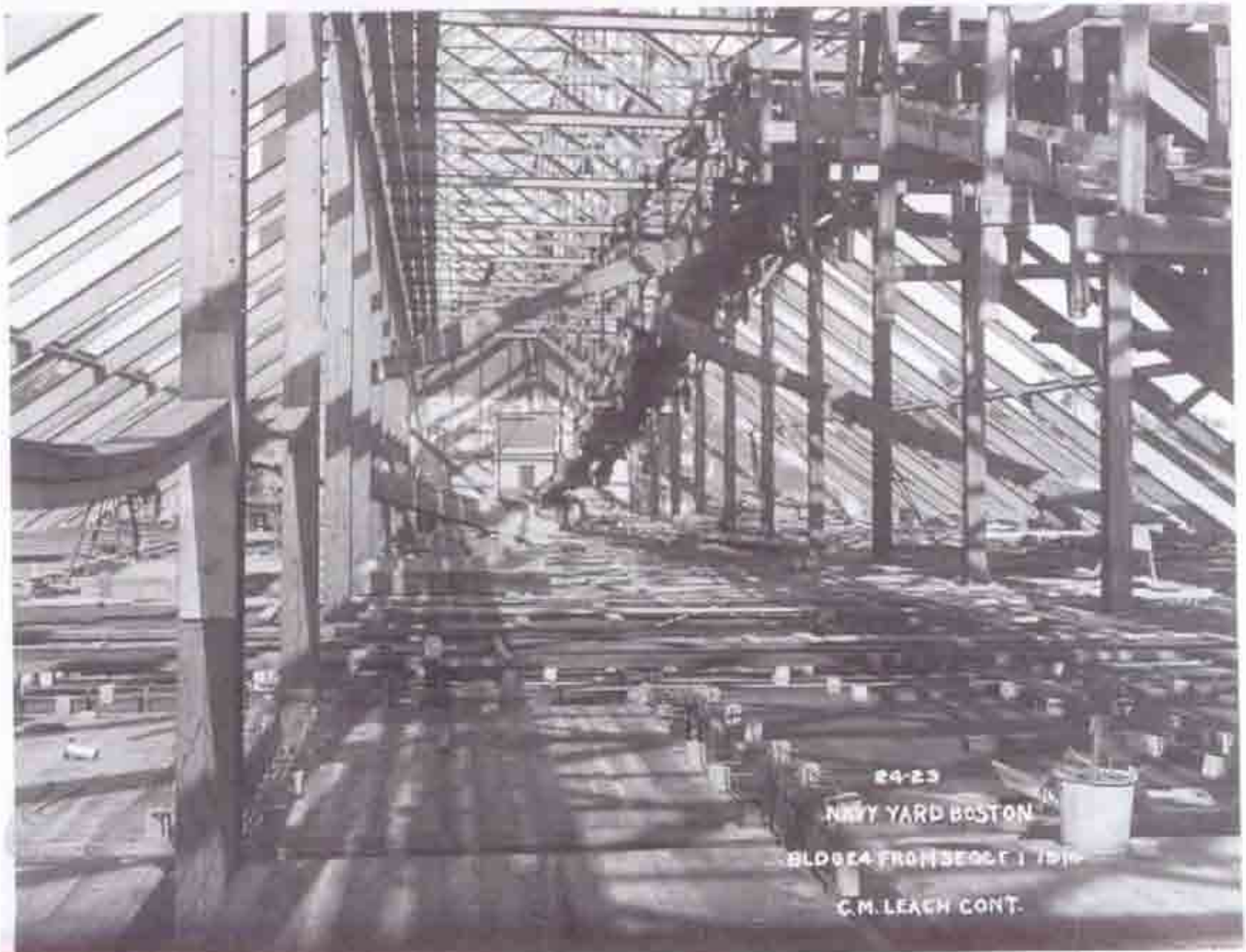


Fig. B-24 Photo "24-23 NAVY YARD BOSTON BLDG 24 FROM SE OCT 1 1914 C. M. LEACH CONT". Third floor interior, looking north. Structural steel columns and roof framing in place. Rebar being placed for concrete floor pour.

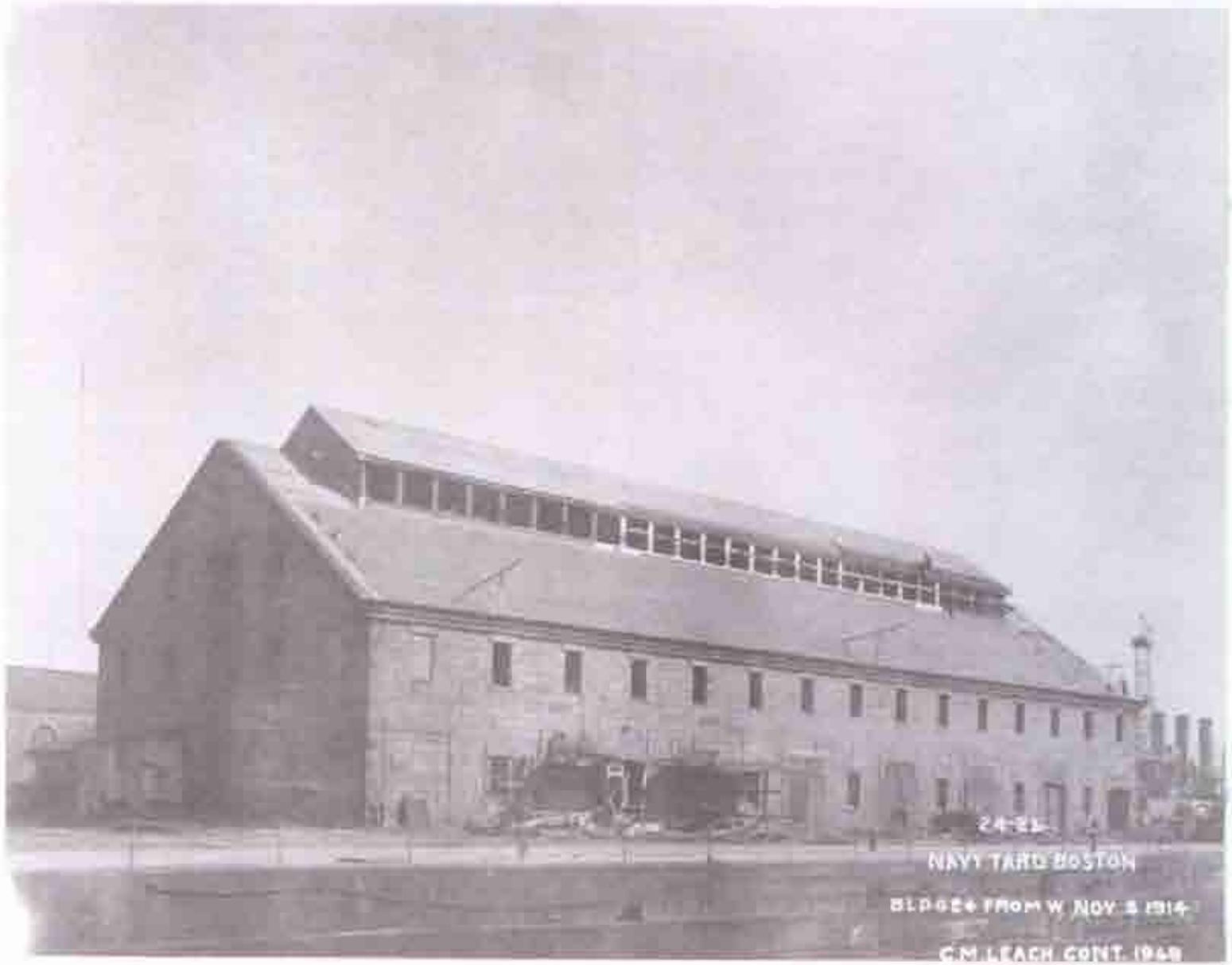


Fig. B-25 Photo "24-23 (note: this is not an entry mistake, both photos were labeled 24-23 – LH) NAVY YARD BOSTON BLDG 24 FROM W NOV 3 1914 C. M. LEACH CONT. 1968". Exterior, looking southwest. New roof constructed with monitor. Slate not complete on main roof or monitor. Monitor window framing in progress. Windows not installed yet.

Fig. B-26 Photo "24-24 NAVY YARD BOSTON BLDG 24 FROM SE NOV 3 1914 C. M. LEACH CONT. 1968". Third floor interior, looking north. Heating pipes installed, concrete poured around columns, roof sheathing complete, materials stacked on floor.

Fig. B-27 Photo "24-25 NAVY YARD BOSTON BLDG 24 FROM W DEC 3 1914 C. M. LEACH CONT. 1968". Exterior, looking southwest. Roof complete, monitor windows installed and partially open, original doors still in place with broken window panes in transoms, new 1/1 windows installed.

Fig. B-28 Photo "24-26 NAVY YARD BOSTON BLDG 24 FROM SE. 1ST FL. DEC. 3 1914 C. M. LEACH CONT. 1968". First floor interior, looking north. Concrete poured for floors and column casings. Windows installed. Still under construction.

Fig. B-29 Photo "24-27 NAVY YARD BOSTON BLDG 24 2ND FL. FROM S.E. DEC. 3 1914 C. M. LEACH CONT 1968". Second floor interior, looking north. Concrete poured for floors and column casings. Bundled wood (probably flooring material) stockpiled on floor.

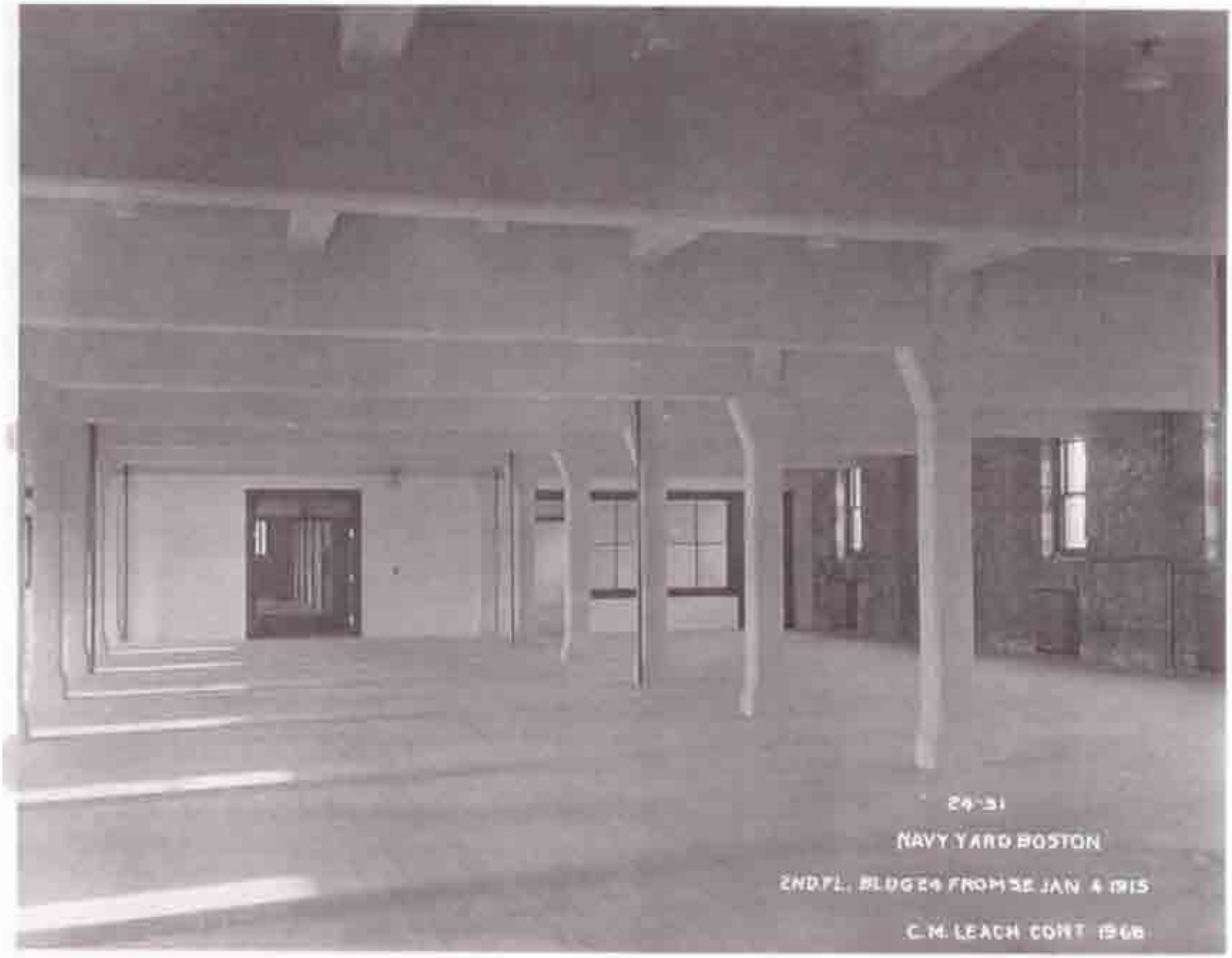


Fig. B-30 Photo "24-31 NAVY YARD BOSTON 2ND. FL. BLDG 24 FROM S.E. JAN 4 1915 C.M. LEACH CONT 1968". Second floor interior, looking north. Construction complete. Floors, columns and ceiling appears uniform in color, possibly whitewashed. Looking at wall with door and sidelights into office. Radiators in place under windows along exterior wall. Exterior walls appear to be exposed brick, unpainted.

Fig. B-31 Photo "24-32 NAVY YARD BOSTON 3rd. FL BLDG 24 FROM S.E. JAN 4 1915 C.M LEACH CONT 1968". Third floor interior, looking north. Work complete, radiators in place along perimeter eaves, piping along columns.

Fig. B-32 "24-33 NAVY YARD BOSTON HEMP FROM BLDG 62 ON 3RD FLOOR BLDG 24 FEB. 9 1915 FROM S.E." First floor interior, looking northwest. Open floor plan.

Fig. B-33 Photo "24-34 NAVY YARD BOSTON HEMP FROM BLDG 62 ON 1ST FLOOR BLDG 24 FEB. 9 1915 FROM S.E." Third floor interior, looking northwest. Shows the building in use.

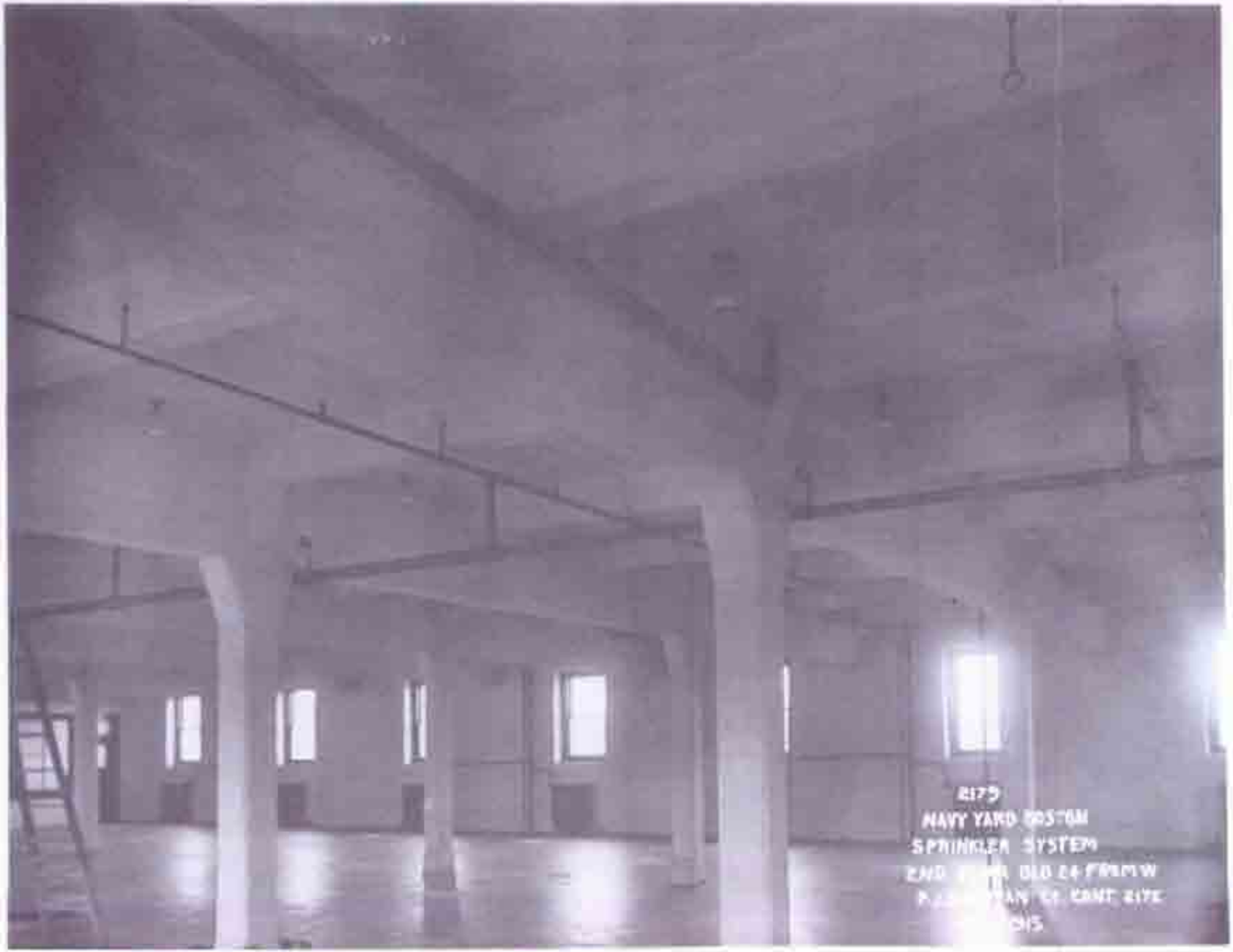


Fig. B-34 Photo "2179 NAVY YARD BOSTON SPRINKLER SYSTEM 2ND FLOOR BLD 24 FROM W P.J. SULLIVAN CO. CONT. 2173 (?) OCT 1, 1915". Second floor interior, looking east. Sprinkler system in place.

Fig. B-35 Photo "2239 NAVY YARD BOSTON HALL IN BLDG. 24 FROM N.W. FEB. 8, 1916". Second floor hall, looking southeast. Banners, lights and flags in place.

Fig. B-36 Photo "2240 NAVY YARD BOSTON HALL IN BLDG. 24 FROM N.W. FEB. 8, 1916". Second floor hall, looking southeast. Banners, lights and flags in place.

Fig. B-37 Photo "2241 NAVY YARD BOSTON HALL IN BLDG. 24 FROM S.E. FEB. 8. 1916". Second floor hall, looking northwest. Banners, lights and flags in place.

Fig. B-38 Photo "2242 NAVY YARD BOSTON HALL IN BLDG. 24 FROM E. FEB. 8, 1916". Second floor hall, looking southeast. Banners, lights and flags in place. Ceiling light fixtures visible.

Fig. B-39 Photo "2243 NAVY YARD BOSTON HALL IN BLDG. 24 FROM S. FEB. 8, 1916". Second floor hall, looking north. Banners, lights and flags in place. Ceiling light fixtures and sprinkler system visible.

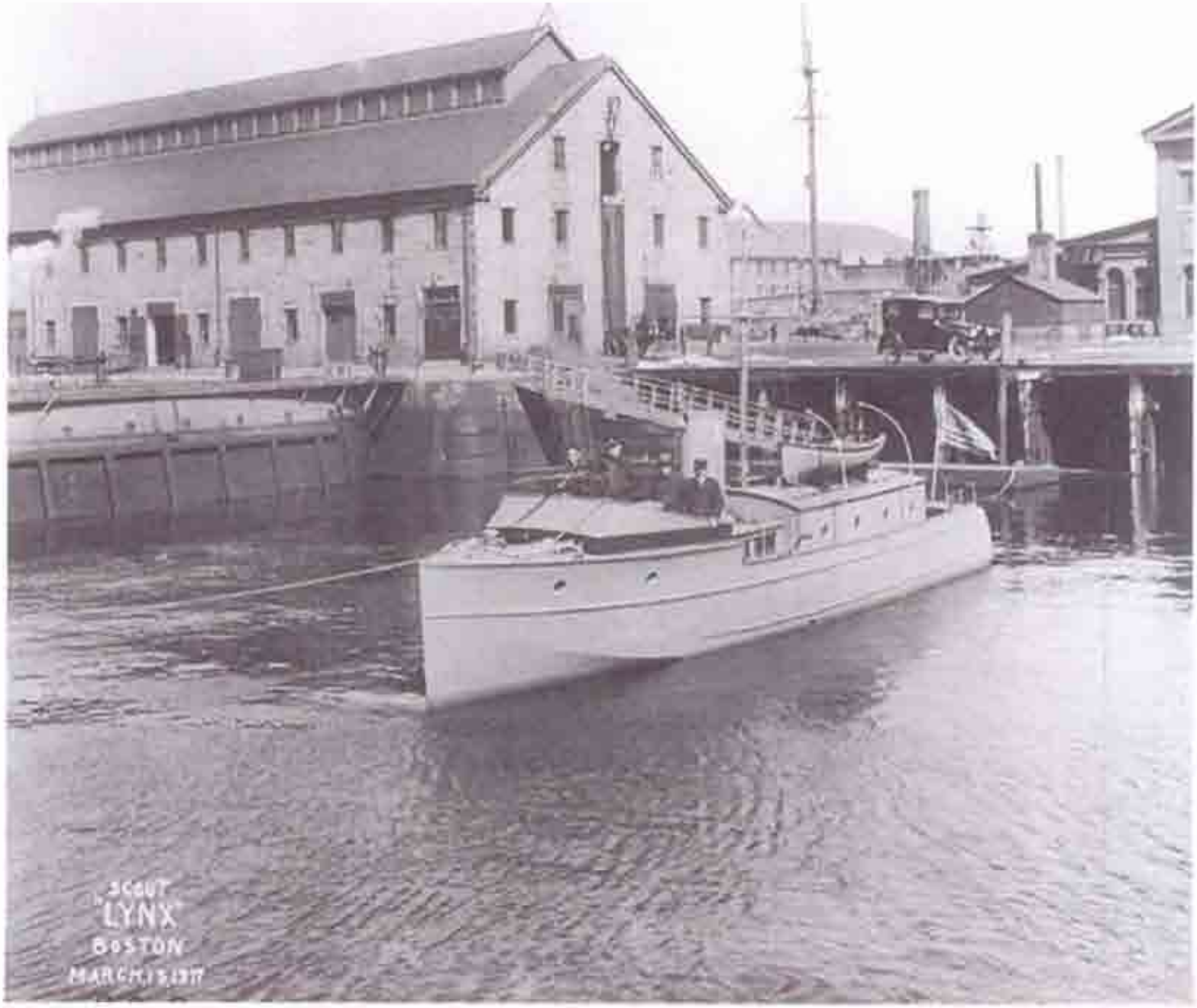


Fig. B-40 "Photo #NH102012 Motor boat Lynx at Boston, March 1917." From the harbor, looking northwest. North end of building and most of west elevation visible. Shows the building after the 1914 reconstruction. All of the openings on the north elevation are unaltered.

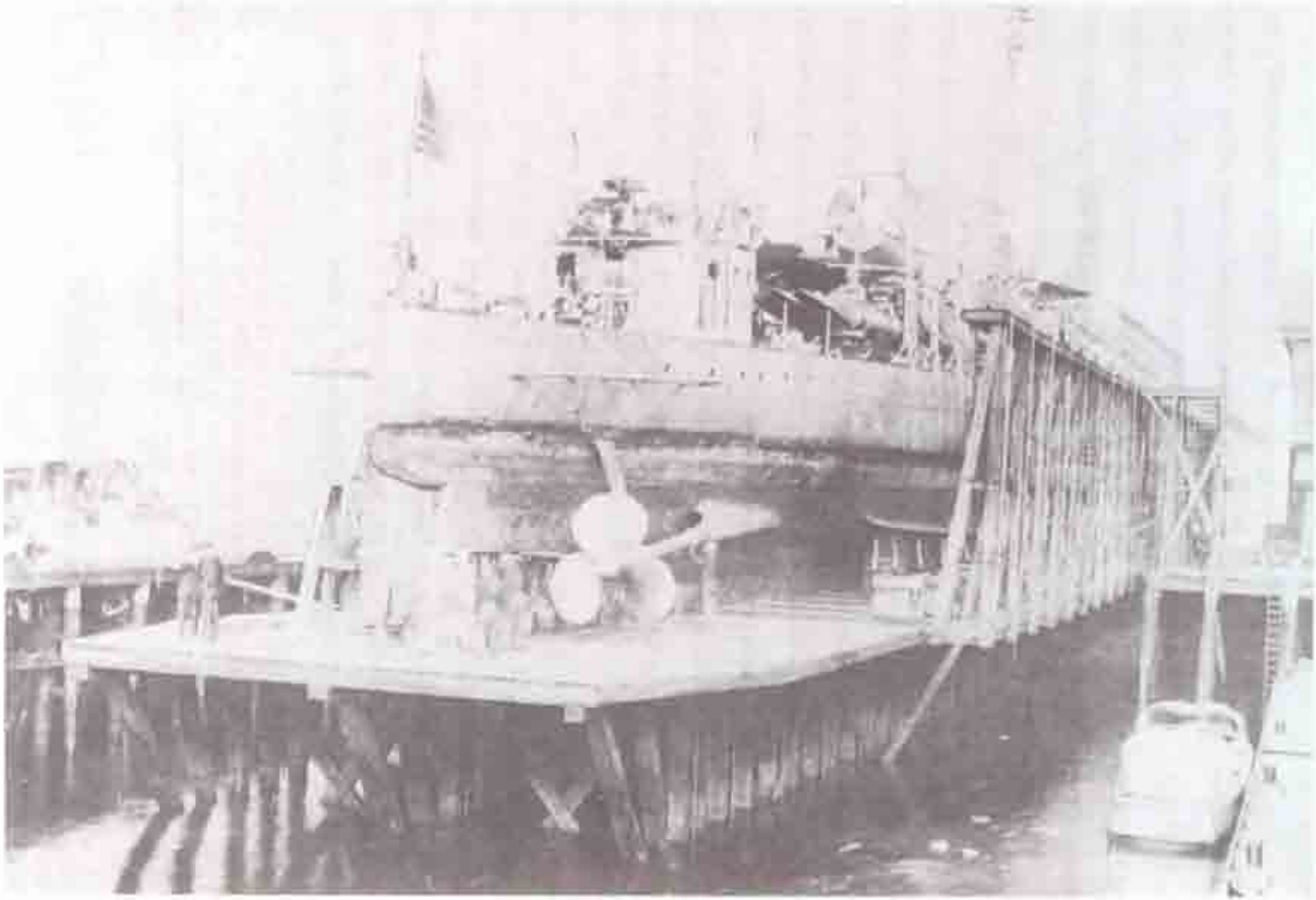


Fig. B-41 Photo of USS Delphy on the Marine Railway. Shows marine railway in use. Building is not visible.

Fig. B-42 Photo "NAVY YARD BOSTON HEAD END OF MARINE RAILWAY CONT 2843 JAN. 6, 1919 FROM S. W. 4601". North elevation. First floor eastern most window lintel has been raised, probably as part of the work to install the marine railway. The vertical wooden slats have been removed from below the third floor opening.

Fig. B-43 Photo "NAVY YARD BOSTON SITE OF ROADWAY OVER MARINE R. W. CHAINS ALLOT 9202-16 DAY LABOR FEB. 28, 1919 FROM S.W. 4729 4804 (handwritten)". North Elevation. First floor eastern most window lintel and sill have been altered.

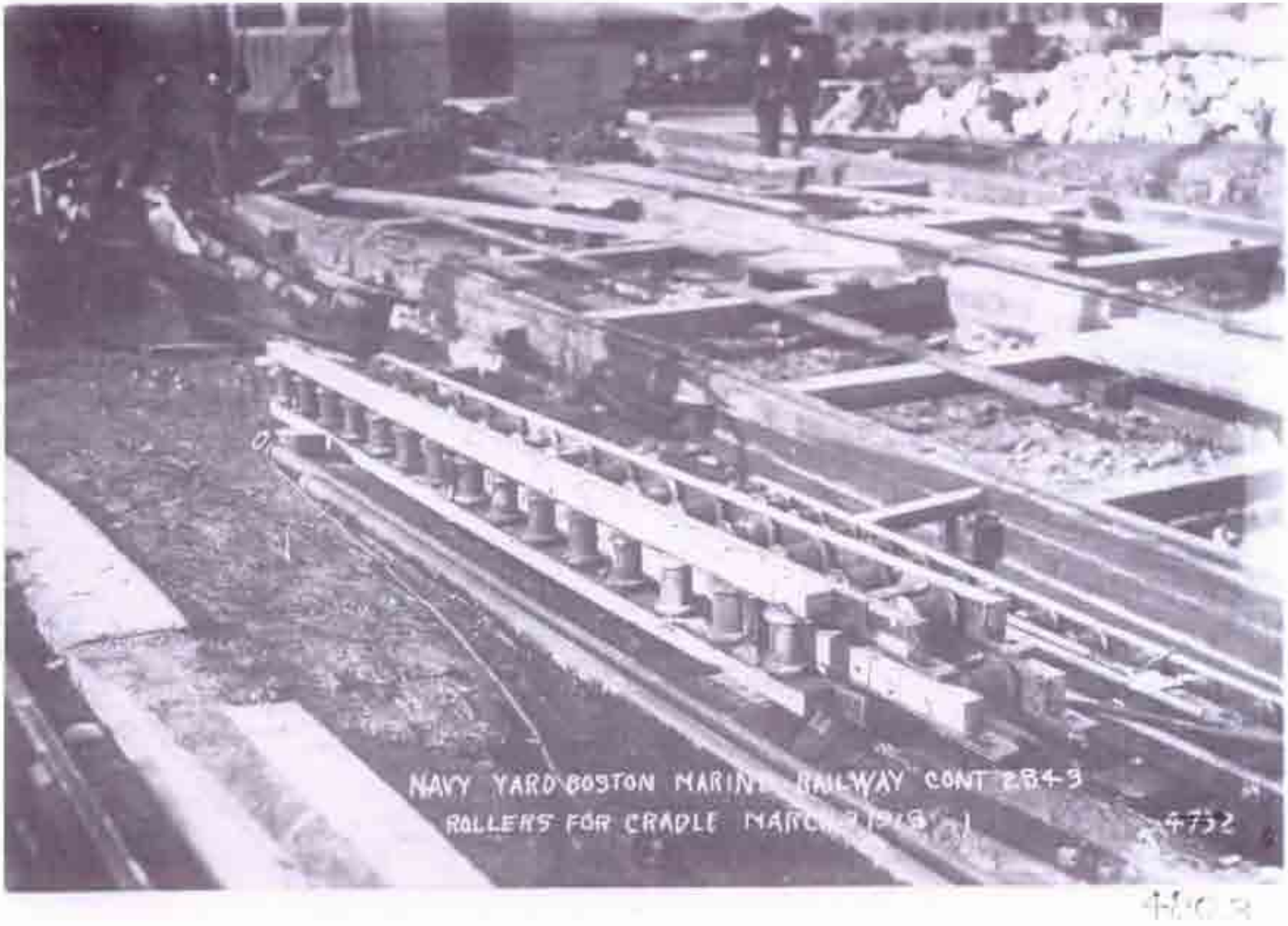


Fig. B-44 Photo "NAVY YARD BOSTON MARINE RAILWAY CONT 2343 ROLLERS FOR CRADLE MARCH 3 1919 4732 4803 (handwritten)". Looking north across the marine railway rollers. Limited view of the building in the background. Shows first floor window sill lowered as part of the marine railway construction.

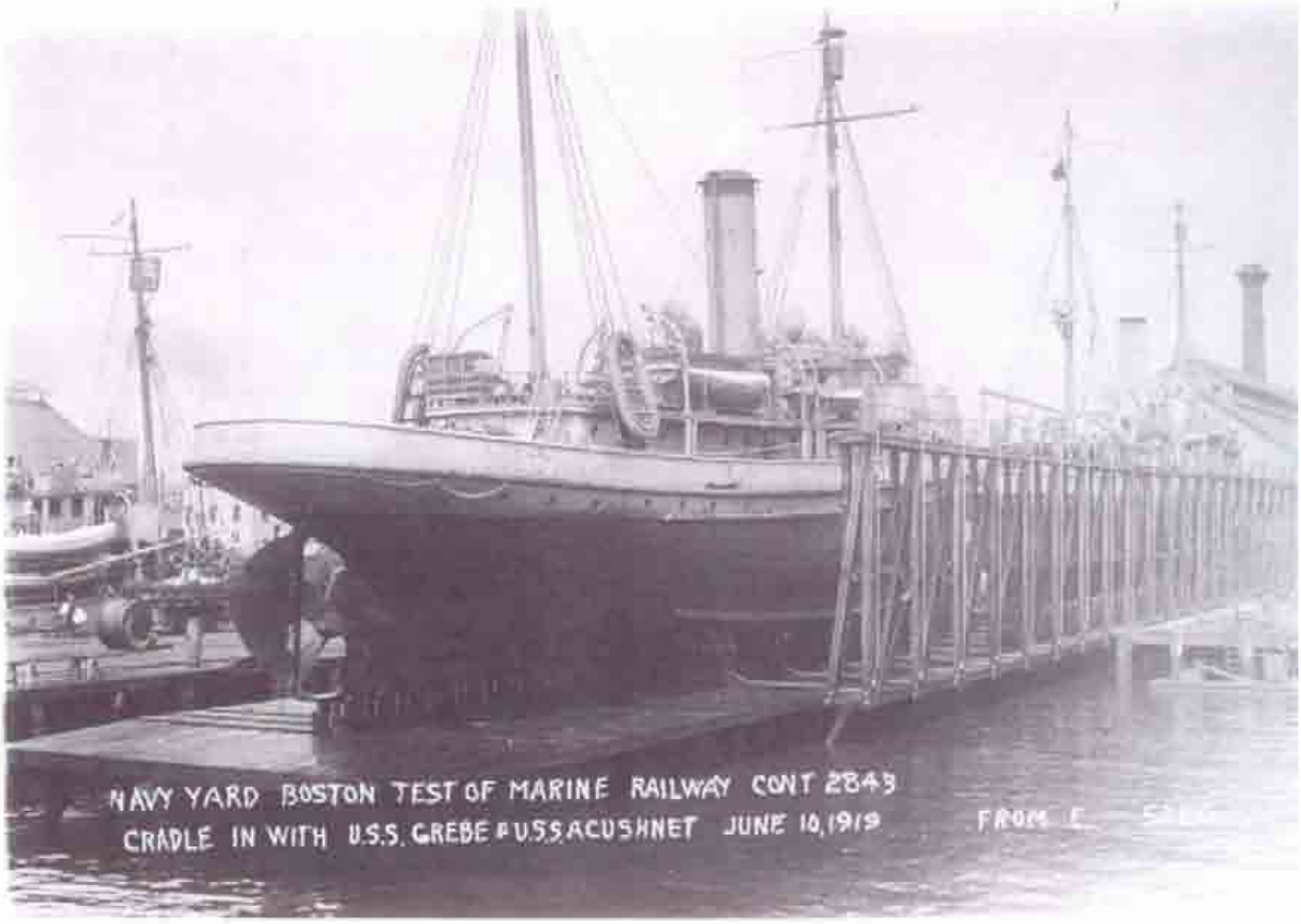


Fig. B-45 Photo "NAVY YARD BOSTON TEST OF MARINE RAILWAY CONT 2843 CRADLE IN WITH U.S.S. GREBE & U.S.S. ACUSHNET JUNE 10, 1919 FROM E. 5080". Shows marine railway in operation. Building visible in background, monitor windows open.

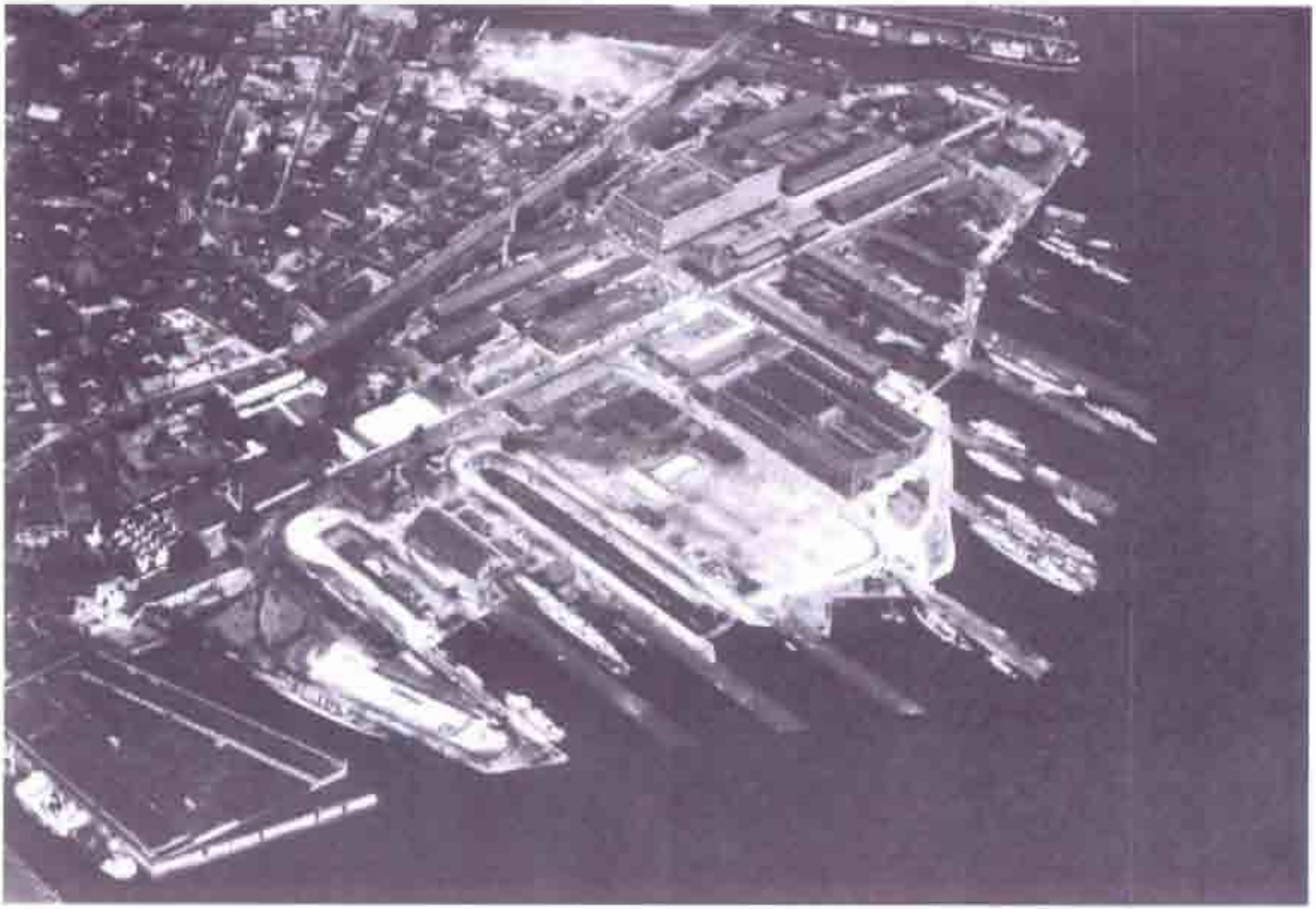


Fig. B-46 Aerial photo of Navy Yard in the 1930's (copied from Black, 1988, p.443). Shows marine railway with a vessel hauled out. There do not appear to be any skylights on the roof at this time.

Fig. B-47 Photo "223-36 Mar 27-36 Constitution" in pencil on back. 1936. Interior photo, appears to be first floor. Note light fixtures.

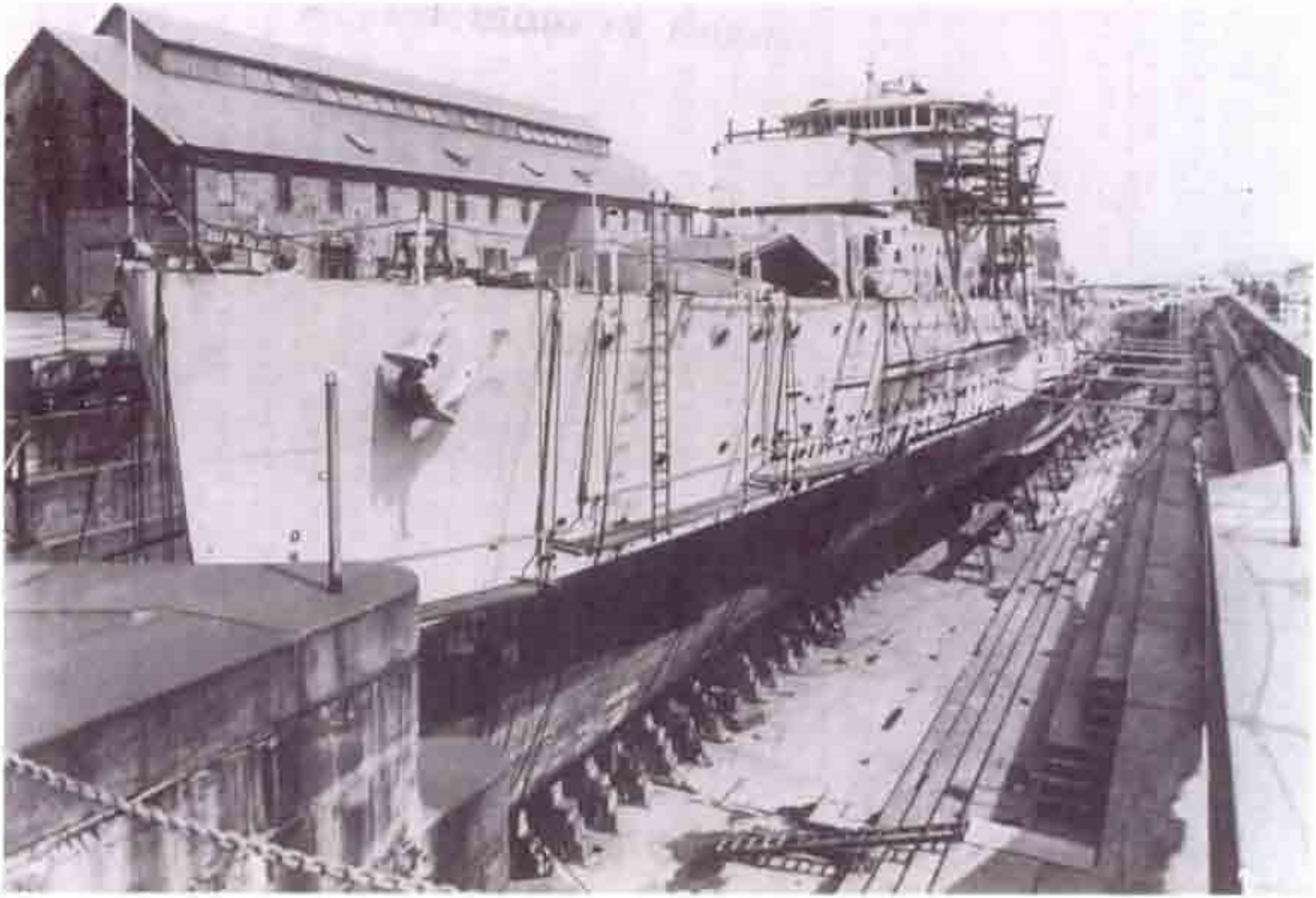


Fig. B-48 Photograph of the Ralph Talbot in Dry Dock No. 1, July 1, 1937. (copied from Black, 1988, p.499). Looking east across Drydock 1. Four skylights visible on west roof slope. Some monitor windows open, some closed. The operating system that opened all of the windows at the same time must have been disconnected by this time.

Fig. B-49 Aerial shot of Boston Navy Yard in June 1940 (copied from Black, 1988, p.507). Shows marine railway empty. There appear to be six skylights on the west roof slope.

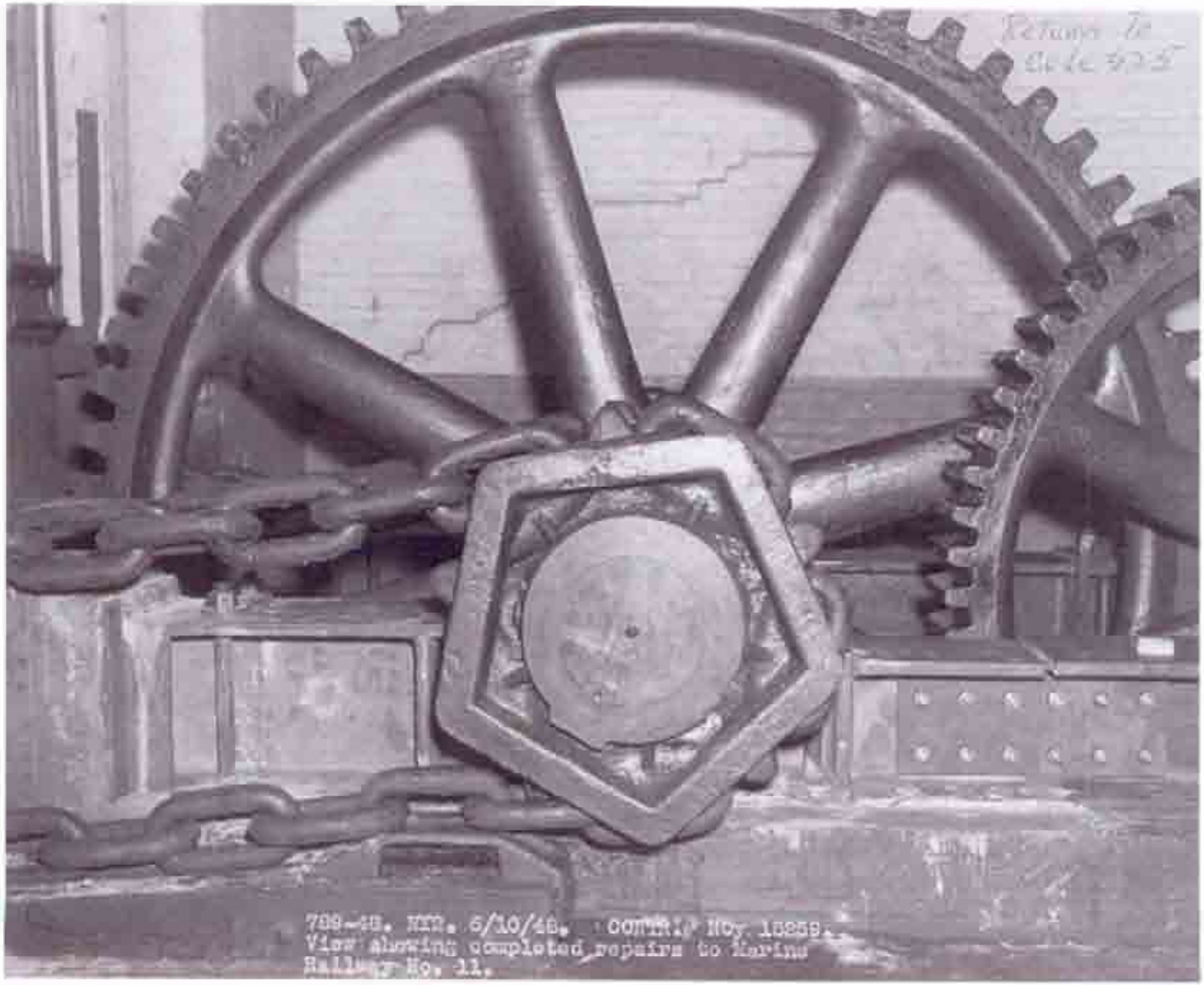


Fig. B-50 Photo "789-48. NY2. 6/10/48. CONTR. #NOy 15259. View showing completed repairs to Marine Railway No. 11." Shows part of gear mechanism for the marine railway. Note the step crack in the brick wall beyond the machinery.

Fig. B-51 BOSTS 8704. Photo – no title or markings. ca. 1950. Looking north from the east side of Drydock 1. Partial north end of building and marine railway visible. Dormer has been installed on west roof.

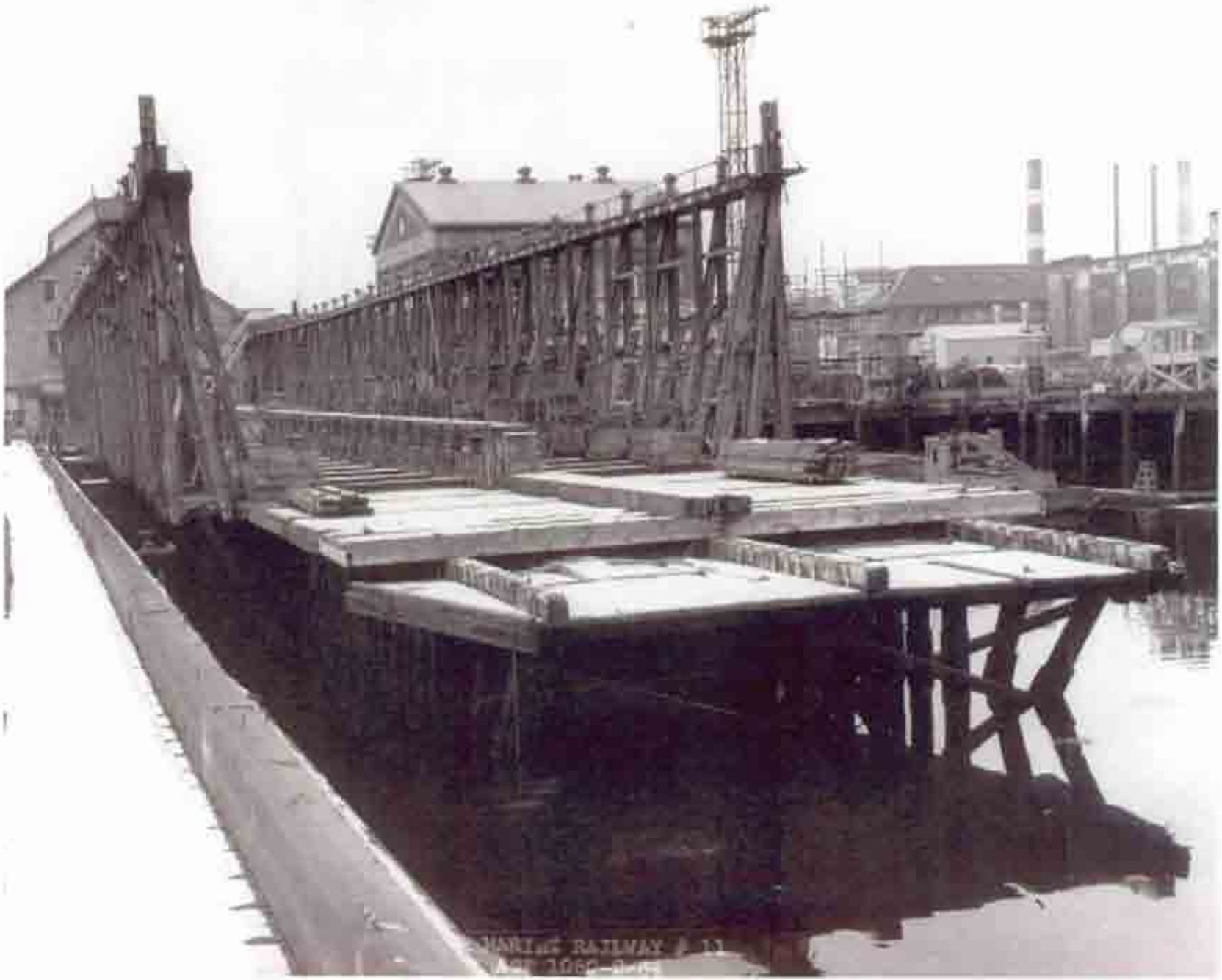


Fig. B-52 Photo "MARINE RAILWAY # 11 ASF 1050-2-64". Looking north along the marine railway

Fig. 8-53: Photo "ASF 1082 Pier One". West roof elevation visible across Pier One showing dormer and skylights.

Fig. B-54 Photo "BLDG. 24 FEB. 16, 1973 ASF 1410". 1973 photo showing cracked lintel over door.

Fig. B-55 Photo of USS Constitution approaching Dry Dock 1, April 17, 1973 (copied from Black, 1988, p.797). Looking northeast from over the water. Dormer and six skylights visible on west roof.

Fig. B-56 Photo, no title or designation. 1973 photo looking northeast. Shows the building at the time that it was turned over to the Boston National Historical Park.

Appendix C | Historic Drawings

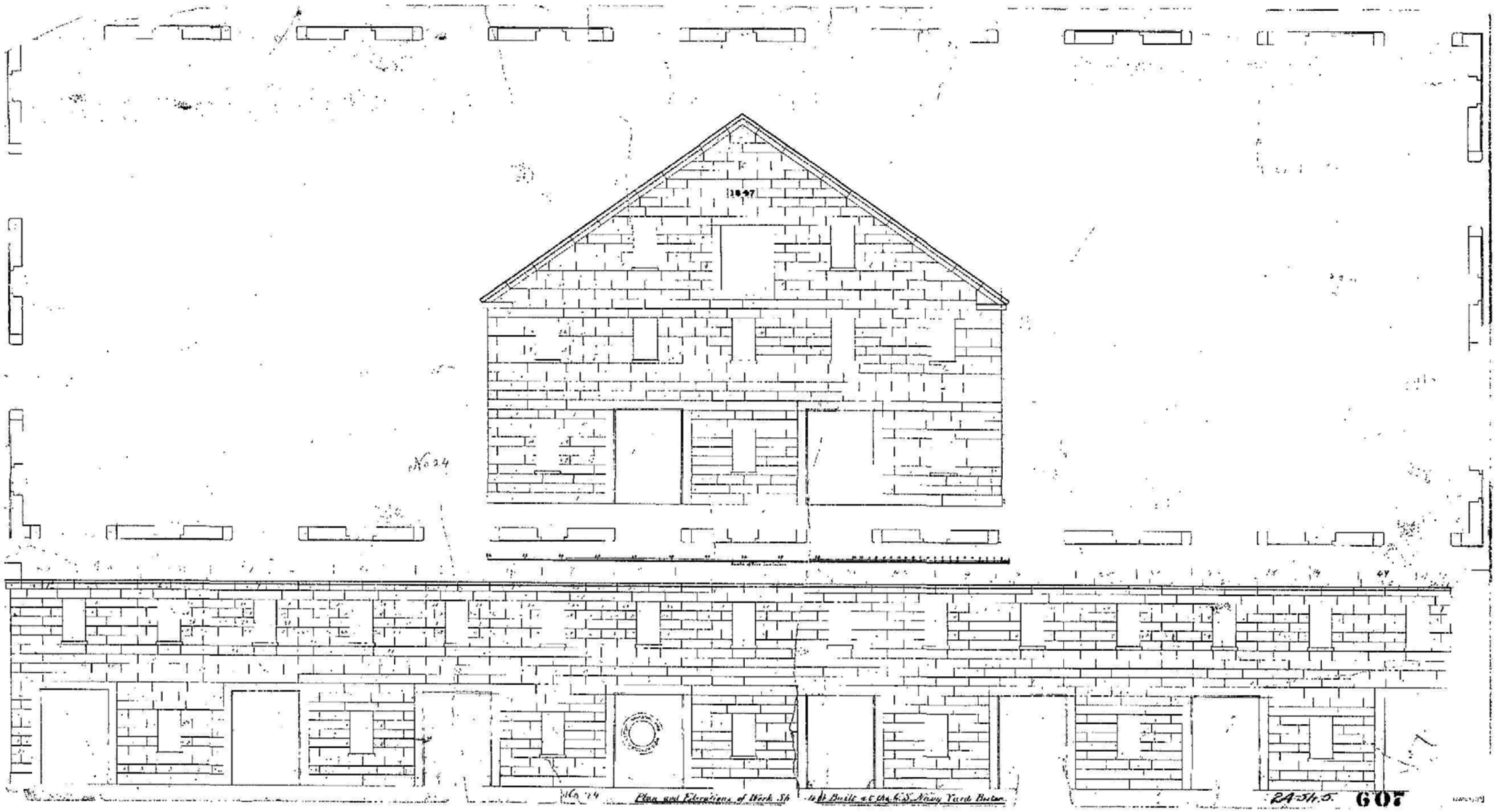


Fig. C1 *24-Sh5 "Plans and Elevations of Workshop to be Built at the U. S. Navy Yard Boston". Not dated, but assumed to be from 1847.*

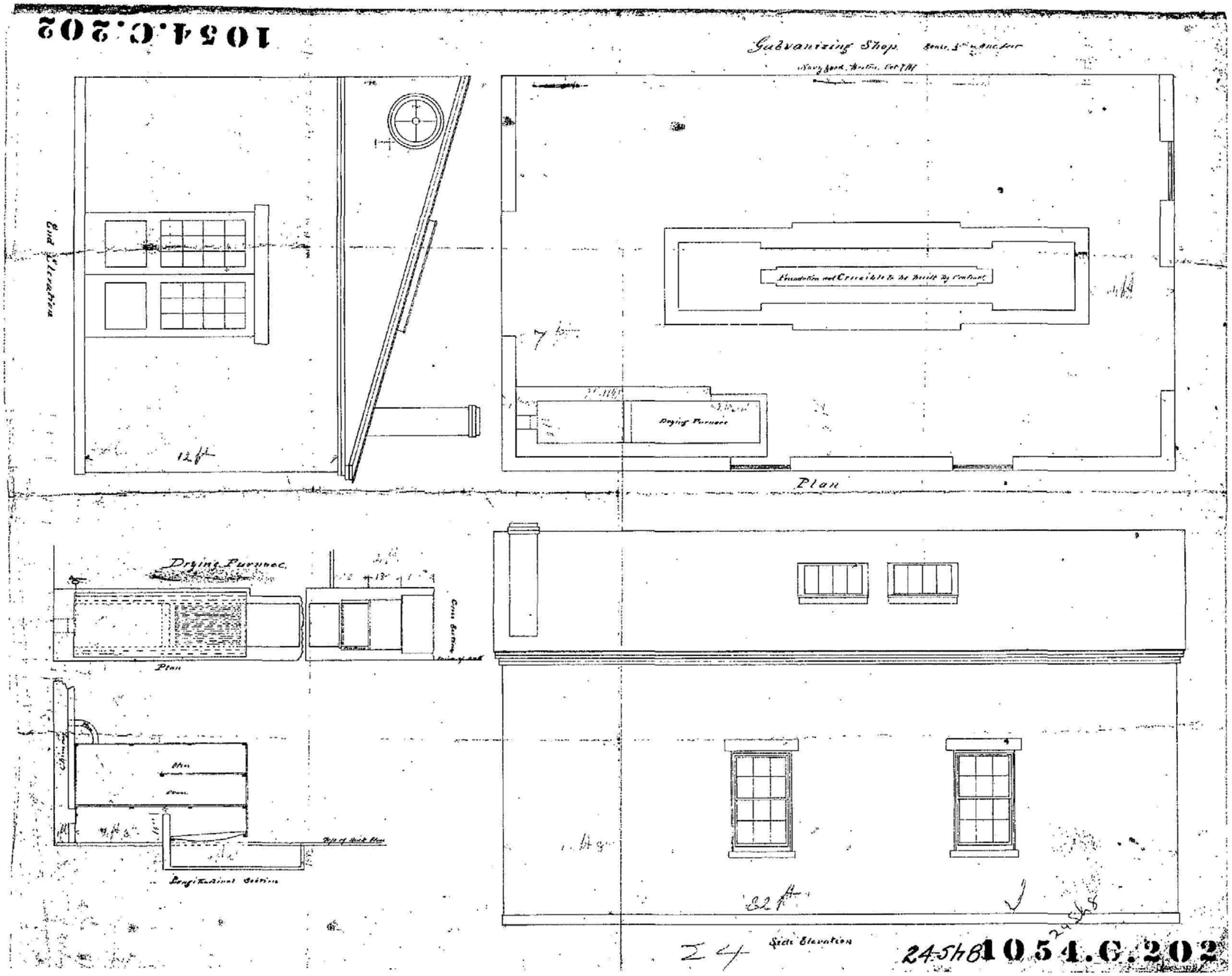


Fig. C2 *24-Sh8 Plan and elevations of the "Galvanizing Shop" that was constructed on the north end of the building in 1867. This structure appears in Photo B6.*

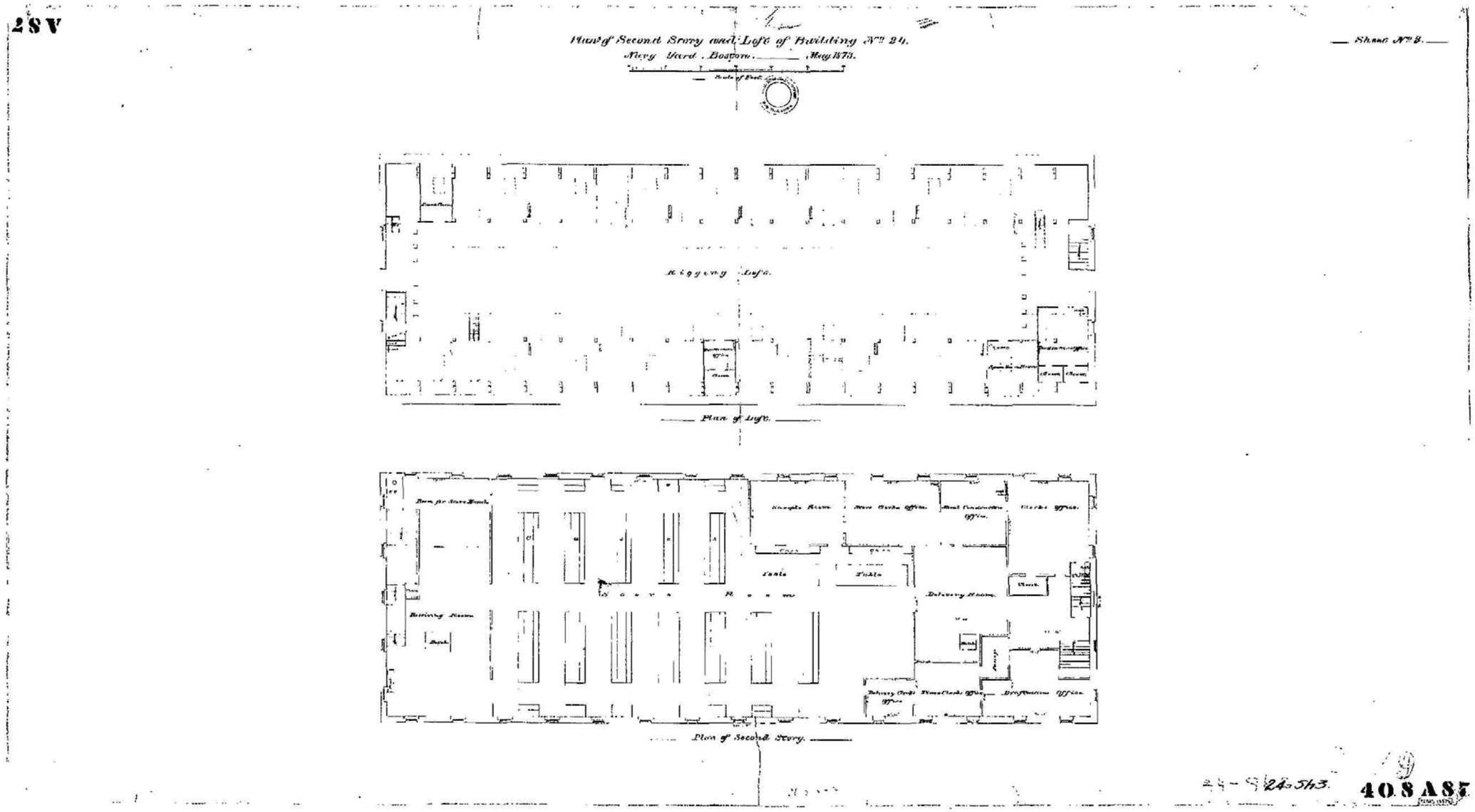


Fig. C3 *24-Sh3 "Plan of Second Story and Loft of Building No. 24" Dated May 1873. Note Draftsman's Office in southwest corner. See Photo B5 for blueprint drying rack in south window.*

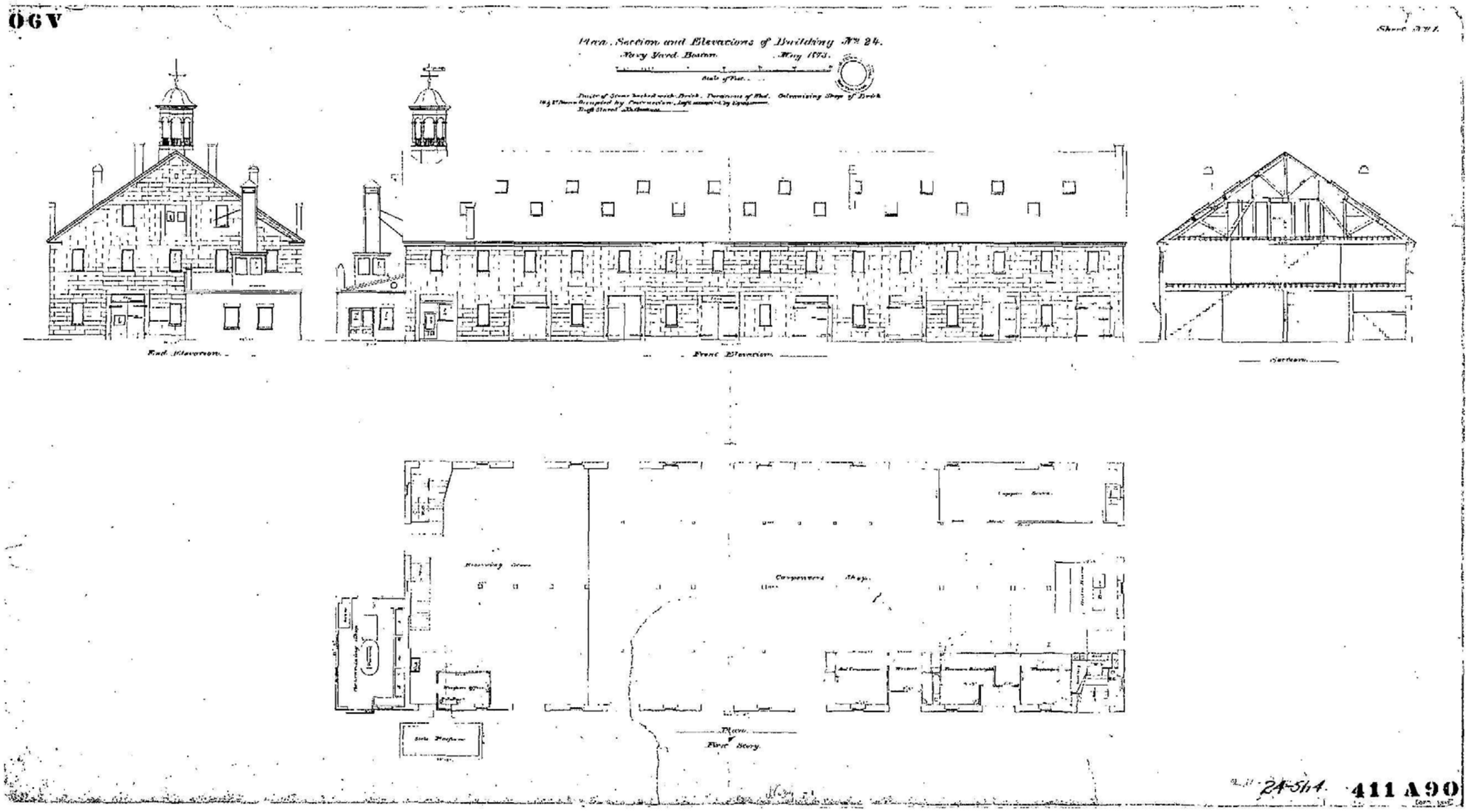


Fig. C4 *24-Sh4 "Plan, Section and Elevations of Building No. 24". Dated May 1873. Note Scale Platform off of northwest corner. This is possible foundation found during test pit investigations. Note that vault is not installed in northwest corner at this time.*

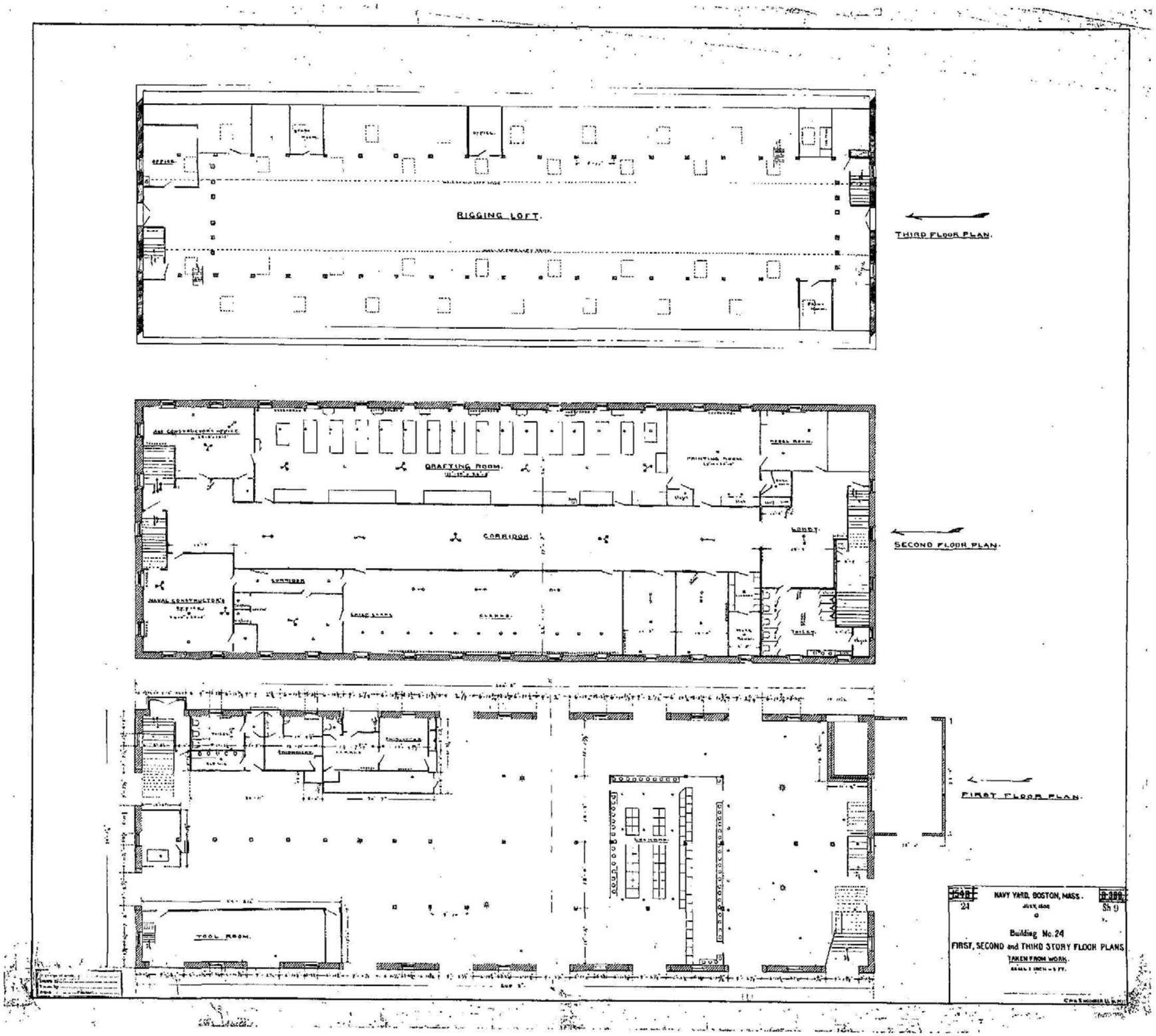


Fig. C5 *24-Sh9 "Second and Third Story Floor Plans". Dated 1900. Shows vault for the first time. Printing Room on the second floor is in the location of the blueprint drying racks in Photo B6. Awnings in Photo B6 are in locations of offices on floor plans.*

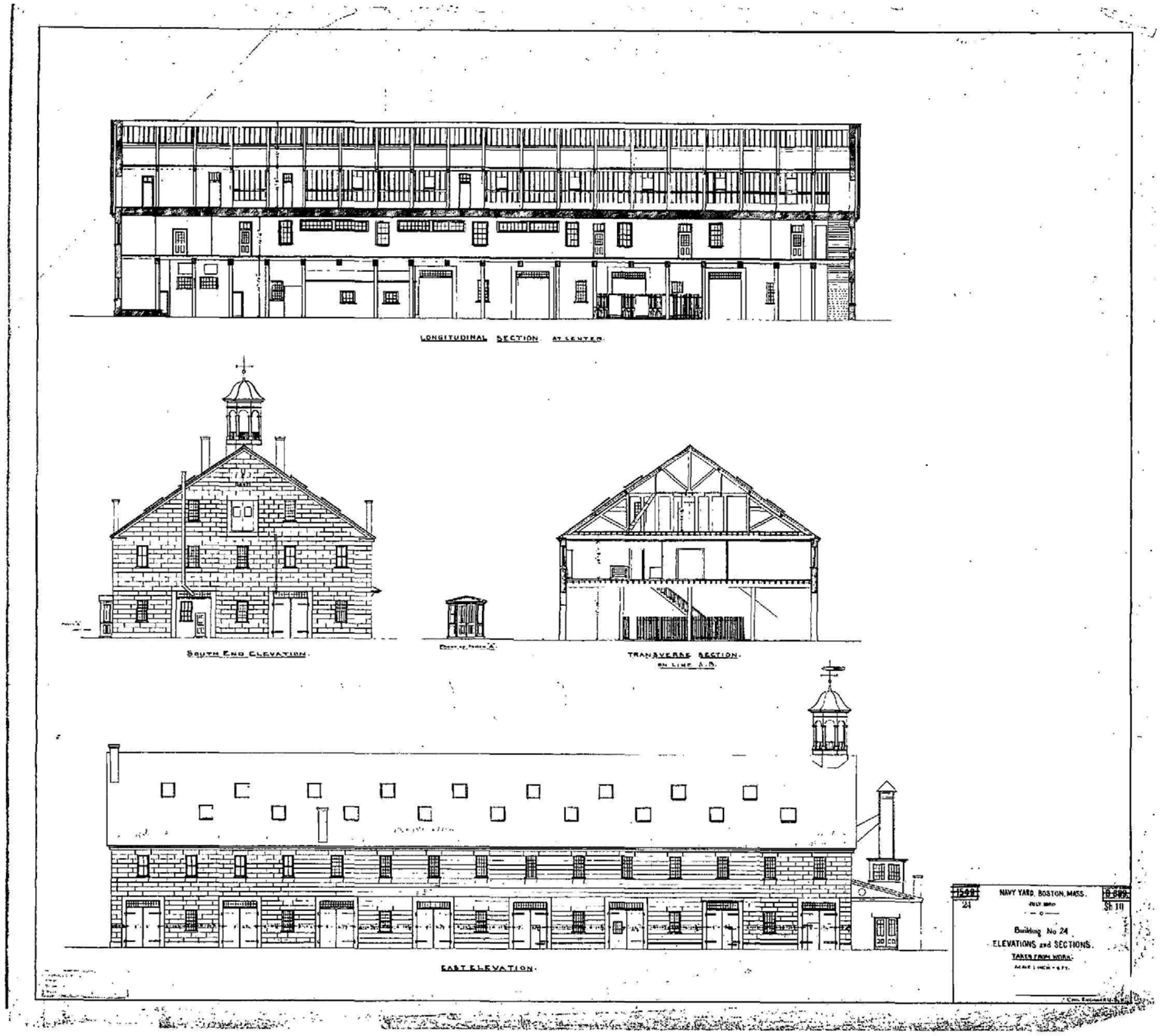


Fig. C6 *24-Sh10 "Elevations and Sections". Dated 1900. Shows 2/2 windows in office locations.*

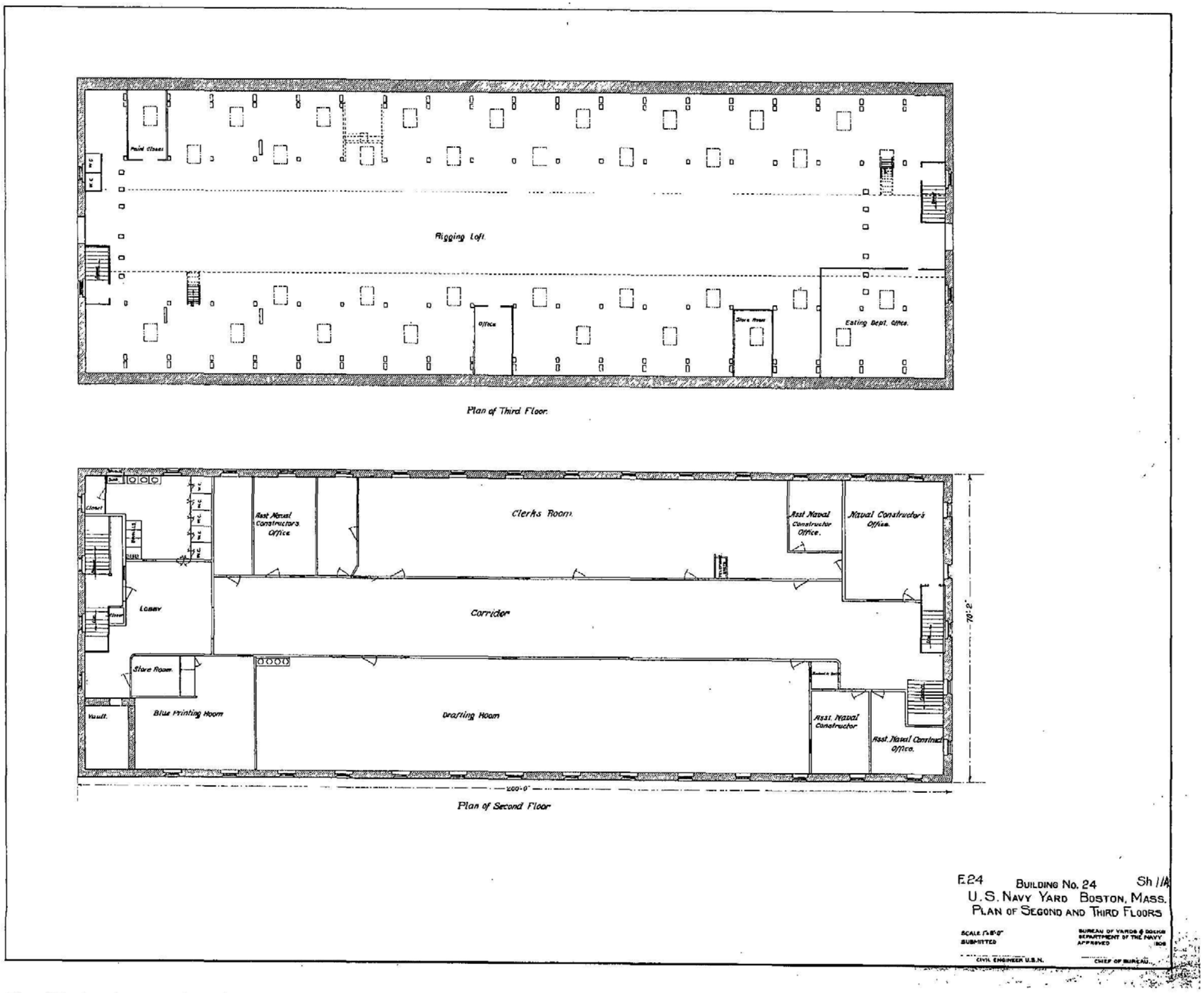


Fig. C7 *24-Sh11A "Plan of Second and Third Floors". Dated 1909. Note Blue Printing Room has moved one bay north from 1900 plans. See Photo B9 for window sill alterations to these two windows.*

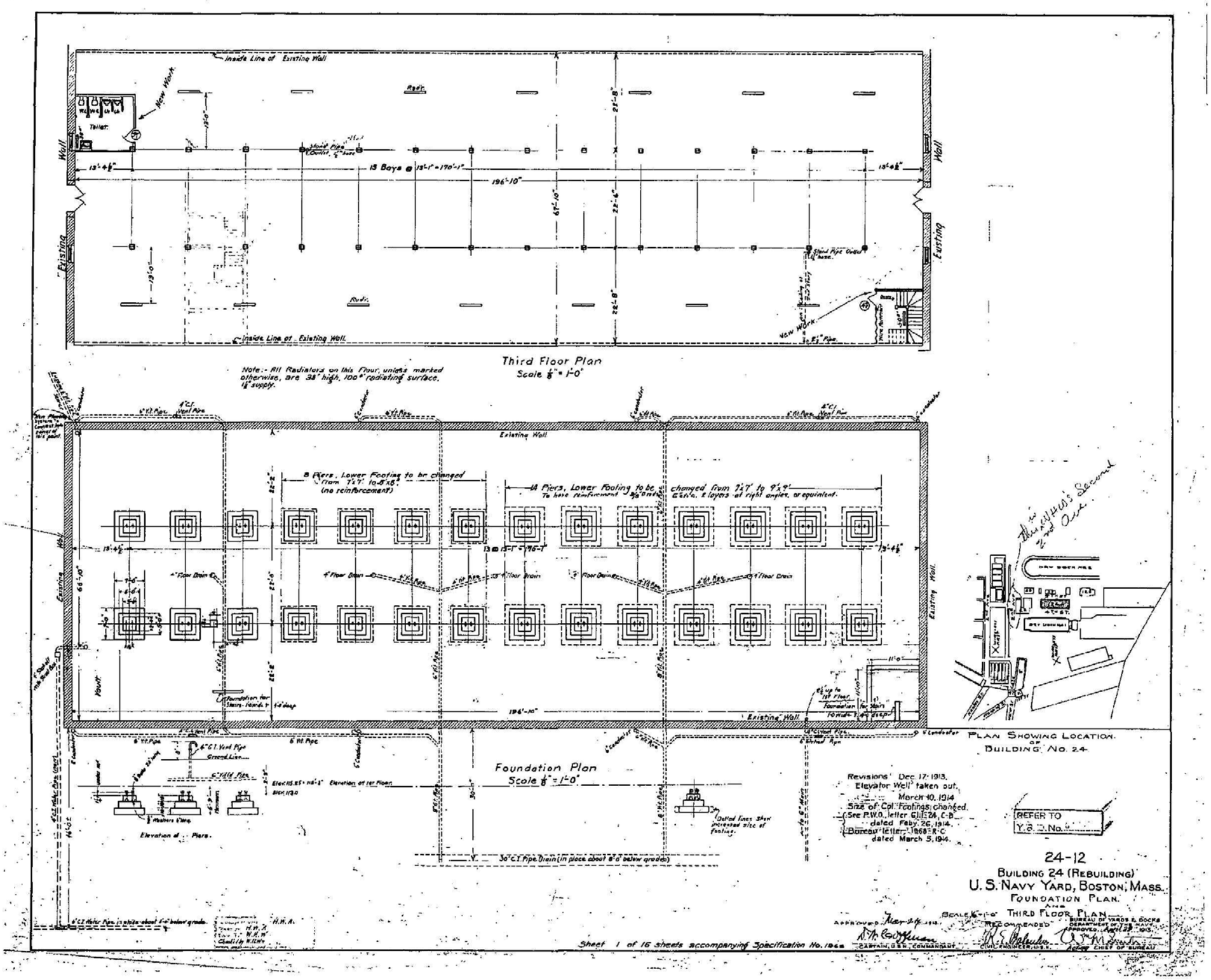


Fig. C8 24-12 "Foundation Plan and Third Floor Plan". *Dated 1913 (rebuilding).*

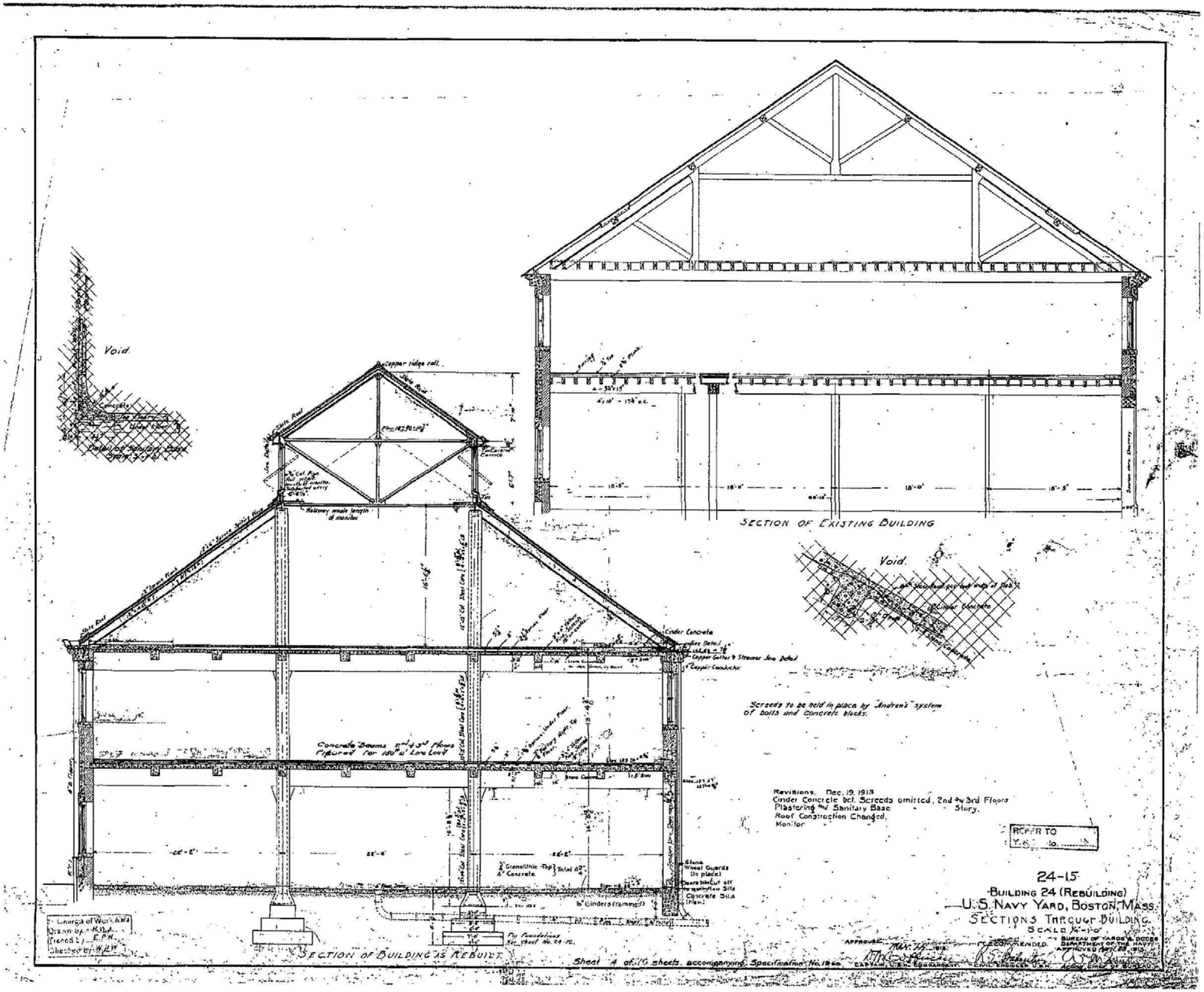


Fig. C9 *24-16 "Sections Through Building". Dated 1913 (rebuilding). Shows new concrete beams and columns, and the structure of the original building.*

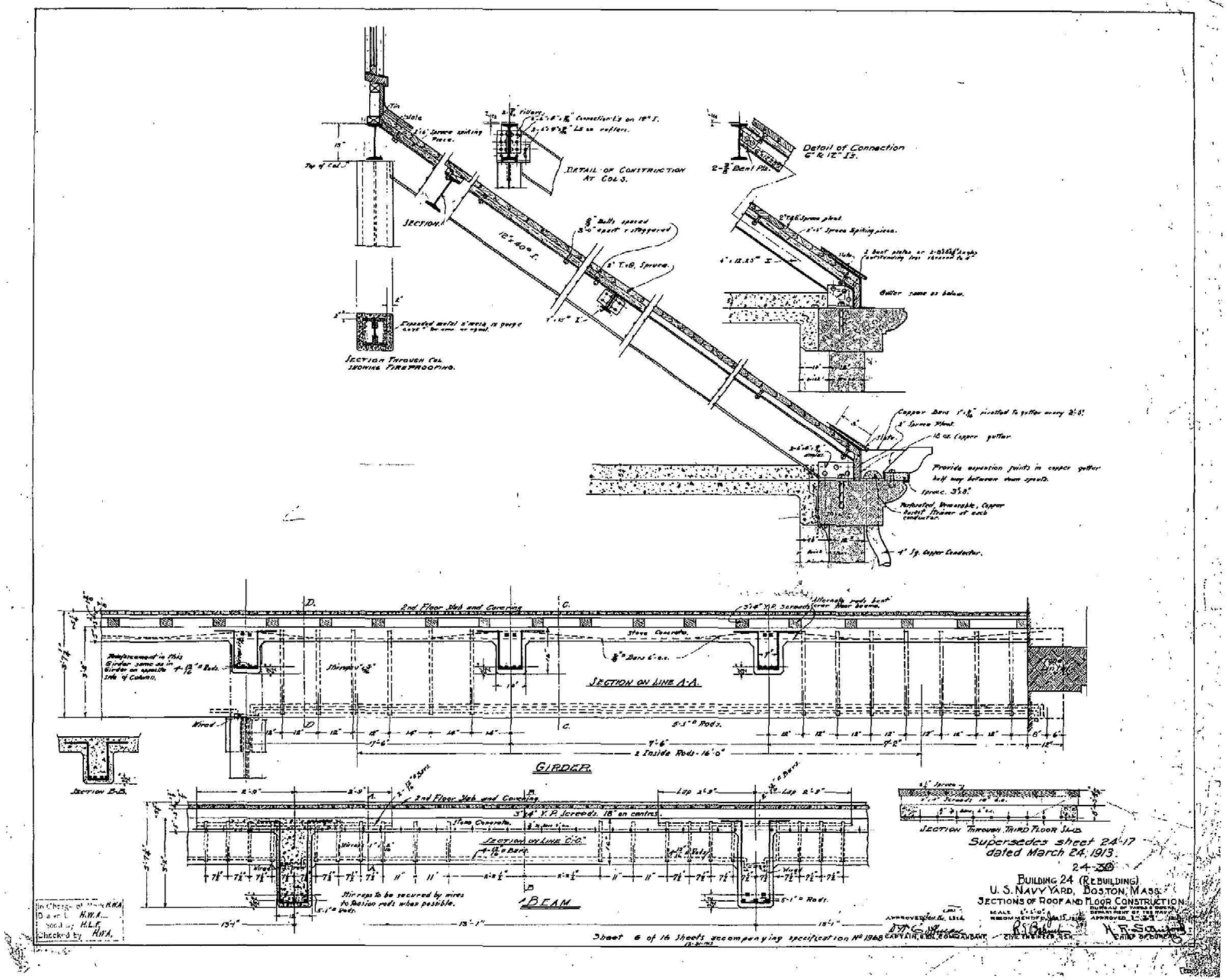


Fig. C10 *24-30 "Sections of Roof and Floor Construction". Dated 1914 (rebuilding). Note the bolt used to fasten the gutter nailer to the cornice stone. This is the element that is rusting and causing the cornice stones to spall.*

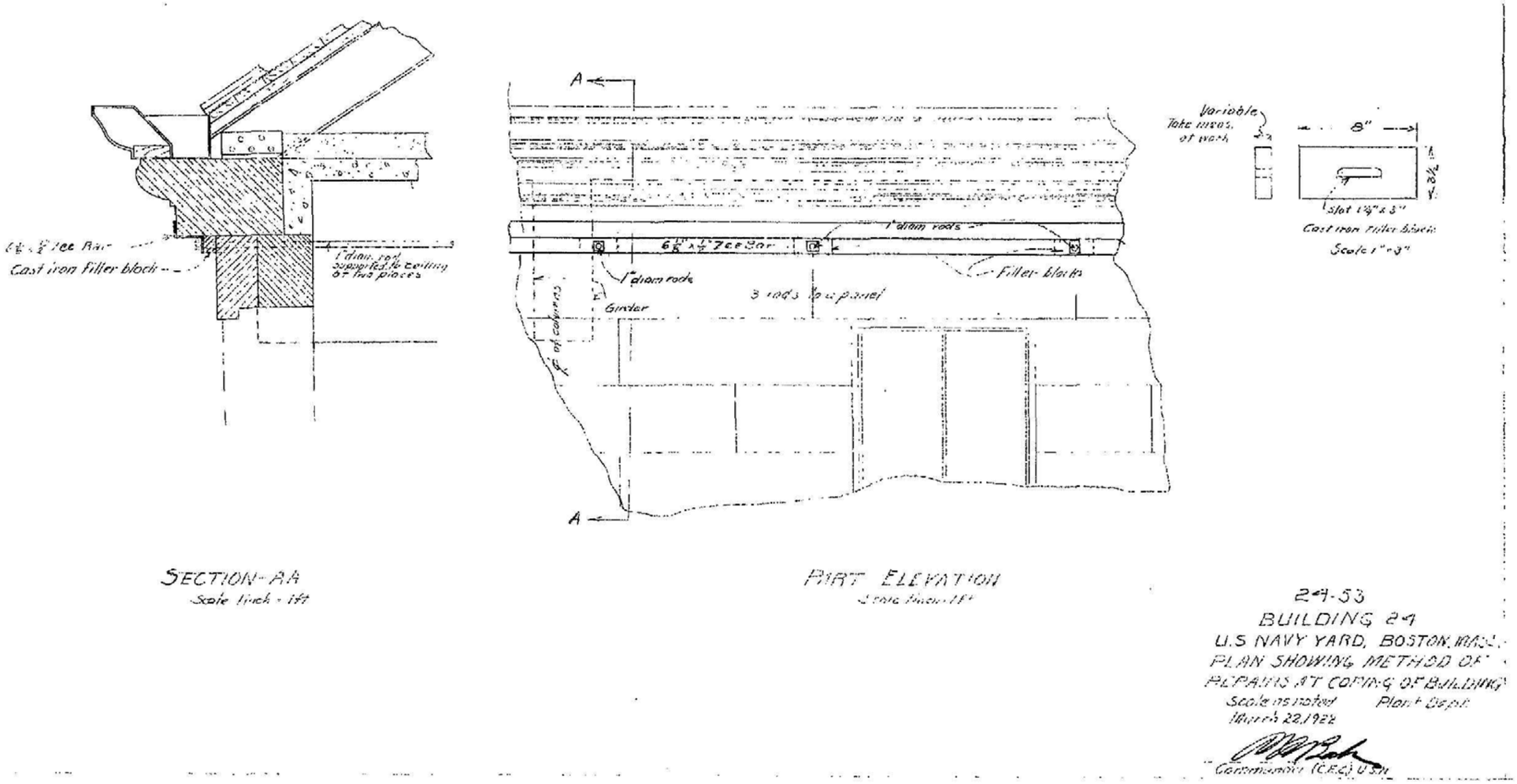


Fig. C11 *24-53 "Plan Showing Method of Repairs at Coping of Building". Dated March 22, 1922. Shows the Z Channel installation at the cornice*

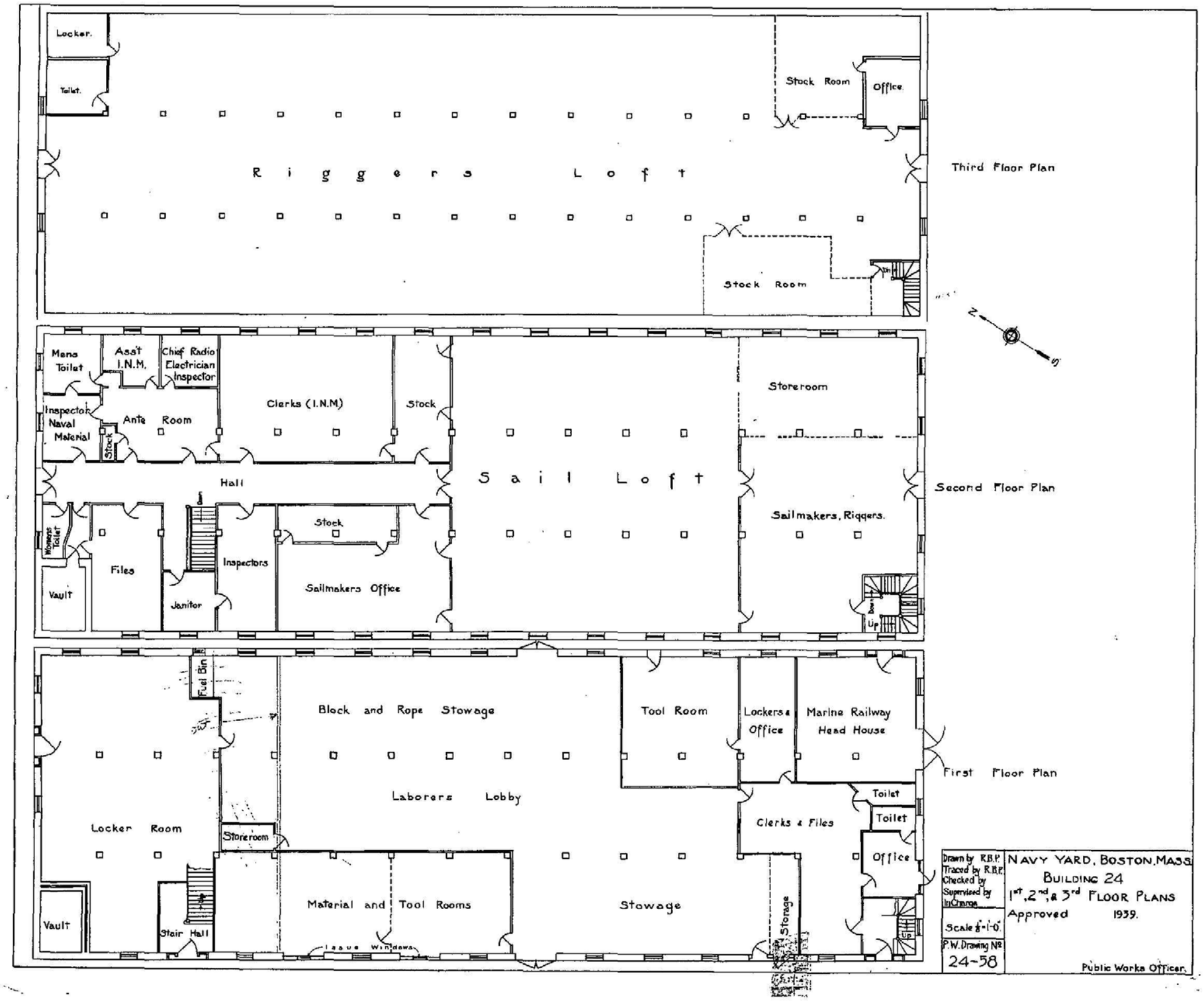


Fig. C12 *24-58 "1st, 2nd, & 3rd Floor Plans". Dated 1939. Shows varied use of the building at this time.*

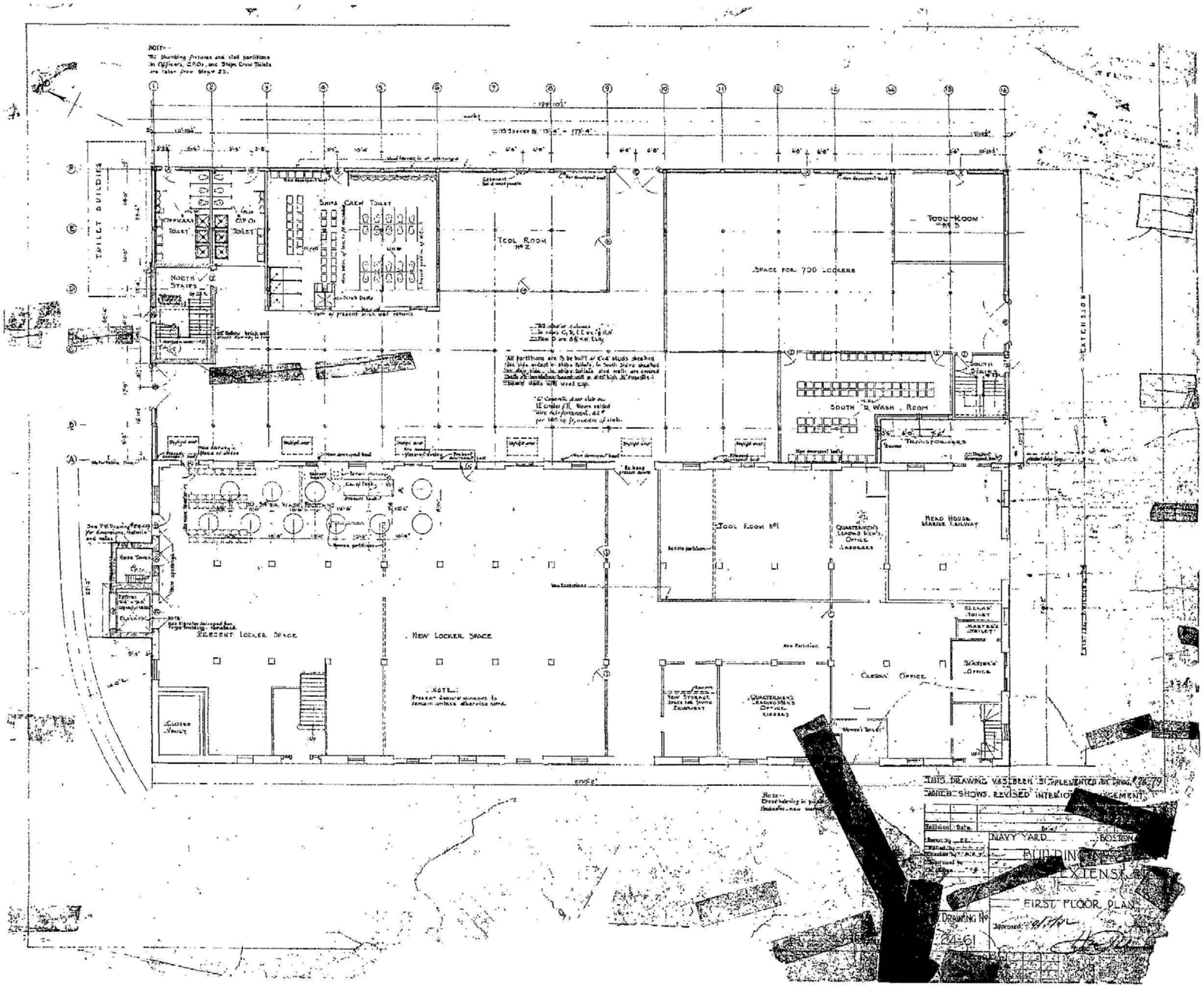


Fig. C13 *24-61 "East Extension - First Floor Plan". Dated 1943. Shows full floor plan with east extension.*

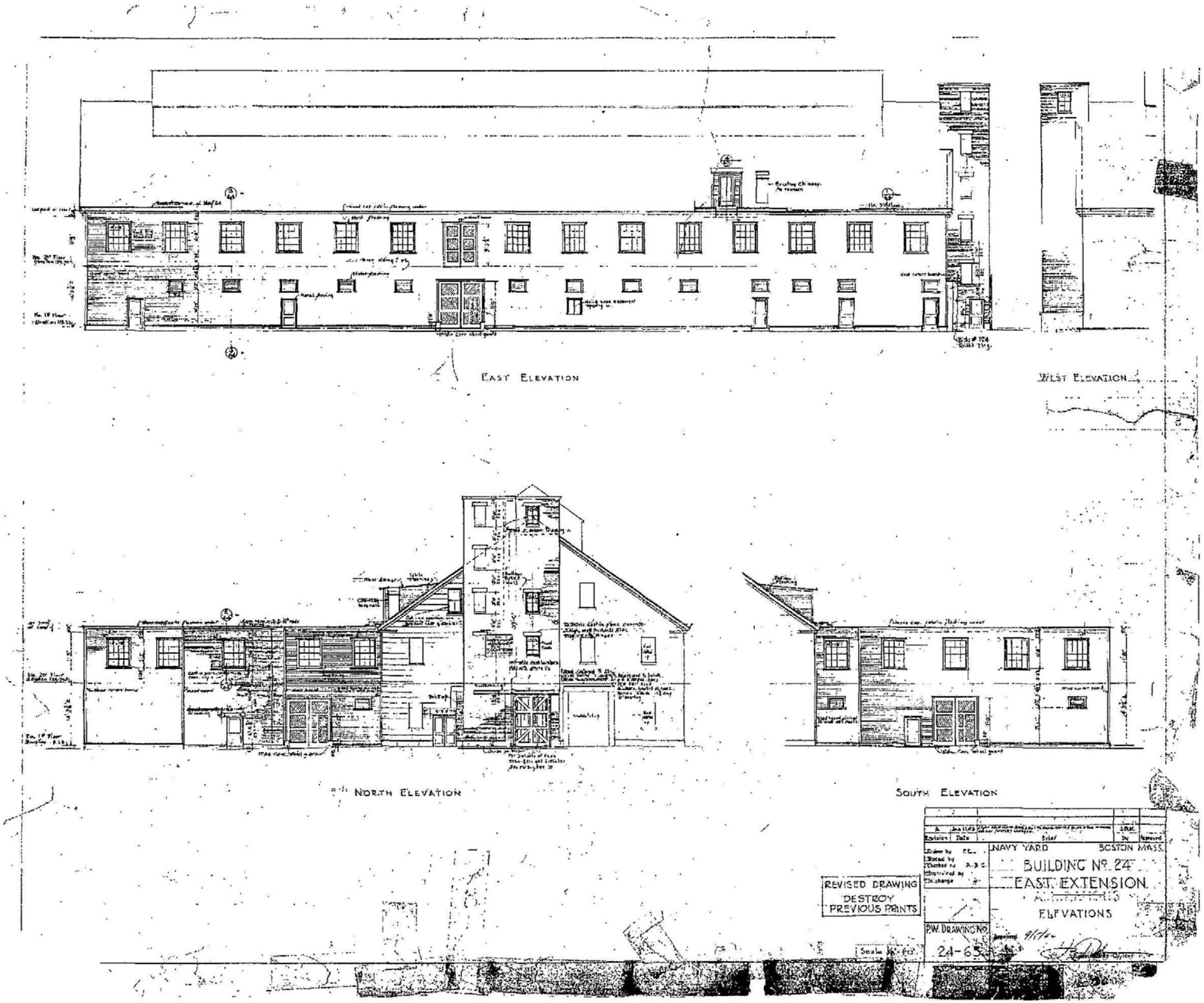


Fig. C14 *24-65 "East Extension – Elevations". Dated 1943. Shows elevations with original door and window configurations.*

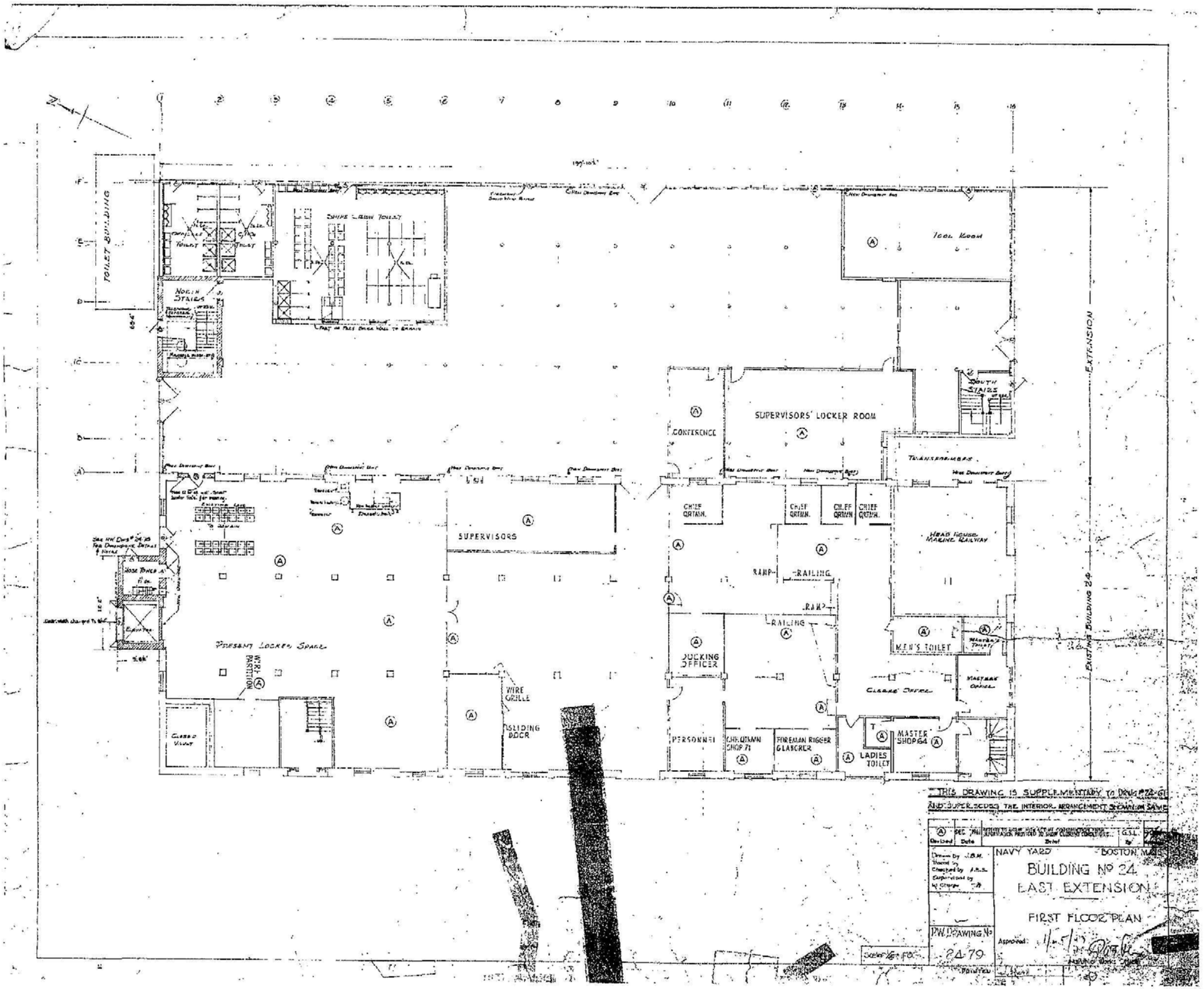


Fig. C15 *24-79 "East Extension – First Floor Plan". Dated Dec. 1961. Revisions to the floor plan, using the 1943 drawings.*

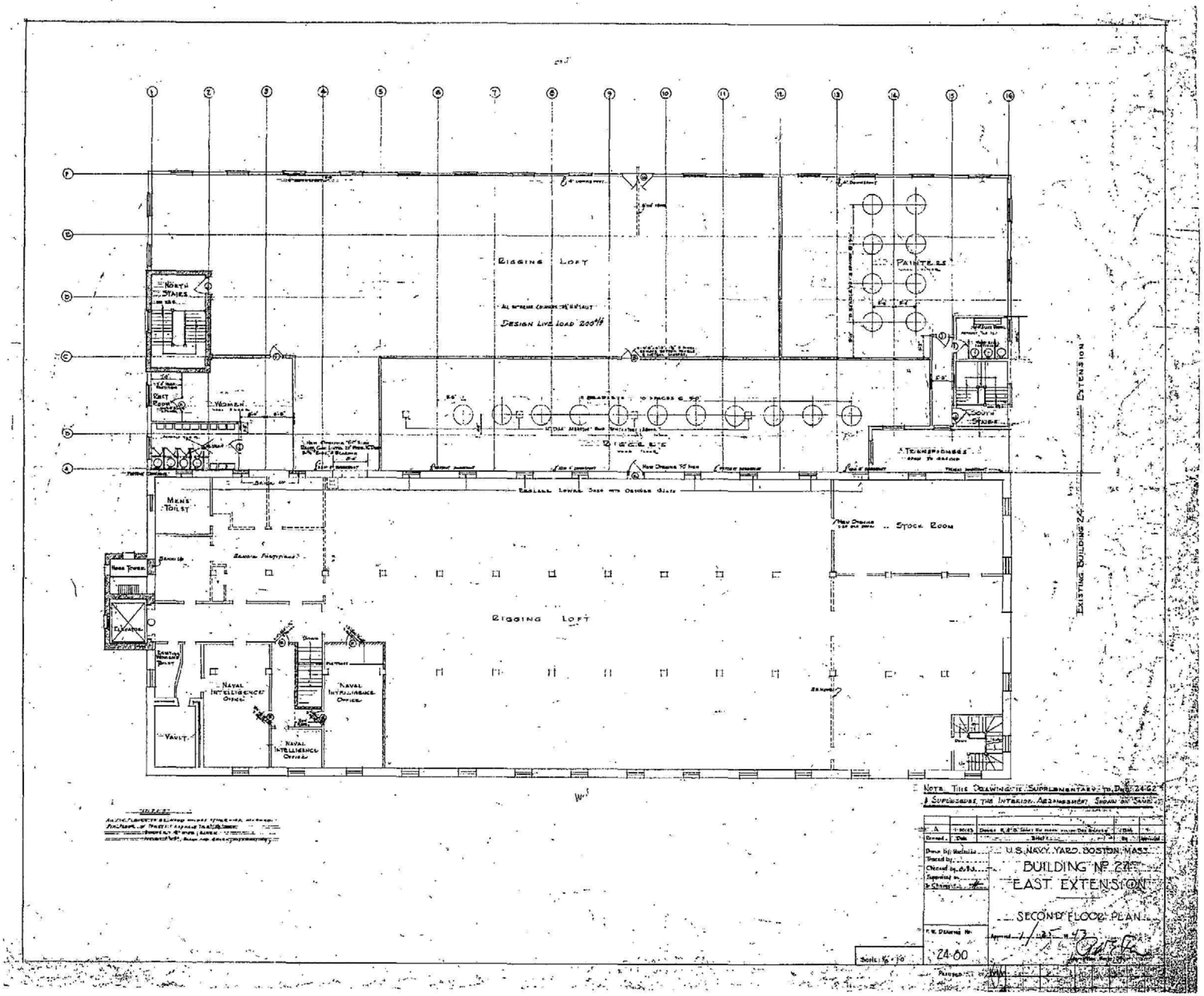


Fig. C16 *24-80 "East Extension – Second Floor Plan". Dated 1961. Revisions to the floor plan, using the 1943 drawings.*

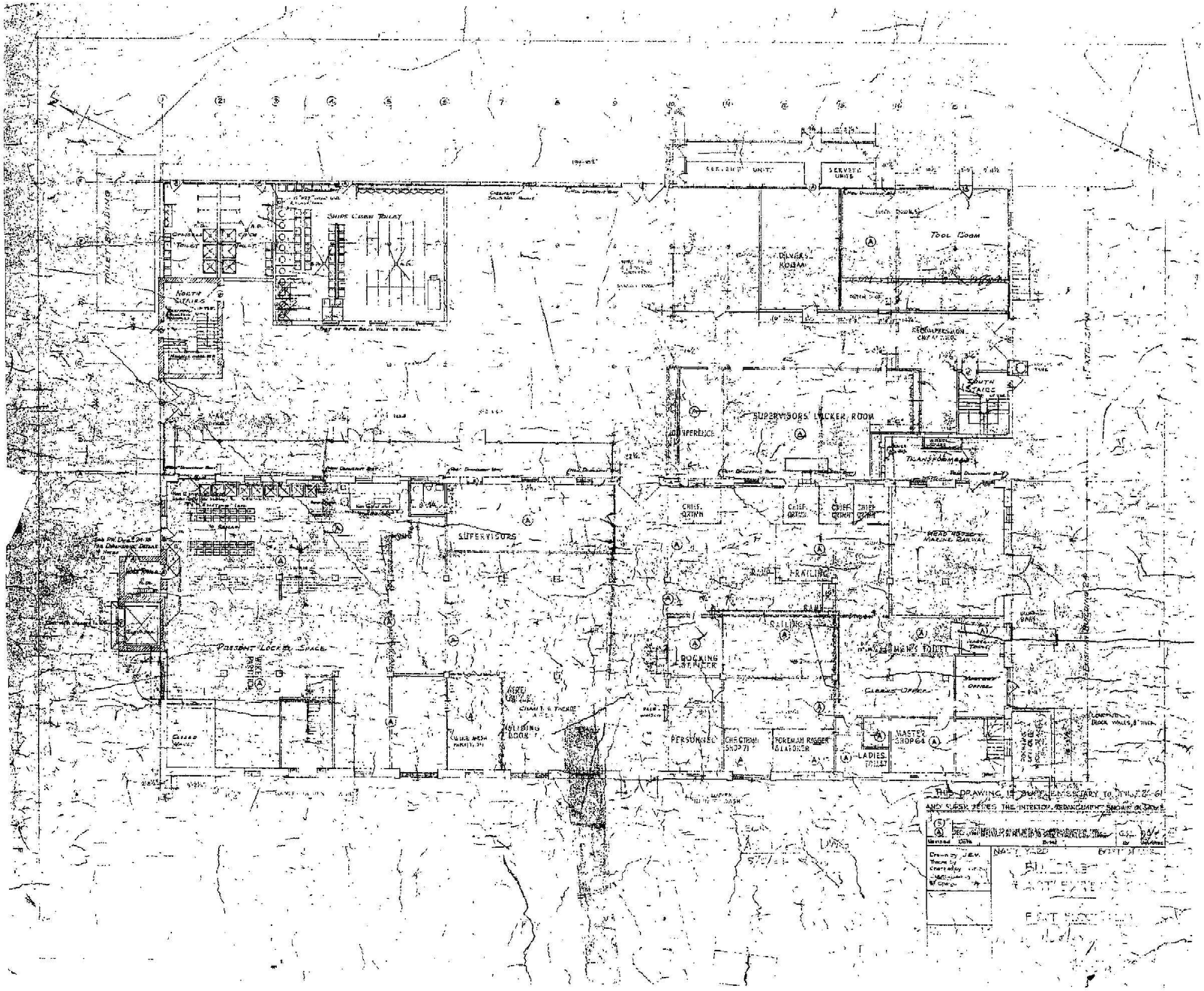


Fig. C17 *Dated 5/5/64. "First Floor Plan". Revisions to the floor plan, using the 1943 drawings.*

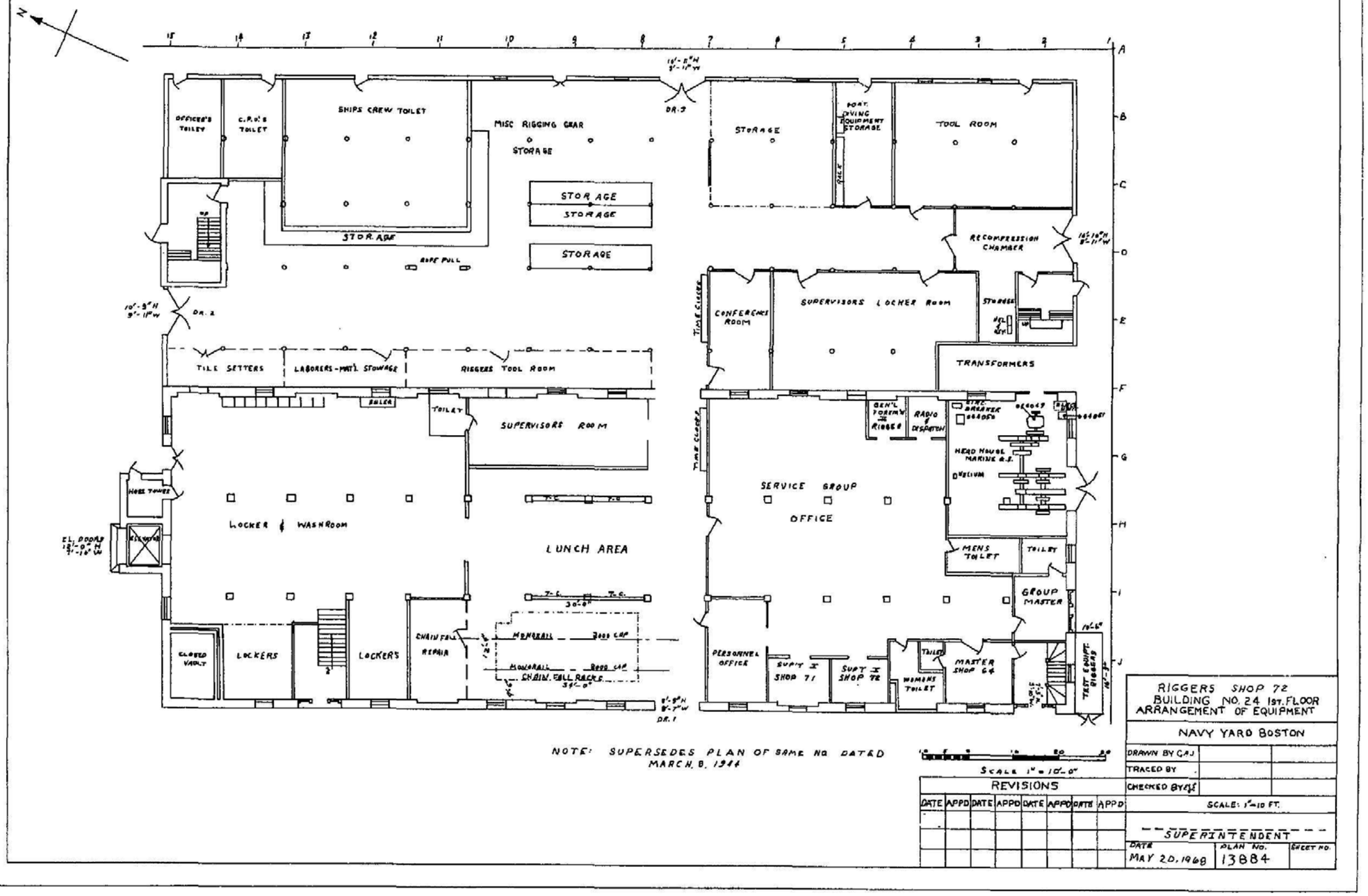


Fig. C18 *Dated May 20, 1968. "Riggers Shop 72, Building No. 24, 1st Floor Arrangement of Equipment".*

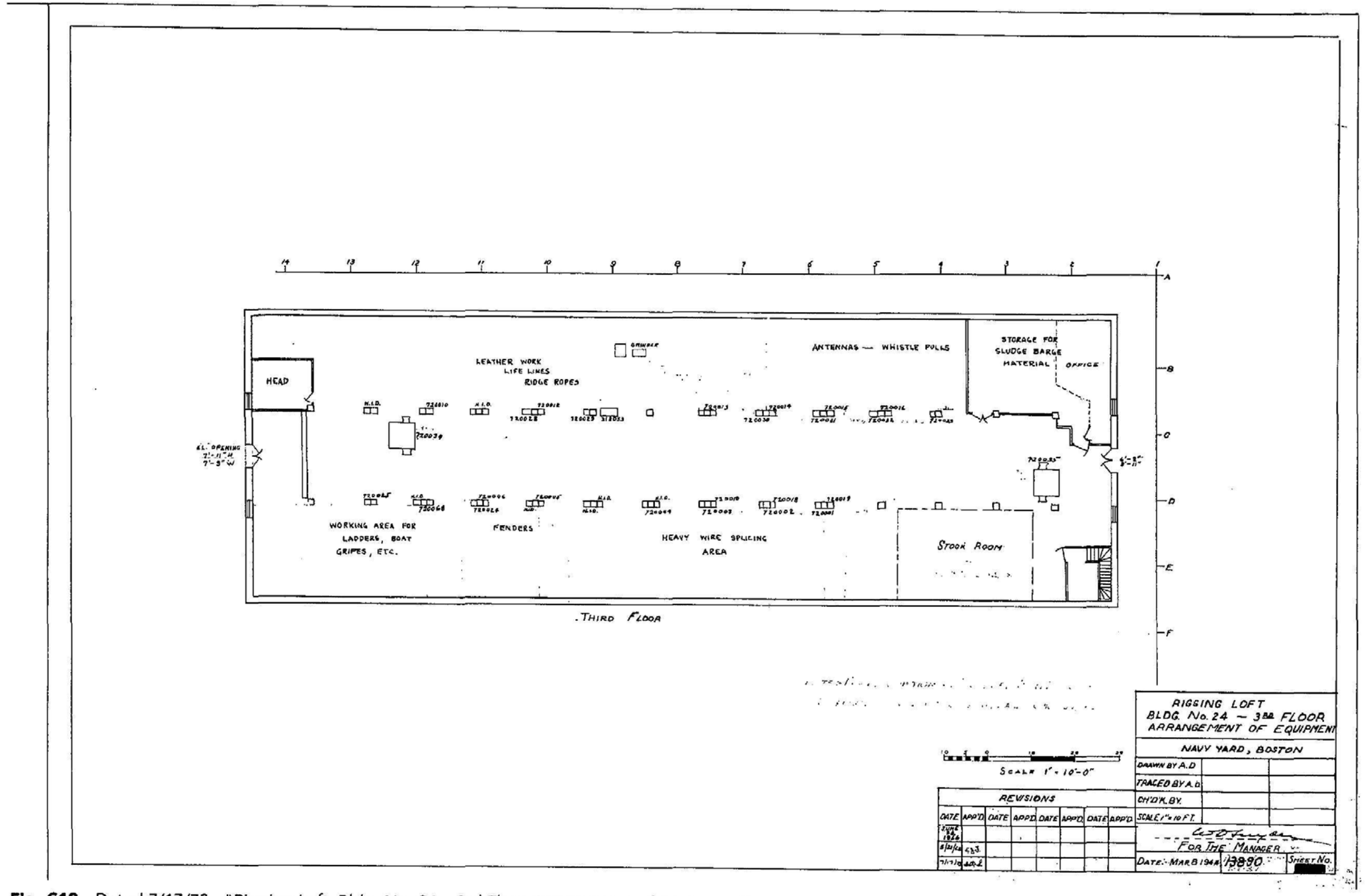


Fig. C19 *Dated 7/17/73. "Rigging Loft, Bldg. No. 24 – 3rd Floor Arrangement of Equipment".*

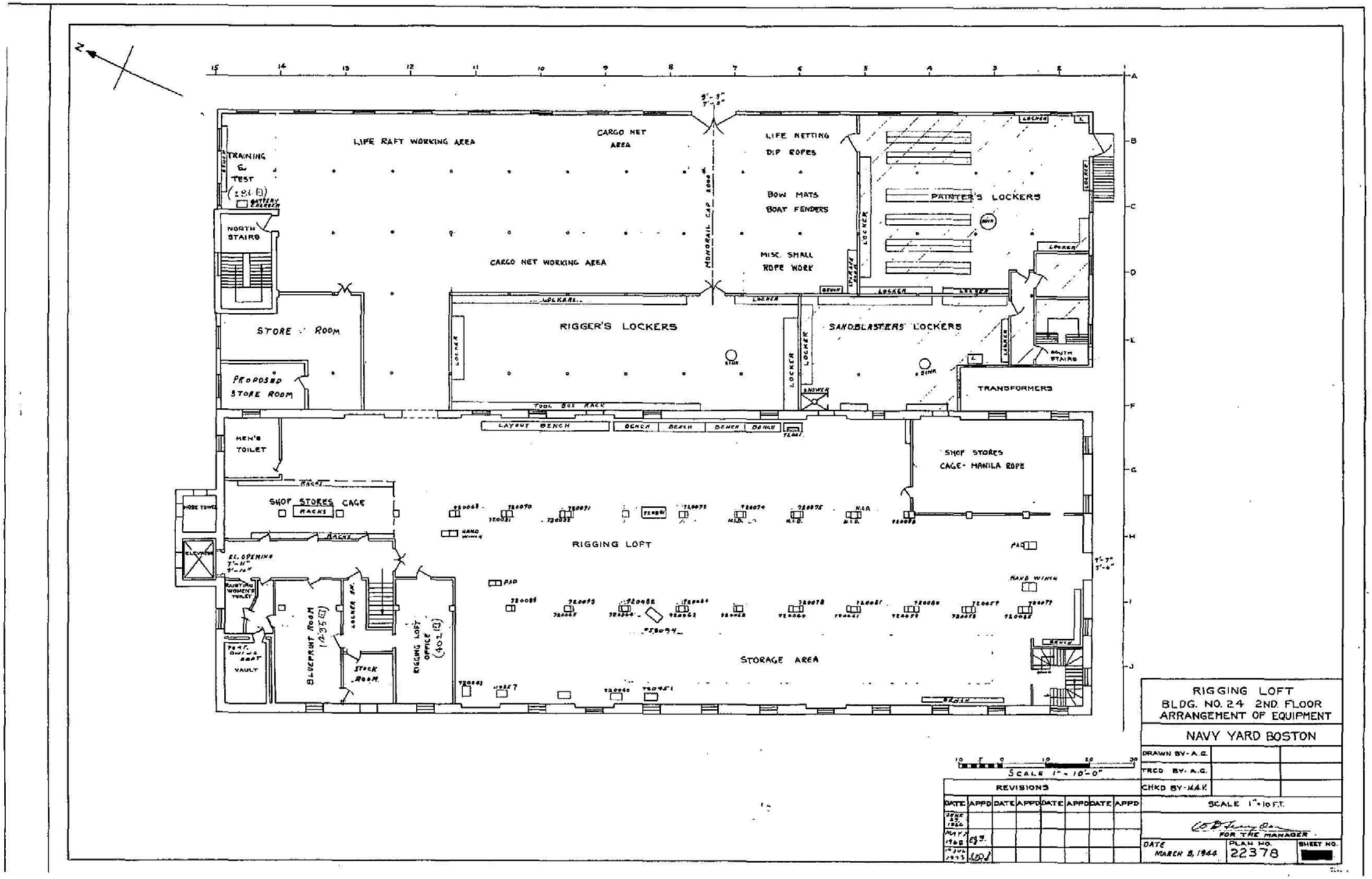


Fig. C20 *Dated 17 Jul 1973. "Rigging Loft, Bldg. No. 24, 2nd Floor Arrangement of Equipment".*

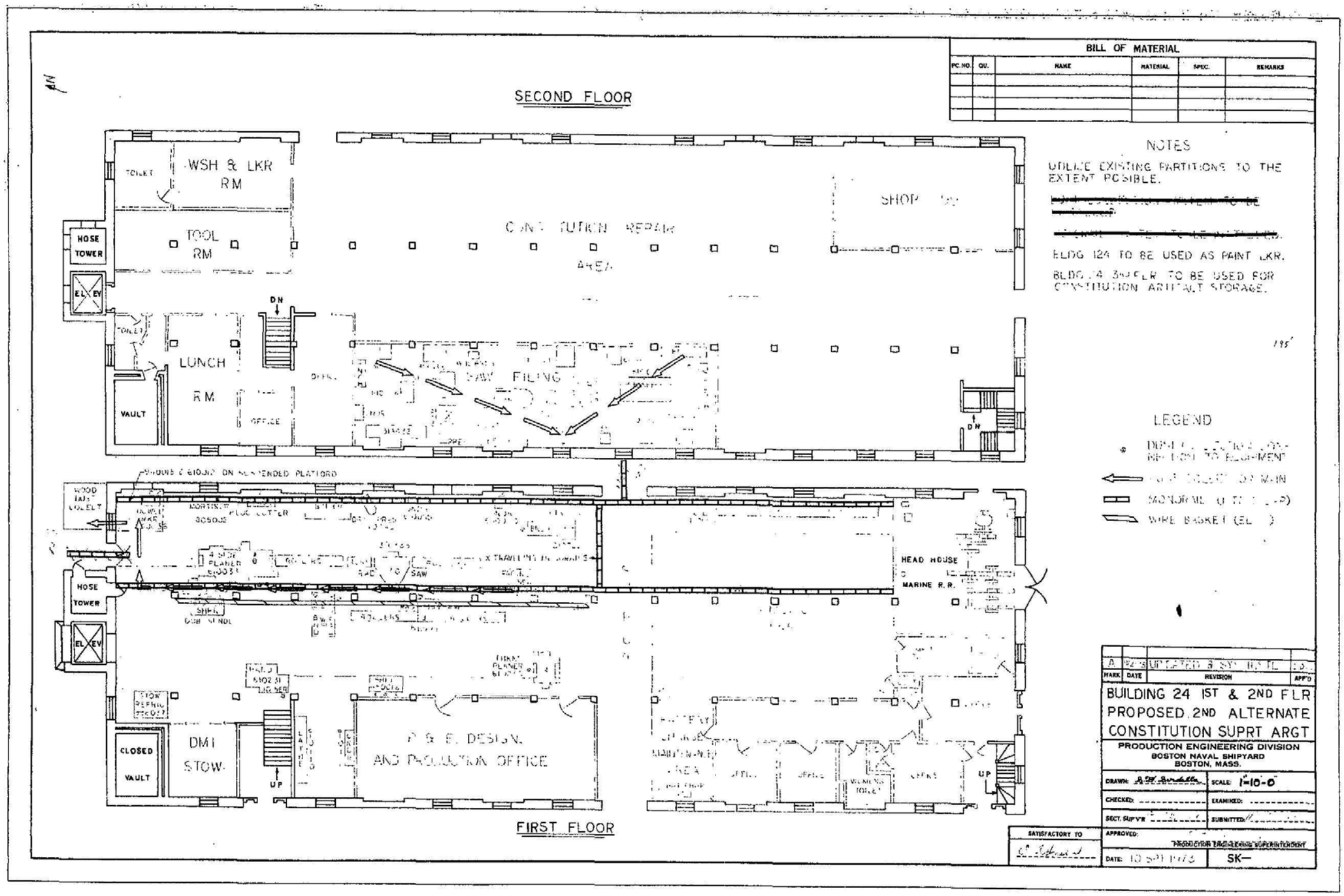


Fig. C21 *Dated 10 Spt 1973. "Building 24 1st & 2nd Flr Proposed 2nd Alternate Constitution Suprt Argt."*

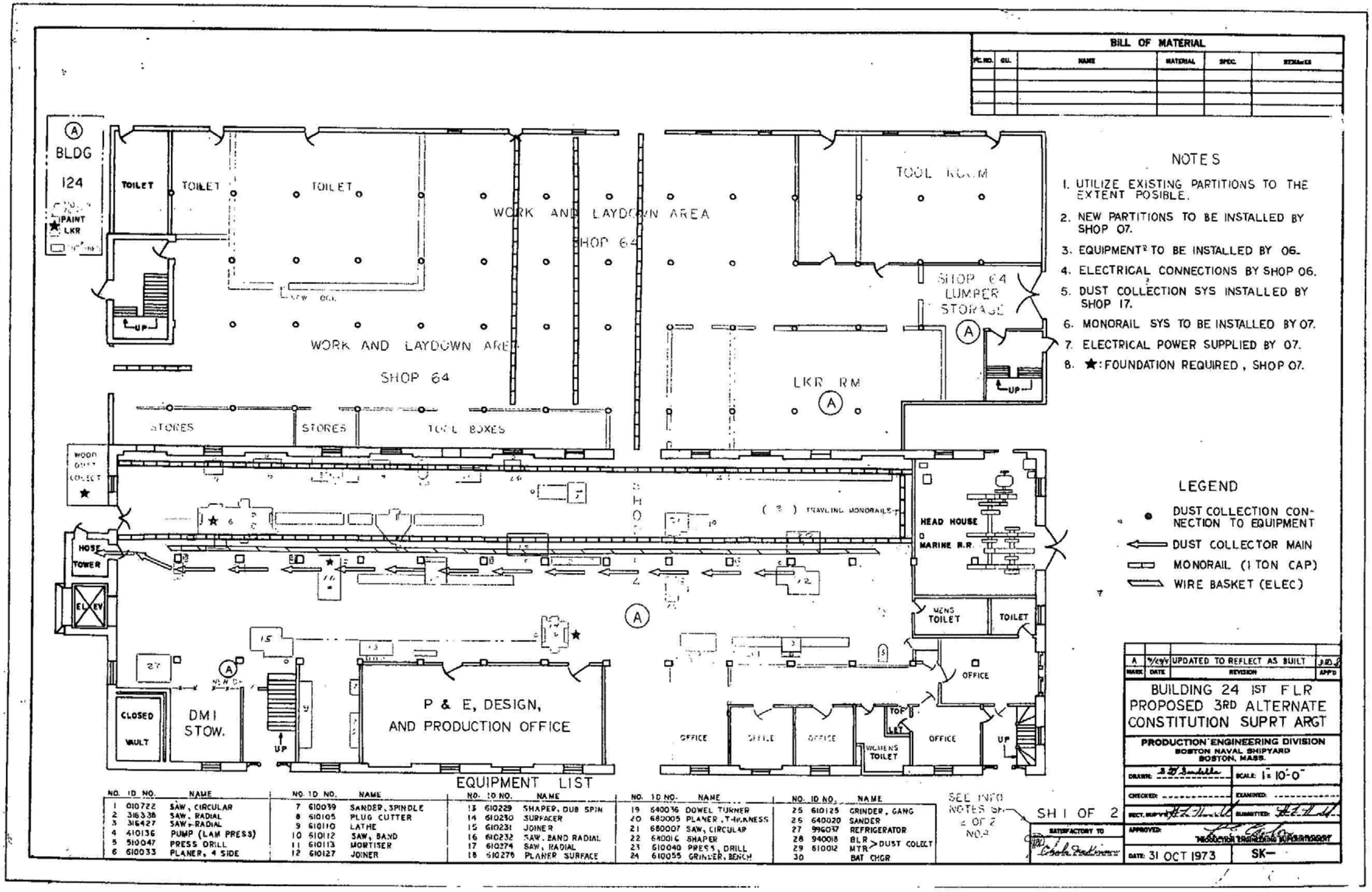
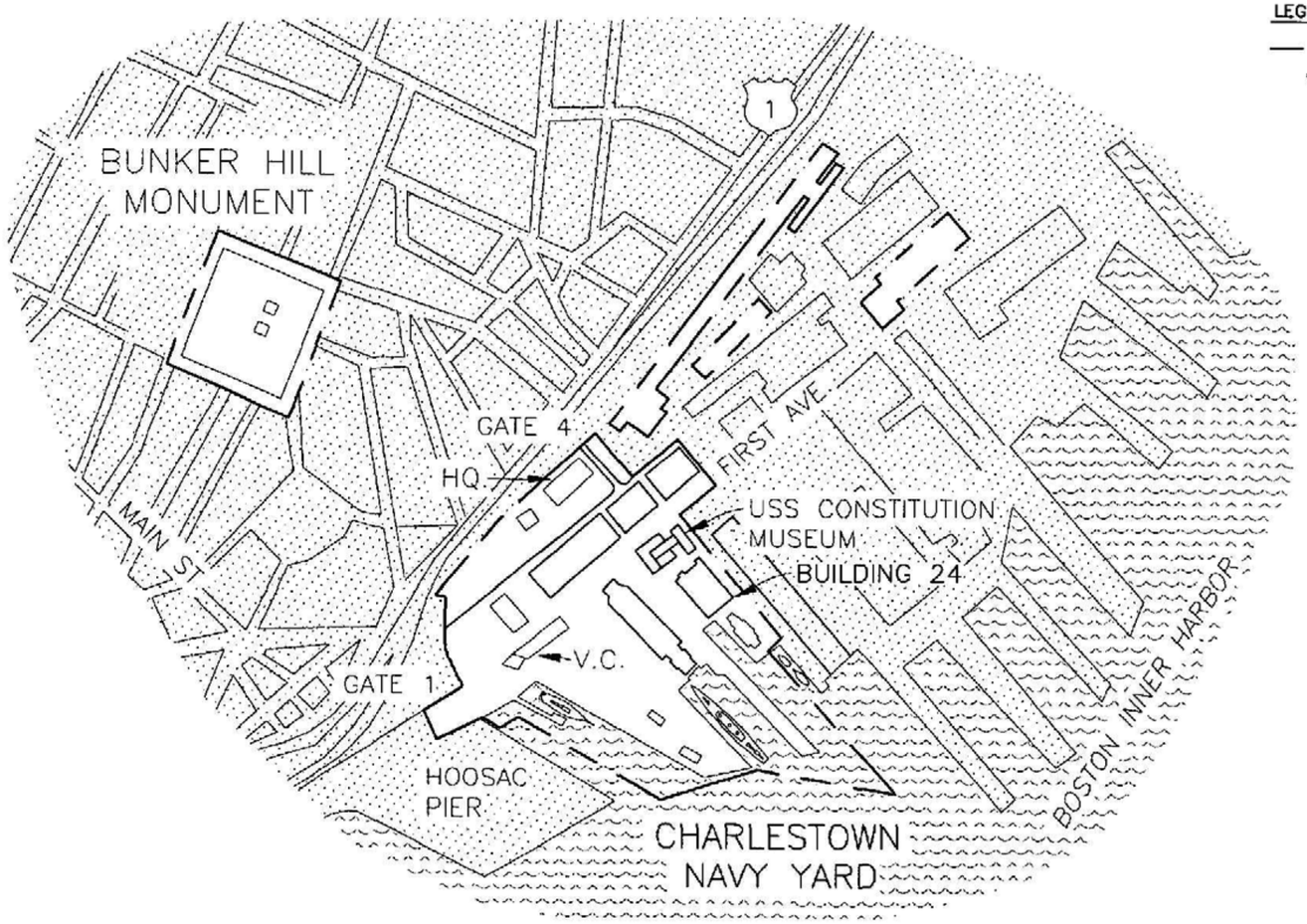


Fig. C22 *Dated 31 Oct 1973. "Building 24 1st Flr Proposed 3rd Alternate Constitution Suprt Argt."*

Appendix D | Existing Conditions Drawings



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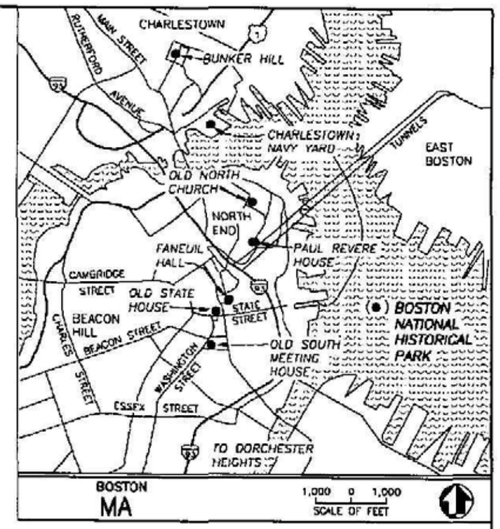
V.C. VISITOR CENTER

HQ. PARK HEADQUARTERS



BOSTON
MASSACHUSETTS

1. X1.0 COVER SHEET

BUILDING 24

2. A1.0 FOUNDATION PLAN
3. A1.1 FIRST FLOOR PLAN
4. A1.2 SECOND FLOOR PLAN
5. A2.1 WEST ELEVATION
6. A2.2 SOUTH ELEVATIONS
7. A2.3 EAST ELEVATION
8. A2.4 NORTH ELEVATION
9. A3.1 SECTION

SCALE OF FEET
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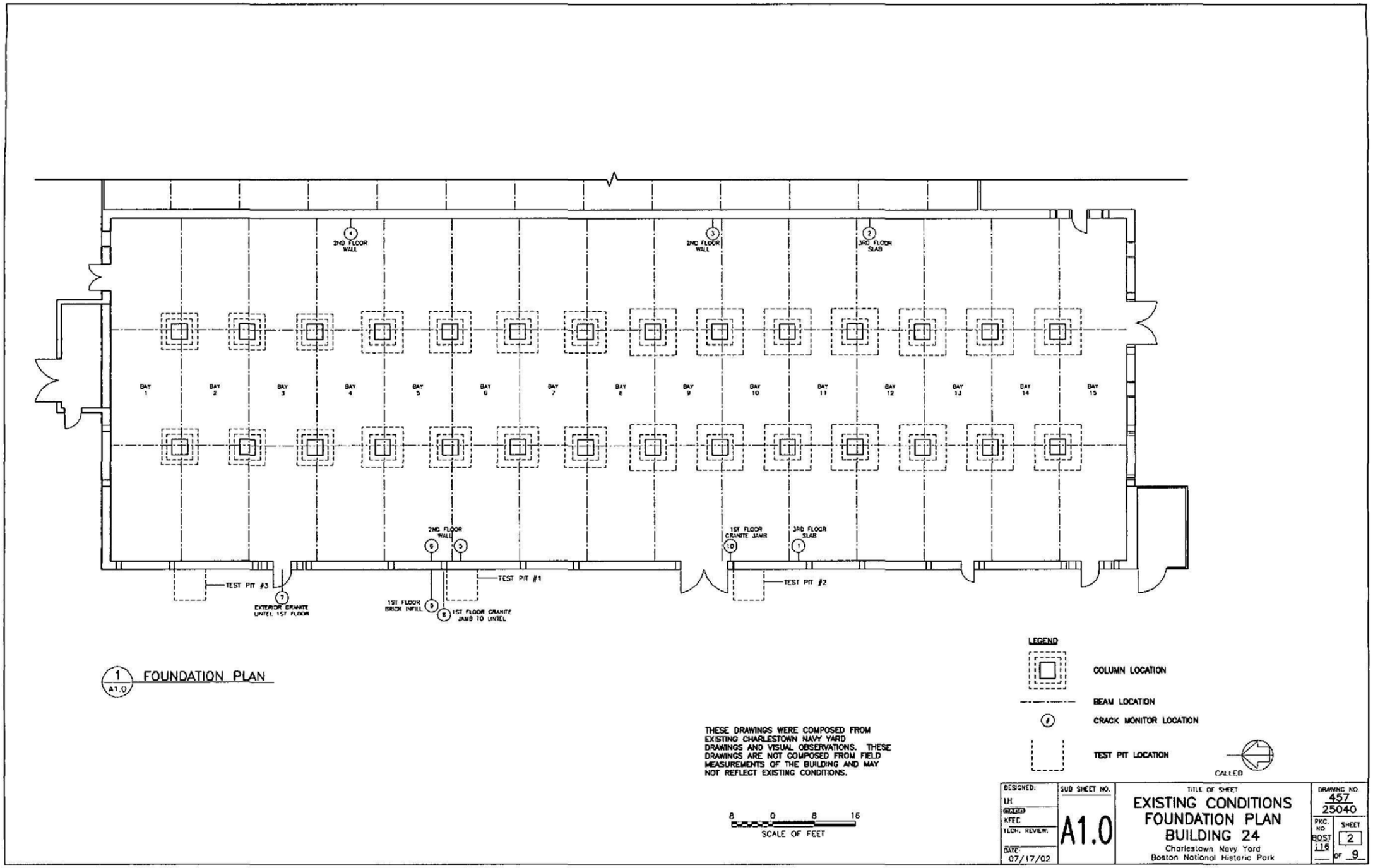
300 0 300
SCALE OF METERS

BOSTON NATIONAL HISTORICAL PARK

1443–CX–2000
BOST–116

	FINAL SCHEMATIC DESIGN UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE DENVER SERVICE CENTER	TITLE OF DRAWING CHARLESTOWN NAVY YARD LOCATION WITHIN PARK BUILDING 24 NAME OF PARK BOSTON NATIONAL HISTORICAL PARK REGION NORTHEAST · COUNTY SUFFOLK · STATE MASSACHUSETTS	DRAWING NO. 457 25040 PKG. NO. 116 119 130 SHEET 1 OF 9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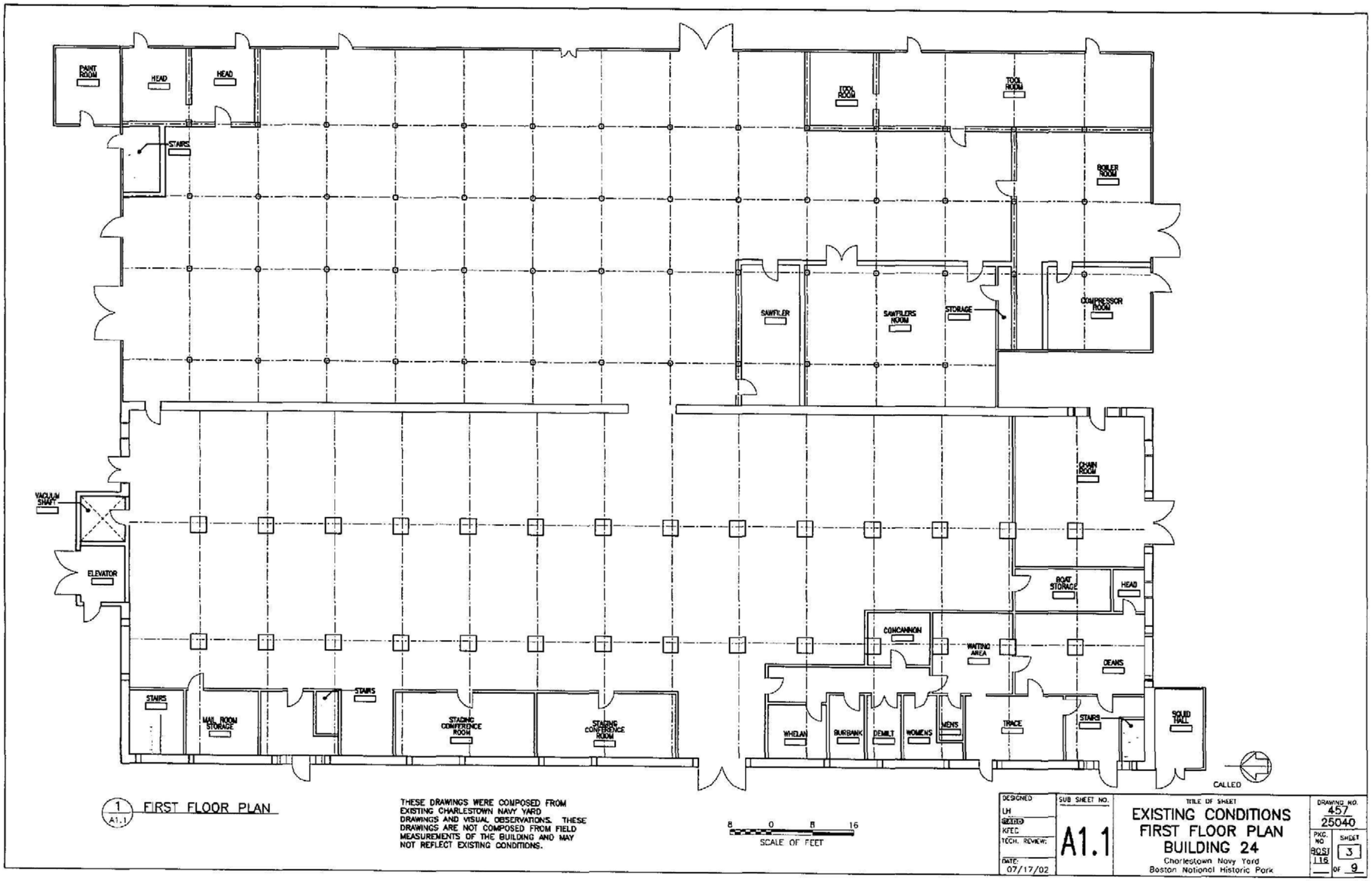
2ND FLOOR WALL
3RD FLOOR SLAB
BAY 1
BAY 2
BAY 3
BAY 4
BAY 5
BAY 6
BAY 7
BAY 8
BAY 9
BAY 10
BAY 11
BAY 12
BAY 13
BAY 14
BAY 15
2ND FLOOR WALL
1ST FLOOR GRANITE JAMB
3RD FLOOR SLAB
TEST PIT #3
EXTERIOR GRANITE LINTEL 1ST FLOOR
1ST FLOOR BRICK INFILL
TEST PIT #1
1ST FLOOR GRANITE JAMB TO LINTEL
TEST PIT #2
LEGEND
COLUMN LOCATION
BEAM LOCATION
CRACK MONITOR LOCATION
TEST PIT LOCATION
CALLED
THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.
8 0 8 16
SCALE OF FEET
1 A1.0 FOUNDATION PLAN
DESIGNED: LH
DRAWN: KFEC
TECH. REVIEW:
DATE: 07/17/02
SUB SHEET NO. A1.0
TITLE OF SHEET
EXISTING CONDITIONS FOUNDATION PLAN BUILDING 24
Charlestown Navy Yard
Boston National Historic Park
DRAWING NO. 457 25040
PKG. NO. BOST 116
SHEET 2 OF 9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HEAD
HEAD
STAIRS
TOOL ROOM
TOOL ROOM
BOILER ROOM
SAWFILER
SAWFILERS ROOM
STORAGE
COMPRESSOR ROOM
CHAIN ROOM
VACUUM SHAFT
ELEVATOR
STAIRS
MAIL ROOM STORAGE
STAIRS
STAGING CONFERENCE ROOM
STAGING CONFERENCE ROOM
WHELAN
BURBANK
DEMLT
WOMENS
MENS
CONCANNON
WAITING AREA
TRACE
BOAT STORAGE
HEAD
DEANS
STAIRS
SQUID TALL
CALLED
1 A1.1 FIRST FLOOR PLAN
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DESIGNED LH
DRAWN KTEC
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DATE: 07/17/02
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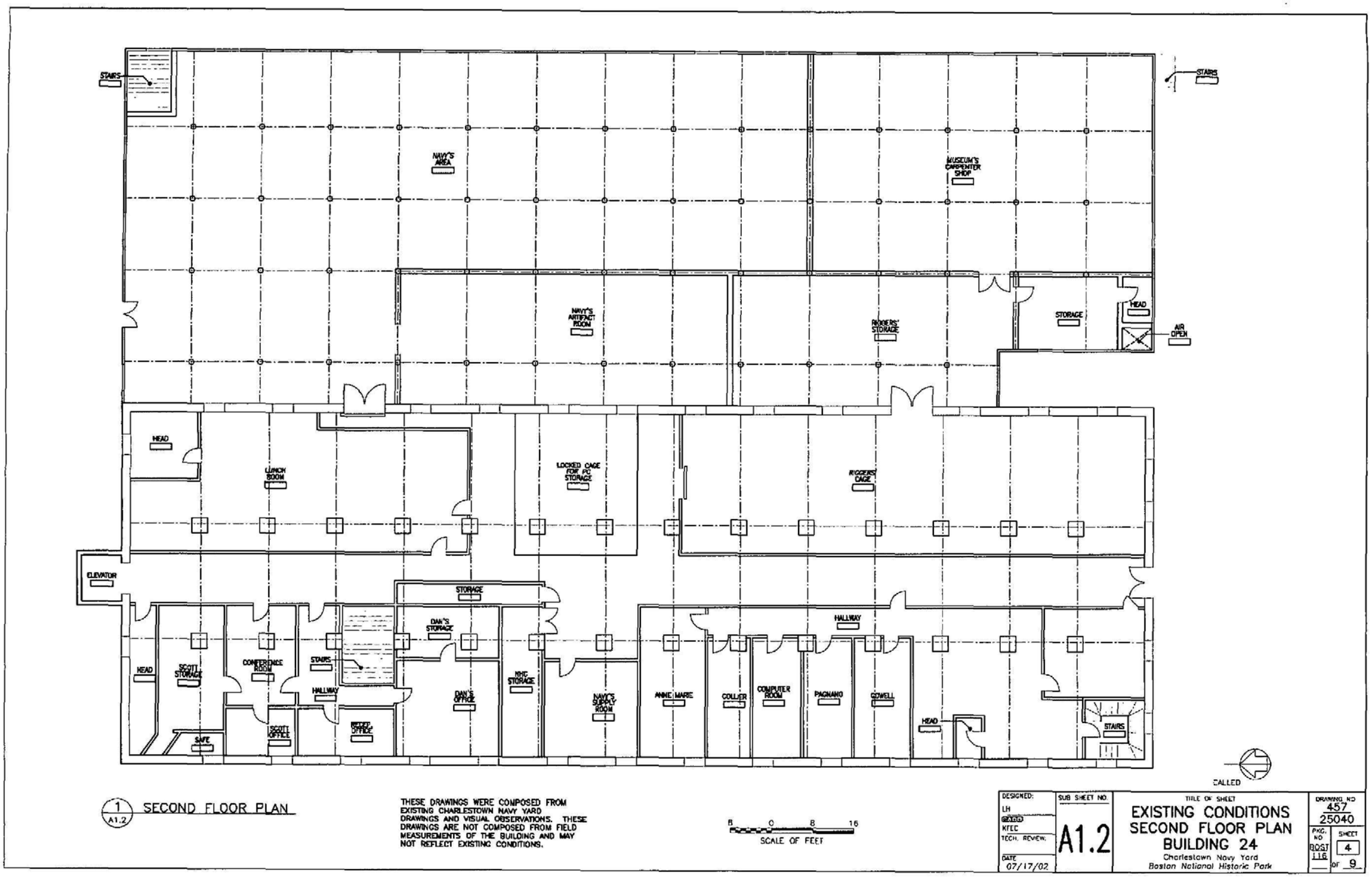
TITLE OF SHEET
EXISTING CONDITIONS
FIRST FLOOR PLAN
BUILDING 24
Charlestown Navy Yard
Boston National Historic Park
DRAWING NO. 457 25040
PKG. NO BOSI 116
SHEET 3 OF 9


STAIRS
NAVY'S AREA
MUSEUM'S CARPENTER SHOP
STAIRS
NAVY'S ARTIFACT ROOM
RIGGERS' STORAGE
STORAGE
HEAD
AIR OPEN
HEAD
LUNCH ROOM
LOCKED CAGE FOR PC STORAGE
RIGGERS' CAGE
ELEVATOR
STORAGE
DAN'S STORAGE
HALLWAY
HEAD
SCOTT STORAGE
CONFERENCE ROOM
STAIRS
HALLWAY
DAN'S OFFICE
NMC STORAGE
NAVY'S SUPPLY ROOM
ANNE MARIE
COLLIER
COMPUTER ROOM
PAGNANO
GOWELL
HEAD
STAIRS
SAFE
SCOTT OFFICE
RIGGS OFFICE
CALLED
1 A1.2 SECOND FLOOR PLAN
THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.
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TECH. REVIEW:
DATE 07/17/02
SUB SHEET NO. A1.2
TITLE OF SHEET
EXISTING CONDITIONS
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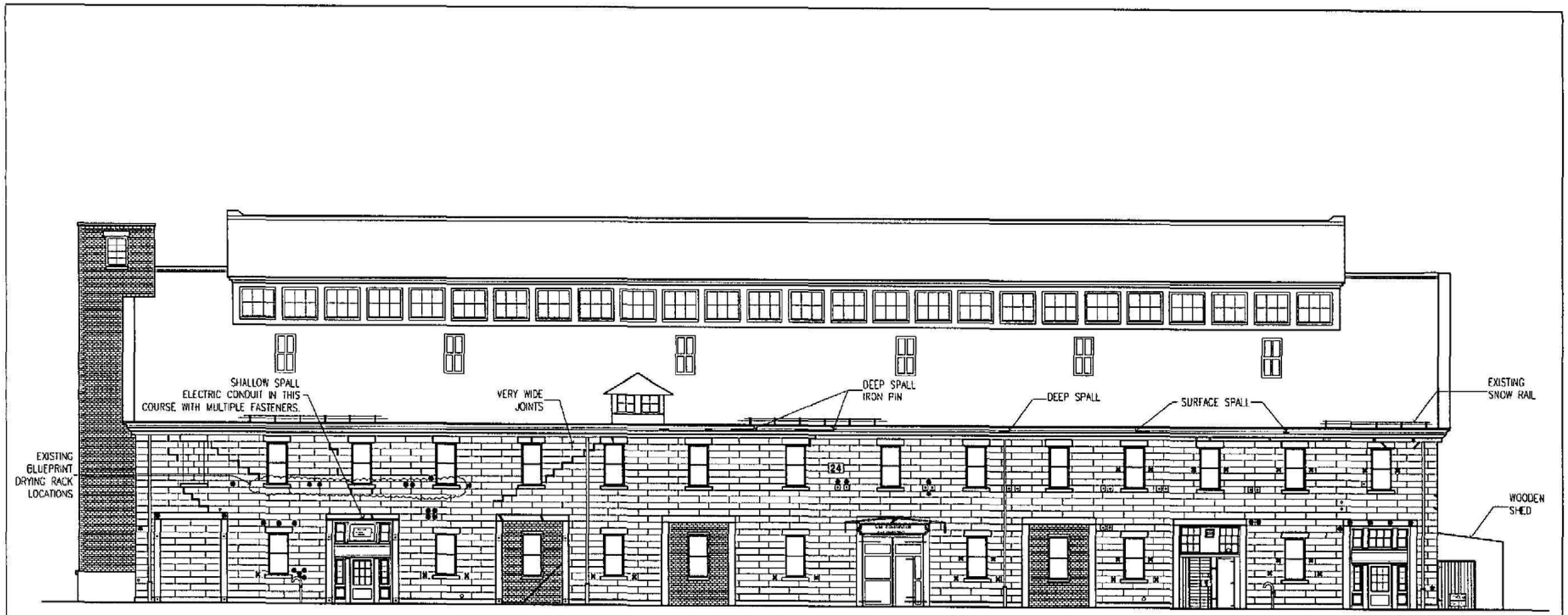
BUILDING 24
Charlestown Navy Yard
Boston National Historic Park
DRAWING NO 457 25040
PKG. NO BOST 116
SHEET 4 of 9



1 / A2.1 WEST ELEVATION

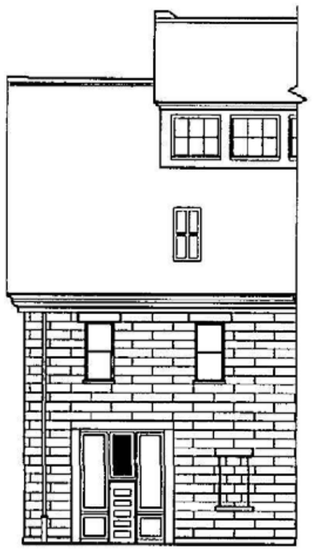
THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.

LEGEND

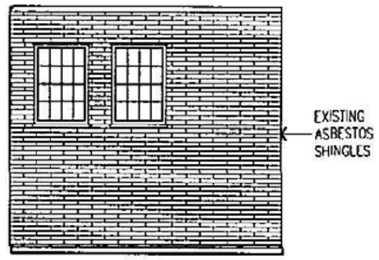
- BRICK
- GRANITE
- SIDING
- DEEP SPALL
- WOODEN SLATS
- PATCHED HOLE
- METAL PLATE
- EYE BOLT
- FASTENER OR BOLT

DESIGNED: LH	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO
CHKD KTEC	A2.1	EXISTING CONDITIONS WEST ELEVATION BUILDING 24 Charlestown Navy Yard Boston National Historic Park	457 25040
TECH. REVIEW.			PKG. NO BOST 116 — SHEET 5 OF 9
DATE 09/10/02			

1 A2.2 SOUTH ELEVATION



2A A2.2 EAST ELEVATION



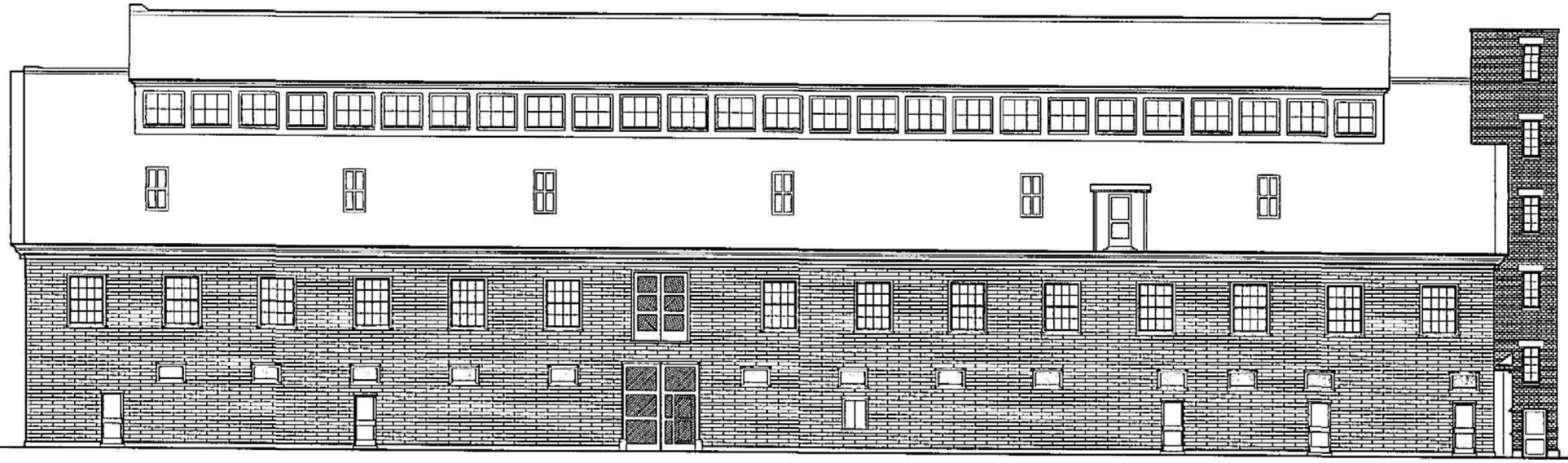
2B A2.2 WEST ELEVATION

THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.

LEGEND

- BRICK
- GRANITE
- SIDING
- DEEP SPALL
- WOODEN SLATS
- PATCHED HOLE
- METAL PLATE
- EYE BOLT
- FASTENER OR BOLT

DESIGNED: LH	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO.
DRAWN: KTEC	A2.2	EXISTING CONDITONS SOUTH ELEVATIONS BUILDING 24 Charlestown Navy Yard Boston National Historic Park	457 / 25040
TECH. REVIEW:			PKG. NO: BOST 116 — SHEET: 6 OF 9
DATE: 09/10/02			



1 / A2.3 EAST ELEVATION

LEGEND

- BRICK
- GRANITE
- SIDING
- DEEP SPALL
- WOODEN SLATS
- PATCHED HOLE
- METAL PLATE
- EYE BOLT
- FASTENER OR BOLT

THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.

DESIGNED: LH	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO
DRAWN: KFEC	A2.3	EXISTING CONDITIONS EAST ELEVATION BUILDING 24 Charlestown Navy Yard Boston National Historic Park	457 25040
TECH. REVIEW:			PKG. NO BOST 116 — SHEET 7 OF 9
DATE: 09/10/02			

1 / A2.4 NORTH ELEVATION

LEGEND

- BRICK
- GRANITE
- SIDING
- DEEP SPALL
- WOODEN SLATS
- PATCHED HOLE
- METAL PLATE
- EYE BOLT
- FASTENER OR BOLT

THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.

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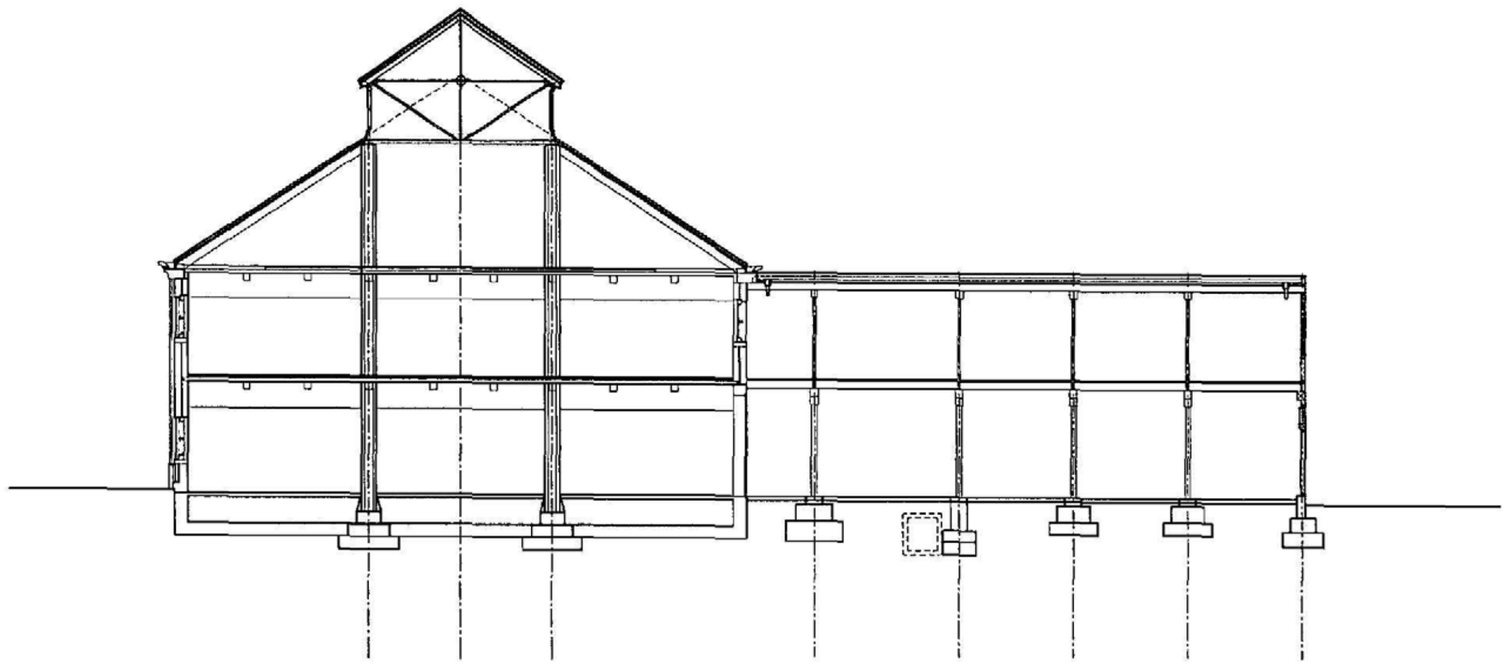
TECH. REVIEW:			PKG. NO NOST 116 — SHEET 8 OF 9
DATE: 09/10/02			



1 / A3.1 SECTION FACING SOUTH

THESE DRAWINGS WERE COMPOSED FROM EXISTING CHARLESTOWN NAVY YARD DRAWINGS AND VISUAL OBSERVATIONS. THESE DRAWINGS ARE NOT COMPOSED FROM FIELD MEASUREMENTS OF THE BUILDING AND MAY NOT REFLECT EXISTING CONDITIONS.

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Appendix E | Hazardous Materials Report

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LIMITED HAZARDOUS BUILDING MATERIAL SURVEY
OF

NATIONAL PARK SERVICE – CHARLESTOWN NAVY YARD
BUILDING 5, BUILDING 24, COMMANDANT'S HOUSE

ATC PROJECT NO. 60.05072.0011

April 30, 2002

Prepared by:

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1. EXECUTIVE SUMMARY

ATC Associates Inc (ATC) of Woburn, Massachusetts was retained by Goody, Clancy & Associates, Inc. of Boston, Massachusetts to perform a limited asbestos-containing material (ACM), lead paint and PCB containing light fixture ballast survey at the Charlestown Navy Yard located in Boston, Massachusetts. The survey was limited to areas and materials that may be impacted by planned renovations. Based on ATC's understanding of the planned renovations, the survey included the following:

- Building 5: First floor interior finishes (demolition, HVAC upgrade), exterior windows
- Building 24: Exterior windows, exterior façade, roofing materials
- Commandant's House: Interior finishes (wall and floor penetrations, HVAC upgrade)

Interior finishes for Building 5 and the Commandant's House included vinyl floor tiles, carpet, and various plaster systems, gypsum board walls, ceiling tiles and wood. Exterior façade finishes for building 24 included cut stone and asbestos-cement shingles. Roofing materials for building 24 include slate shingles with asphaltic sealant/flashing on the pitched roof (west side of building) and built-up bitumen membrane with a gravel cover on the flat roof (east side of building).

1.1 Asbestos Survey

The asbestos survey involved locating, quantifying, and assessing the condition of accessible asbestos-containing materials, using bulk sampling and visual inspection techniques. The survey of the facility was performed by Commonwealth of Massachusetts Department of Labor and Workforce Development (MDLWD) - certified asbestos inspector Kevin Drinan (AI# 32387) April 9 & 10, 2002. The survey consisted of an investigation and sampling of suspect materials in the designated building areas. A total of 120 samples of suspect asbestos-containing materials were collected, with 98 samples analyzed for asbestos content.

ATC's inspector performed both a visual inspection and a representative bulk sampling in the subject areas. Section 3.1 outlines the U.S. Environmental Protection Agency (EPA) guidance document titled, "Guidance for Controlling Asbestos-Containing Materials in Buildings" (Document No. 560/5-85/024) and the sampling techniques required for a comprehensive ACM survey. The findings of this report are based upon representative observations of accessible areas and the number of representative bulk samples that were collected and analyzed. Please reference the bulk sample analytical results from SciLab Boston, Inc., Weymouth, MA included in Appendix A.

Table 1, found in Section 3.3, contains the detailed findings of the inspection, including location, type of asbestos-containing materials (ACM), current condition and the estimated quantity of each ACM for the selected areas of the Subject Site. Asbestos was identified in multiple types of building materials and components, including the following:

Building 5

- 9" x 9" Tan and Brown (Checkerboard) Floor Tile
- 9" x 9" Floor Tile Under Tan/Brown Tiles
- 9" x 9" Floor Tile (Black)
- 12" x 12" Floor Tile (Brown)
- Floor Tile Under 12" x 12" (Grey) Floor Tiles
- Ceramic Wall Tile Mastic (Cold Storage Rooms)
- Asbestos-Cement Panels at Lighted Display Cases
- Asbestos Cement Board at Structural Beam Enclosure
- Interior Window Glazing Compound
- Exterior Window Frame Caulking
- Pipe Insulation, Block Insulation (Assumed)
- Pipe Insulation, Layered Paper
- Pipe Fitting Insulation, Layered Paper Insulated Pipes (Note: Fitting Insulation on Fiberglass Insulated Pipe Not Asbestos-Containing)

Building 24

- Roof – Flat Roof Main Field
- Roof – Flat Roof Flashing
- Roof – Flat Roof Flashing Sealant
- Roof – Slate Roof Sealant
- Roof – Slate Roof Flashing
- Siding – Asbestos-Cement Shingles

Commandants's House

- Pipe Insulation
- 9" x 9" Floor Tiles (Grey) & Associated Mastic
- 12" x 12" Floor Tiles (Grey) & Associated Mastic

Recommendations based on the inspection and bulk-sampling results are discussed in Section 3.5.

ATC has also prepared cost estimates, found in Section 3.7, for the removal of identified asbestos-containing materials. The estimated total cost for the removal of all identified asbestos-containing materials is approximately **$123,350**. The costs associated with hidden materials that may be present in the project area will be approximately 10% of the total estimated cost range. Additional costs will be incurred for project oversight, including final visual inspection by a Massachusetts Department of Labor and Workforce Development (MDLWD) licensed Project Monitor.

1.2 Lead Survey

In Section 4.0, the findings of the Lead Paint Determination are discussed. On April 9 of 2002, ATC performed representative lead paint testing of all accessible areas of the Subject Site. Mr. Harold Springer, performed the testing with NITON X-ray Fluorescence (XRF) Lead Paint Analyzer.

Lead paint was detected on the representative painted wood, plaster and metal surfaces tested throughout the buildings. Table III, found in Section 4.2, contains the results of the testing, including location, building component, substrate, color, and the XRF reading for each component tested within the buildings.

Consequently, all work performed in the buildings that will disturb these surfaces must comply with OSHA standard 29 CFR 1926.62 for worker protection. Additional requirements include disposal of waste material in compliance with EPA and MA DEP requirements. ATC recommends that waste classification of the components that may be scheduled for removal or demolition, be performed during the design and development phase to properly estimate disposal costs. A more detailed discussion of the waste classification, regulatory implications, and general recommendations based on the lead paint inspection results are discussed in Sections 4.3, 4.4 and 4.5.

The estimated costs associated with renovations/demolition on components coated with lead paint should not exceed 10 % above the cost for planned renovation. This cost includes contractor record-keeping requirements, personal protection of workers, and possible isolation of the work area to comply with the OSHA Lead Standard (29 CFR 1926.62), DLWD 454 CMR 22.11 and hazardous waste disposal if required.

1.3 PCB Survey

ATC employee, Mr. Kevin Drinan conducted a limited investigation for the presence of PCB-Containing light ballasts within the interior of Building 5, first floor. ATC identified approximately 95 PCB-containing light ballasts within the subject area. The estimated cost for the disposal of PCB-containing ballasts within the first floor of Building 5 is **$1,400.00.** The inspection and results are discussed in Section 5.0.

1.4 Limitations

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with customary principles and practices in the field of environmental science and engineering. This statement is in lieu of other statements either expressed or implied. This report does not warrant against future operations or conditions, nor does it warrant against operations or conditions present of a type or at a location not investigated.

Environmental evaluations are limited in the sense that conclusions and recommendations are developed from personal interviews and information obtained from limited research and secondary sources. Except as set forth in this report, ATC has made no independent investigations as to the accuracy or completeness of the information derived from the secondary sources and personal interviews and has assumed that such information was accurate and complete.

This report is intended for the sole use of Goody, Clancy & Associates, Inc. and National Park Service. The scope of services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users, and use or re-use of this document or the findings, conclusions, or recommendations, is at risk of said user.

2.0 CERTIFICATION OF RESULTS

This report has been prepared for the exclusive use of Goody, Clancy & Associates, Inc. and National Park Service. Photocopying of this document by parties other than those designated by Goody, Clancy & Associates, Inc. or National Park Service, or use of this document for purposes other than it's intended use, is prohibited.

Respectfully submitted this 30th day of April, 2002

ATC Associates Inc.

Kevin F. Drinan
Project Manager

Doug Rader
Division Manager,. Building Sciences

3.0 ASBESTOS-CONTAINING BUILDING MATERIALS SURVEY

3.1 Sampling Methodology

The survey was performed by an EPA-accredited and Massachusetts licensed asbestos inspector. ATC conducted a limited representative inspection of selected areas of Building 5, Building 24, and the Commandants House at the Charlestown Navy Yard. Limited exploratory demolition was not performed as part of the survey. Efforts were made to identify multiple layers of flooring systems, as well as any suspect materials located within wall chases, plenum chases, and plumbing chases.

ATC collected representative bulk samples of all identified suspect asbestos-containing materials. In an attempt to reduce the number of samples collected and analyzed, ATC did not analyze samples after a sample from a specific homogenous material indicated that a sample contains greater than 1% or greater asbestos (1st Positive) for all materials. Except where noted herein, sampling was conducted according to the U.S. Environmental Protection Agency (EPA) guidance document titled, "Guidance for Controlling Asbestos-Containing Materials in Buildings" (Document No. 560/5-85/024).

Suspect asbestos-containing building materials exist in the form of surfacing, miscellaneous materials and thermal insulation.

The following illustrates the sampling strategy employed by ATC:

(a) Surfacing materials - In a randomly distributed manner, collect bulk samples of surfacing materials, representative of each homogeneous area, and not assumed to be ACM.

- (1) Collect at least three bulk samples from each homogeneous area that is less than or equal to 1,000 ft².
- (2) Collect at least five bulk samples from each homogeneous area that is greater than 1,000 ft², but less than or equal to 5,000 ft².
- (3) Collect at least seven bulk samples from each homogeneous area that is greater than 5,000 ft².

(b) Thermal systems insulation.

- (1) In a randomly distributed manner, collect at a minimum, three (3) bulk samples of thermal systems insulation material, representative of each homogeneous area, and not assumed to be ACM.
- (2) Collect, at a minimum, one (1) bulk sample of patched thermal systems insulation, representative of each homogenous area, and not assumed to be ACM, providing the section of patch was less than 6 linear or square feet.
- (3) Collect, at a minimum, three (3) representative bulk samples of each insulated mechanical system not assumed to be ACM, including, but not limited to cementitious material used on pipe fittings such as tees, elbows, or valves. Representative sampling was conducted in a manner sufficient as to identify whether each homogenous area is either asbestos or non-asbestos containing.
- (4) Bulk samples are not required to be collected from any homogeneous area where the accredited asbestos inspector has determined that the thermal systems insulation is a non-suspect material (i.e., fiberglass, foam glass, rubber, or any other non-ACM).

(c) Miscellaneous materials - Collect, at a minimum, one (1) representative bulk samples of each miscellaneous material not assumed to be ACM, including, but not limited to ceiling tiles, floor tiles, associated floor tile mastic, etc. Representative sampling was conducted in a manner sufficient as to identify whether each homogenous area is either asbestos or non-asbestos containing.

For the purpose of this report, ATC has classified the asbestos-containing materials as being in either Good, Fair or Poor condition. The following are the general definitions of each category:

- Good Condition – Any material which is intact with no noticeable damage
- Fair Condition – Any material with a small amount of overall or localized damage (generally less than 10% of the entire area).
- Poor Condition – Any material with a large amount of damage (generally greater than 10% of the entire surface area).

3.2 Review of Existing Documents

No documents or previous reports relative to asbestos-containing materials were provided.

3.3 Asbestos-Containing Building Materials

The following is a listing of all *suspect* asbestos-containing materials identified and bulk sampled by ATC.

Building 5

- 9" x 9" Tan and Brown (Checkerboard) Floor Tile and Associated Mastic (Main Hall)
- 9" x 9" Floor Tile Under Tan/Brown Tiles and Associated Mastic (Main Hall)
- 9" x 9" Floor Tile (Black) and Associated Mastic (West Mechanical Room)
- 12" x 12" Floor Tile (Brown) and Associated Mastic (West Mechanical Room)
- 12" x 12" Floor Tile (Grey) and Associated Mastic (Lounge Serving Area)
- Floor Tile Under 12" x 12" (Grey) Floor Tiles
- Floor Leveling Compound
- 2' x 2' Ceiling Tiles
- 2' x 4' Ceiling Tiles
- 1' x 1' Ceiling Tiles (Concealed Spline)
- 1' x 1' Ceiling Tiles (Glued)
- Glue Daubs for 1' x 1' Ceiling Tiles
- "Old" Interior Window Glazing Compound
- "New" Interior Window Glazing Compound
- Asbestos-Cement Panels at Lighted Display Cases
- Asbestos Cement Board at Structural Beam Enclosure
- Pipe Insulation, Block Insulation (Assumed)
- Pipe Insulation, Layered Paper
- Pipe Fitting Insulation, with Layered PAper
- Pipe Fitting Insulation, Fiberglass Insulated Pipes
- Plaster – Skim Coat (Cold Storage Rooms)
- Plaster – Base Coat (Cold Storage Rooms)
- Plaster – Skim Coat (Throughout)
- Plaster – Base Coat (Throughout)
- Ceramic Tile Mastic (Cold Storage Rooms)
- Carpet Mastic
- Exterior Window Frame Caulking
- Exterior Window Glazing Compound

Building 24

- Roof – Flat Roof Main Field
- Roof – Flat Roof Flashing
- Roof – Flat Roof Flashing Sealant
- Vapor Barrier (Red Paper) Under Slate Shingles
- Exterior Window Frame Caulking
- Roof – Slate Roof Sealant
- Roof – Slate Roof Flashing
- Siding – Asbestos-Cement Shingles
- Black Vapor Barrier Under Asbestos Cement Shingles
- Exterior Window Glazing Compound

Commandants's House

- Pipe Insulation
- 9" x 9" Floor Tiles (Grey) & Associated Mastic
- 12" x 12" Floor Tiles (Grey) & Associated Mastic
- Plaster

The following is a listing of those materials identified or assumed to be asbestos-containing:

Building 5

- 9" x 9" Tan and Brown (Checkerboard) Floor Tile
- 9" x 9" Floor Tile Under Tan/Brown Tiles
- 9" x 9" Floor Tile (Black)
- 12" x 12" Floor Tile (Brown)
- Floor Tile Under 12" x 12" (Grey) Floor Tiles
- Ceramic Wall Tile Mastic (Cold Storage Rooms)
- Asbestos-Cement Panels at Lighted Display Cases
- Asbestos Cement Board at Structural Beam Enclosure
- Interior Window Glazing Compound
- Exterior Window Frame Caulking
- Pipe Insulation, Block Insulation (Assumed)
- Pipe Insulation, Layered Paper
- Pipe Fitting Insulation, Layered Paper Insulated Pipes (Note: Fitting Insulation on Fiberglass Insulated Pipe Not Asbestos-Containing)

Building 24

- Roof – Flat Roof Main Field
- Roof – Flat Roof Flashing
- Roof – Flat Roof Flashing Sealant
- Roof – Slate Roof Sealant
- Roof – Slate Roof Flashing
- Siding – Asbestos-Cement Shingles

Commandants's House

- Pipe Insulation
- 9" x 9" Floor Tiles (Grey) & Associated Mastic
- 12" x 12" Floor Tiles (Grey) & Associated Mastic

The following table provides the material location, estimated quantity, and general condition of the above-identified asbestos-containing and asbestos-contaminated materials at the Subject Site:

TABLE I

Asbestos-Containing Building Materials
Charlestown Navy Yard – Boston, Massachusetts

Building 5, First Floor			
Main Hall -Behind South Finish Wall	Pipe Insulation – Pipe Ø 3" or less (including fittings) (3' of debris on ceiling at side entrance door)	60 LF	Fair
Main Hall – Behind North and South Finish Wall	Asbestos Cement Composite Panels (2" thick panels)	450 SF	Good
Main Hall & Lounge - Throughout	9" x 9" Floor Tiles, Two Layers, Including Under Carpet and Under 12" x 12" Floor Tiles.	4,800 SF	Good
Kitchen	Asbestos Cement Board, Structural Beam Enclosure	200 SF	Good
	Pipe Insulation – Pipe Ø 3" or less (including fittings)	100LF	Fair
Cold Storage	Ceramic Wall Tile Mastic on Plaster Walls	700 SF	Fair
	Pipe Insulation Assumed Above Ceiling	50 LF	
West Mechanical Room	Pipe Insulation – Pipe Ø 3" or less (including fittings)	30 LF	Fair
	Pipe Insulation – Pipe Ø 4" – 8" (including fittings), Quantity Assumed, portion concealed above cold storage.	50 LF	Fair
	9" x 9" Floor Tiles	30 SF	Poor
	12" x 12" Floor Tiles	200 SF	Poor
Perimeter Window – First Floor	Window Glazing Compound (Windows Approximately 3' wide x 6' high)	38 EA	Good
	Window Frame Caulking	700 LF	Good
Building 24			
Flat Roof	Main Roof Field	10,000 SF	Good
	Flashing and Sealant	2,000 SF	Good
Slate Shingle Roof	Shingles with Asphaltic Sealant (assume 20% of Roof)	3,500 SF	Good
	Flashing Around Skylights	500 SF	Good
	Asbestos Cement Shingles (Dormer)	150 SF	Good
East Section. Roof – Exterior	Asbestos Cement Shingles	10,000 SF	Fair
Commandant's House			
Attic	Pipe Insulation – Pipe Ø 3" or less (including fittings)	120 LF	Fair
South Side Pipe Chase (Assumed)	Pipe Insulation – Pipe Ø 3" or less (including fittings)	60 LF	
Ground Floor – NEMA Offices	Pipe Insulation – Pipe Ø 3" or less (including fittings)	200 LF	Good
	12' x 12' Floor Tile and Mastic	320 SF	Good
	9' x 9' Floor Tile and Mastic	150 SF	Good
Ground Floor – janitorial Storage and Coatroom (west Entrance)	Pipe Insulation – Pipe Ø 3" or less (including fittings)	50 LF	Good
Exterior – Third Floor South Balcony	Pipe Insulation – Pipe Ø 3" or less (including fittings)	20 LF	Good
Exterior – Ground Level, South Portico	Pipe Insulation – Pipe Ø 3" or less (including fittings)	50 LF	Good

Due to the non-destructive nature of the asbestos survey ATC did not fully inspect all buildings and spaces (e.g. behind wall façades; interior wall chases; areas above fixed ceilings; inaccessible mechanical areas; etc) and equipment (e.g. inside boilers, generators etc.). ATC has provided estimated quantities for identified asbestos containing materials.

Bulk samples of suspect materials were analyzed by SciLab Boston using the approved polarized light microscopy with dispersion staining (PLM/DS) method. By using the PLM/DS method, a trained microscopist is able to identify and distinguish between asbestos group minerals and other fibrous materials such as cellulose (paper), mineral (rock), wood, or glass fiber. The quantity of each of these substances is estimated on a weight basis and recorded as a percent. Only the asbestos content, if any, is recorded in the bulk sample Report of Analysis (Appendix A). If a material contains greater than 1% asbestos, it is considered to be asbestos-containing material.

SciLab Boston, Inc. (SciLab) is an accredited laboratory by the EPA for "Interim Asbestos Bulk Sample Analysis Quality Assurance Program". SciLab also accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). The PLM/DS analytical method is modeled after 40 CFR Part 763, Subpart F, Appendix A: "Interim Method for the Determination of Asbestos in Bulk Insulation Samples".

3.4 Consideration for Hidden Materials

ATC evaluated areas that were reasonably accessible at the time of the survey, in all building areas associated with the planned renovation work. ATC's survey scope of work did not include performing exploratory demolition to access potential hidden asbestos. It is ATC's professional opinion that hidden pipe and pipe fitting insulation may be found in areas behind walls, above permanent and fixed ceilings or in chases. Ceramic wall and floor tile mastics and concealed floor leveling compound. may also be present All suspect insulation, uncovered during future demolition activities, not readily identified as glass fiber insulation, should be assumed to be asbestos-containing, unless future bulk sampling reveals otherwise. Additionally, equipment associated with power and heat generation (e.g. generators, incinerator, boilers, exhaust stacks) may have internal components that contain asbestos. Buildings with wood floors, similar to the Commandant's House, often have a paper material below the wood floor. The paper material may contain asbestos. If this material is encountered it should be considered to contain asbestos until sampled and determined otherwise. ATC notes that there are building areas that contain ACM that were not included in ATC's scope of work.

3.5 Recommendations

Developing and implementing an effective strategy to deal with ACM requires an evaluation of such factors as the amount, specific type, location, current condition and the potential for asbestos fiber release from each type of ACM. The potential for asbestos fiber release depends on the following factors:

- Each material's friability (i.e., ability to be reduced by hand pressure)
- The amount of exposed surface area or condition type
- The amount of disturbance that each ACM will be subjected to

Once all these factors have been assessed, one of the following methods of ACM control can be recommended:

1. *Removal:* The physical process of permanently removing ACM from surfaces or substrates within the building.
2. *Encapsulation:* The application of a coating or liquid sealant to ACM to reduce the tendency of the material to release fibers.
3. *Enclosure:* The covering or wrapping of friable ACM in, under or behind airtight barriers.

4. *O & M Program:* A plan consisting of policies and procedures describing specific actions applicable to the prevention of asbestos fiber release by minimizing disturbance or damage to ACM and establishing long term surveillance of the facility with regard to renovation, maintenance, cleaning and general observations.

The information and recommendations present in this report are intended to provide guidelines for dealing with the surveyed areas containing ACM. These recommendations reflect requirements, guidelines and practices established by regulatory agencies on the federal, state and local levels.

Specific Recommendations

In its current state, all non-friable asbestos-containing materials (i.e., roofing materials, floor tile and associated mastic; window caulking and glazing; flashing caulk; asbestos-cement panels and shingles, etc) do not pose an immediate health risk in their current condition. Some of the siding shingles have come loose and fallen to the ground. This debris should be collected and disposed of as asbestos-waste. Cutting, abrading, drilling or breaking these asbestos-containing materials is prohibited. The friable asbestos-containing material (i.e., pipe and pipe fitting insulation), where present and intact, may pose a health risk if disturbed or impacted by maintenance or renovation/demolition activities. Due to the potential health hazard, ATC recommends the removal and proper disposal of identified ACM that may be damaged or impacted by renovation or demolition activities, by a Massachusetts DLWD-licensed asbestos abatement contractor.

General Recommendations

ATC does not recommend the removal of any ACM identified to be in good conditions in areas surveyed, based on the current condition of these materials at the time of the survey. Removal of asbestos-containing materials in good condition are required only prior to disturbance. ATC recommends that all areas and materials noted in poor condition should be properly decontaminated or abated in a timely manner.

An asbestos abatement contractor is required to follow the requirements outlined in Massachusetts State and Federal regulations regarding asbestos, however ATC recommends *the development of a project specification and the use of* project oversight to ensure compliance with all applicable regulations as well as protect the interest of the Owner and its employees. The project specification shall reference those regulations pertinent to this project, including those work procedures that shall be followed by all asbestos personnel specific to this project. The project oversight provides the Owner with onsite technical expertise during all phases of the abatement work. Tasks performed during project oversight should include periodic work inspections to ensure that all procedures employed by the abatement contractor are acceptable, and air monitoring around each work area to detect elevated asbestos fiber levels. The project oversight provides a constant management of the abatement project to ensure that all asbestos-containing materials are removed in accordance with all applicable regulations and to prevent an asbestos fiber release. These additional services can be provided by ATC upon request.

Additionally, it is the recommendation of ATC that if a suspect material has not been positively identified, but is similar in mode of occurrence or physical properties as other identified asbestos-containing materials, it should be considered asbestos containing. Only through further sampling and analysis can a suspect material be identified as non-asbestos.

The information and recommendations present in this report are intended to provide guidelines for dealing with the surveyed areas containing asbestos materials. *These recommendations reflect requirements, guidelines* and practices established by regulatory agencies on the federal, state and local levels.

3.6 Additional Sampling Recommendations

In the interest of minimizing damage to wall finishes in the Commandants House, ATC only collected five samples of plaster, which indicated that the plaster is not an asbestos-containing material. EPA regulations require that seven samples of this material be collected to demonstrate that it is a non-asbestos material. ATC recommends that additional sampling be conducted before impacting the material. Specific locations for sampling can be determined during the design phase of the project.

ATC recommends that other suspect materials that were either not included in the scope of work or hidden materials that may possibly be uncovered by exploratory demolition (e.g. ceramic wall and floor tile mastics, floor leveling compound, vapor barrier, pipe chases), should be identified and sampled prior to any renovation work. These suspect materials should be assumed asbestos-containing until future sampling proves otherwise.

It is also the recommendation of ATC that if an accessible suspect material has not been positively identified or inadvertently missed by ATC, but is similar in mode of occurrence or physical properties as other identified asbestos-containing materials, it should be considered asbestos-containing. Only through further sampling and analysis should a suspect material be identified as non-asbestos.

3.7 Cost Estimates

The costs associated with the abatement of asbestos-containing materials are based upon current Department of Labor and Workforce Development and OSHA standards and requirements. ATC estimates the cost for the removal and disposal of all identified asbestos-containing materials to be approximately **$123,350**. Additional costs will be incurred if future bulk sampling reveals uncovered hidden materials (e.g. vapor barrier, pipe insulation, roofing components) to contain asbestos. The additional costs associated with the removal of hidden materials found to contain asbestos will be substantially higher than the initial cost estimate and may cause significant time delays or extend the time line of a project. Please refer to the table below for the breakdown of costs.

TABLE II - COST ESTIMATES
Identified Asbestos Containing Materials

Asbestos Containing Material	Estimated Quantity	Estimated Removal Cost
Building 5 – First Floor		
Pipe Insulation	290 LF	$4,350.00
Floor Tiles (two layers)	4,800 SF	$14,400.00
Floor Tiles (one layer)	230 SF	$500.00
Asbestos Cement Composite Panels (2" thick Panels)	450 SF	$2,700.00
Asbestos Cement Board	200 SF	$800.00
Ceramic Wall Tile Mastic (Cold Storage Rooms	700 SF	$7,000
Window Glazing Compound (each window)	38 EA	$3,000
Window Frame Caulk	700 LF	$3,500
Sub Total – Building 5		**$36,250**
Building 24		
Asbestos-Cement Siding Shingles	10,150 SF	$40,600
Built-up Bitumen Membrane Roof & Flashing	12,000 SF	$24,000
Slate Roof – Skylight Flashing	500 SF	$2,000
Slate Roof – Dispose Shingles with Sealant (incremental cost over shingles without sealant)	3,500 SF	$3,500
Sub Total – Building 24		**$70,100**
Commandant's House		
Pipe Insulation – Attic	120 LF	$2,500
Pipe Insulation – Ground Floor	250 LF	$3,000
Pipe Insulation – Exterior	70 LF	$10,000
Floor Tiles and Mastic	470 SF	$1,500
Sub Total – Commandants House		**$17,000**
Total Approximated Cost Estimate		**$123,350**

Additional costs will be incurred for additional sampling, project design, project management and air monitoring, including final visual inspection by a Massachusetts Department of Labor and Workforce Development (MDLWD) licensed Project Monitor.

4.0 LEAD PAINT DETERMINATION

4.1 Sampling Methodology

ATC performed a lead paint determination on representative surfaces that may be impacted by planned renovations. The primary method of determining the lead content on the painted surfaces throughout the building was by X-ray Fluorescence (XRF) Analysis. ATC utilized a Niton Lead Paint Analyzer for this survey. Mr. Michael McCarter, who is trained by Niton in safety measures and use of the instrument, performed the survey.

At this time, there are no federal or state regulations that specifically identify testing procedures via XRF in non-residential buildings. ATC followed the manufacturer's testing methodology for procedures.

The Occupational Safety and Health Administration (OSHA) requires employers to determine an employee's exposure to airborne concentration of lead while impacting surfaces coated with lead-containing paints and requires that the contractors and their employees adhere to the OSHA Lead-in-Construction standard found at 29 CFR 1926.62. OSHA defines a lead containing surface coating as any paint or coating that contains detectable lead. Although XRF measuring techniques are a quick and useful tool for quantifying the lead content of paint, OSHA does not recognize XRF negative results as a means of demonstrating that a paint or coating does not contain lead. OSHA requires that follow-up laboratory analytical techniques be utilized to demonstrate that a paint does not contain lead.

4.2 Summary of Findings

The following table is a listing of representative surfaces tested throughout the building.

TABLE III - COMPONENTS TESTED VIA XRF

Location	Component	Substrate	Color	XRF Result (mg/cm²)
Building 5 – First Floor				
Foyer	Walls	Wood	Light Blue	0.6
	Baseboard	Wood	Light Blue	2.3
	Entry Door Casing	Wood	Light Blue	1.8
Entry Lobby	Door Casing	Wood	Light Blue	0.2
	Lobby Door Casing	Wood	Light Blue	0.3
	Walls	Wood	Light Blue	-0.1
	Baseboard	Wood	Light Blue	-0.3
	Crown Molding	Wood	Light Blue	0.6
Storage Closet at Lobby	Ceiling	Wood	Green	-0.2
	Walls	Paneling	Brown	0.0
	Baseboard	Wood	Green	0.0
Men's Room	Door	Wood	Light Blue	-0.3
	Door Casing	Wood	Light Blue	0.0
	Door Jamb	Wood	Light Blue	0.3
	Door Jamb	Wood	White	0.0
	Stall	Metal	Gray	0.1
	Window Sash	Wood	Gray	-0.3
	Window Sill	Wood	Gray	-0.1
	Stops	Wood	Gray	-0.2
	Pipe	Paneling	Gray	0.6

Location	Component	Substrate	Color	XRF Result (mg/cm²)
	Upper Walls	Plaster	Blue	0.3
	Ceiling	Sheet Rock	Blue	0.3
	Ceiling	Plaster	Blue	0.3
	Window Sash	Wood	Gray	>9.9
	Window Sill	Wood	Gray	2.3
	Stops	Wood	Gray	0.2
Ladies Room	Window Sash	Wood	White	>9.9
	Window Sill	Wood	White	1.6
	Stops	Wood	White	6.2
	Baseboard	Wood	White	1.3
	Walls	Plaster	White	0.6
	Doors	Wood	White	-0.3
	Door Casing	Wood	White	1.5
	Door Jamb	Wood	White	1.1
	Ceiling	Plaster	White	0.3
	Storage Door	Wood	White	-0.1
	H.P. Door	Wood	White	-0.1
	Door Casing	Wood	White	-0.0
	Door Jamb	Wood	White	-0.2
	Upper Walls	Plaster	Blue/Gray	1.2
	Ceiling	Plaster	Blue/Gray	-0.1
	Heat Pipe	Metal	Blue/Gray	1.6
	Stall	Metal	Gray	-0.0
	Ceiling	Plaster	White	-0.3
Stairs Off Lobby	Walls	Wood	Light Blue	0.5
	Baseboard	Wood	Light Blue	-0.2
	Crown Molding	Wood	Light Blue	0.3
	Door	Wood	Light Blue	-0.2
	Door Casing	Wood	Light Blue	0.2
Lounge Area	Door Casing	Wood	Brown	1.6
	Door Jamb	Wood	Brown	1.2
	Upper Walls	Wood	Brown	1.8
	Lower Walls	Wood	Brown	1.5
	Chair rail	Wood	Brown	0.3
	Storage Door	Wood	Brown	0.2
	Sliding Door	Wood	Brown	0.3
	Baseboard	Wood	Black	-0.0
	Light Frame	Wood	Black	0.2
	Store Room Door	Wood	Brown	-0.1
	Door Casing	Wood	Brown	-0.2
	Door Jamb	Wood	Brown	0.0
	Walls	Wood	Green	-0.2
	Walls	Plaster	Green	0.3

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Location	Component	Substrate	Color	XRF Result (mg/cm²)
Corridor	Walls	Wood	Brown	0.5
	Window Sash	Wood	Brown	0.3
	Window Sill	Wood	Brown	0.4
	Window Casing	Wood	Brown	0.5
	Baseboard	Wood	Black	-0.1
	Structural Column	Wood	Brown	-0.1
	Balusters	Wood	Brown	0.2
	Railing Cap	Wood	Brown	0.1
Main Dinning Hall	Walls	Wood	Natural	-0.1
	Baseboard	Wood	Black	0.0
	Walls	Sheet Rock	White	-0.2
	Structural Column	Wood	Natural	0.2
	Storage Door	Wood	Brown	0.5
	Window Sash	Wood	White	0.2
	Window Casing	Wood	White	9.3
	Walls	Brick	Yellow	>9.9
Kitchen	Upper Walls	Brick	White	-0.3
	Upper Walls	Plaster	White	0.0
	Door	Metal	Gray	0.0
	Door Frame	Metal	Gray	0.1
Water Supply Room	Walls	Concrete	Cream	1.0
	Walls	Brick	Cream	1.3
	Dumb Waiter Walls	Sheet Rock	Cream	-0.1
Bathroom	Ceiling	Plaster	Cream	-0.2
Sprinkler Room	Lower Walls	Concrete	Cream	0.2
	Upper Walls	Brick	Cream	0.5
Exterior	Entrance Door Casing	Wood	White	>9.9
	Door Jamb	Wood	White	7.6
	Dormer	Wood	White	>9.9
	Window Sash	Wood	White	>9.9
	Window Casing	Wood	White	>9.9
	Window Sill	Wood	White	2.9
	Electrical Panel	Wood	White	0.2
	Window Sill	Metal	White	6.1
	Door	Wood	White	4.3
	Door Casing	Wood	White	5.0
	Brick Molding	Wood	White	4.6
	Sprinkler Room Door	Wood	Gray	6.9
	Door Casing	Wood	Gray	3.5
	Vent Pipe	Metal	Red	>9.6
Building 24				
Interior	Structural Columns	Concrete	Green	1.6
	Walls	Brick	Green	8.3

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Location	Component	Substrate	Color	XRF Result (mg/cm²)
	Garage Door Entrance Wall	Concrete	Green	2.6
	Garage Door Entrance Wall	Brick	Green	8.6
Exterior	Door	Wood	White	0.2
	Door	Wood	Gray	-0.2
	Door	Wood	Gray	0.1
	Side Lite	Wood	White	0.2
	Casing	Wood	White	-0.1
	Lintel	Concrete	White	0.4
	Asbestos-Cement Siding	Shingles	Gray	4.6
	Exit Door	Metal	Gray	-0.0
	Exit Door Frame	Wood	White	-0.1
	Door Frame	Wood	White	9.6
	Door	Wood	Gray	0.4
	Garage Opening Frame	Wood	White	>9.6
Commandant's House				
First Floor				
Kitchen	Upper Walls	Plaster	Gray	4.7
	Lower Walls	Plaster	Cream	6.1
Butler's Pantry	Walls	Plaster	Pink	3.3
Dinning Room	Walls	Plaster	Wallpaper	>9.9
	Baseboard	Wood	GOLD	3.2
Parlor	Upper Walls	Plaster	Wallpaper	>9.9
	Lower Walls	Plaster	Cream	>9.9
	Chair rail	Wood	White	>9.9
	Baseboard	Wood	White	4.6
Sitting Room	Upper Walls	Plaster	Green	>9.9
	Lower Walls	Plaster	Wallpaper	>9.9
	Chair rail	Wood	White	>9.7
	Baseboard	Wood	White	8.1
Hall	Walls	Plaster	Red	>9.9
	Baseboard	Wood	White	3.0
Smoking Room	Walls	Plaster	Fabric	-0.2
	Baseboard	Wood	Deep Red	>9.9
Bathroom	Walls	Plaster	White	>9.9
	Baseboard	Wood	White	1.0
Second Floor				
Port Room	Walls	Plaster	Tan	0.7
	Baseboard	Wood	White	>9.9
Leeward Room	Walls	Plaster	White	>9.9
	Baseboard	Wood	White	>9.9
	Closet Walls	Plaster	White	>9.9

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Location	Component	Substrate	Color	XRF Result (mg/cm²)
	Baseboard	Wood	White	>9.9
	Floor	Wood	Red	>9.9
Bath	Upper Walls	Plaster	Green	0.1
	Baseboard	Wood	White	>9.9
Windward Room	Walls	Plaster	Green	>9.6
	Baseboard	Wood	Green	>9.9
Bath	Walls	Plaster	Wallpaper	>9.9
	Baseboard	Wood	White	>9.9
Starward Room	Walls	Plaster	Fabric	8.4
	Baseboard	Wood	White	>9.9
Bath	Wall	Plaster	White	>9.9
	Baseboard	Wood	White	8.7
Third Floor				
Hall	Wall	Plaster	Light Blue	>9.9
	Baseboard	Wood	White	>9.9
Blue and Yellow Flower Room	Wall	Plaster	Wallpaper	7.6
	Baseboard	Wood	White	>9.9
	Crawl Space Door	Wood	White	>9.9
	Crawl Space door Casing	Wood	White	>9.9
	Ceiling	Plaster	Wallpaper	-0.0
Burlap Room	Wall	Plaster	Wallpaper	>9.9
	Baseboard	Wood	White	8.3
	Closet Walls	Plaster	White	9.4
Bath	Walls	Wood	Blue	>9.9
	Ceiling	Plaster	Blue	>9.9
	Walls	Plaster	Blue	0.0
	Baseboard	Wood	White	>9.9
Library Room	Walls	Plaster	Wallpaper	0.2
Yellow Room	Walls	Plaster	Wallpaper	>9.9
	Baseboard	Wood	White	>9.9
	Closet Walls	Plaster	White	>9.9
	Ceiling	Plaster	White	>9.9
	Floor	Wood	Red	>9.9
Star Room	Walls	Plaster	Yellow	0.2
	Baseboard	Wood	White	>9.9
	Crawl Space Walls	Plaster	White	>9.9
	Floor	Wood	Red	>9.9

ATC's inspector was able to access all survey areas to perform both a visual inspection and XRF testing of painted surfaces. The XRF testing listed is representative of painted surfaces in the buildings. Should future renovation activities impact a painted surface of a color, style or type not specifically mentioned in this report, ATC recommends that the surface is assumed to be painted with a lead-containing material until further testing can be performed.

4.3 Regulatory Implications and Regulations

1.1.1.1 Worker Protection

The implications of lead paint existing in a non-residential building are related to the future use of the facility and the need to impact these painted surfaces during the renovation/demolition process. Renovations/demolition will require the *contractors to address worker exposure where the surfaces coated with lead paint are going to be disturbed.*

OSHA defines any detectable concentration of lead paint as a potential lead exposure hazard to workers doing construction/demolition-type work on these surfaces as even small concentrations of lead can result in unacceptable employee exposures depending upon the method of removal and other workplace conditions. Since these conditions can vary greatly, the lead-in-construction standard was written to require exposure monitoring or the use of historical or objective data to ensure that employee exposures do not exceed the action level of 30 micrograms per cubic meter of air ($\mu g/m^3$). Historical data may be applied to all construction tasks involving lead.

OSHA states that until the employer performs an exposure assessment (or can supply prior data regarding the same type of work which may exempt them from the standard) and documents that employees are not exposed above the permissible exposure limit (PEL) of greater than 50 $\mu g/m^3$ of air, the employer must treat employees as if they were exposed above the PEL for the following operations:

- manual demolition of structures, manual scraping, manual sanding, and use of heat gun where lead-containing coatings or paints are present;
- abrasive blasting enclosure movement and removal;
- power tool cleaning
- lead burning;
- using lead-containing mortar or spray painting with lead-containing paint;
- abrasive blasting, rivet busting, or welding, cutting, or burning on any structure where lead-containing coatings or paint are present;
- cleanup activities where dry expendable abrasive are used; and
- any other task the employer believes may cause exposure in excess of the PEL.

This means providing respiratory protection, protective work clothing and equipment, change areas, hand washing facilities, biological monitoring, and training until an exposure assessment has determined that the work activity will result *in a exposure below the PEL. Additional requirements under this standard include a written compliance program as well as* record keeping.

Waste Disposal

Waste disposal is governed by the Federal Resource Conservation and Recovery Act (RCRA) regulations, which distinguish between solid wastes and hazardous wastes. Solid wastes include general construction debris and are subject to minimum handling, transportation, and landfill disposal requirements under RCRA regulations. Hazardous wastes, including certain lead-containing materials, are subject to restrictions designed to prevent the hazardous materials from entering the environment. Lead waste is classified as hazardous or non-hazardous based on the results of the Toxic Characteristic Leachate Procedure (TCLP) testing. The leachability test measures whether or not lead leaches from the waste in excess of the regulated level of 5.0 mg/L. If the results of the TCLP analysis exceed this level, the waste must be handled, transported and disposed as a hazardous waste in an approved waste site, reclamation facility or incinerator site.

EPA's regulations require the leachability test, TCLP, to be performed so that it represents the matrix and material of the waste stream. For the project, this can be in the form of a representative sample of demolition debris taken either before or after the project begins.

Metal that may be removed which contains lead is exempt from the requirements of RCRA since it is not considered a waste because it can go to a scrap facility for recycling. ATC recommends that the owner receive a receipt or bill of lading from the scrap facility stating that the scrap metal was accepted and purchased by the scrap facility.

4.4 Recommendations

Prior to renovations ATC recommends the development of a project specification to ensure compliance with all applicable regulations as well as protect the interest of the client. The project specification shall reference the regulations pertinent to this project, including those work procedures that shall be followed to comply with OSHA requirements and waste disposal.

ATC strongly recommends that TCLP analysis and waste classification be performed during the design and development phase to properly estimate disposal costs. *Waste classification will allow for the identification of acceptable work* procedures to those bidding on the renovation project.

4.5 Cost Estimates

Based upon an estimated increment in cost for the renovation or demolition of interior and exterior building components that are coated with lead paint, it should not exceed 15% to 25% of the cost for planned renovations or general demolition. This cost includes contractor record-keeping requirements, personal protection of workers, and possible isolation of the work area to comply with the OSHA Lead Standard 29 CFR 1926.62 and DLWD 454 CMR 22.11. Additional costs may include disposal of some of the debris as hazardous waste depending on the results of TCLP testing.

5.0 PCB Survey

On April 9, 2002, Mr. Kevin Drinan of ATC conducted a survey of potential polychlorinated biphenyl (PCB) containing fluorescent light ballasts within the first floor of Building 5. Fluorescent light ballasts manufactured prior to 1979 may contain small quantities of PCBs. Recently manufactured fluorescent light ballasts are required to have "No PCB" labels. The primary concern regarding the disposal of used fluorescent ballasts is the health risk associated with exposure to PCBs. Upgrading a lighting system will likely involve the removal and disposal of lamps and/or ballasts. The proper method for disposing spent ballasts depends on the type and condition of the ballasts and the state in which the ballasts are removed and discarded.

ATC visually inventoried fluorescent light fixtures within the subject area. The survey was limited, therefore not all areas of the buildings were inspected and estimates were made based on inspections of representative floors in each building to determine an approximate total number of ballasts. After identifying fluorescent light fixtures within the Subject Site, ATC accessed a representative number of ballasts (approximately 10%) to check for "No-PCB" labels. If ballasts are not labeled "No-PCB", they should be assumed to contain PCBs.

Several varieties of fluorescent light fixtures were noted throughout the subject area. Lighted display cabinets located in the main dinning hall are contain single-bulb fixtures 4' feet and 8 feet long which contain one ballast each that is assumed to contain PCB's. The kitchen contains two-bulb fixtures 4' and 8 feet long which contain one ballast each that is assumed to contain PCB's. Fluorescent light fixture in the lobby and restrooms were observed to contain ballasts labeled "No PCB's". ATC estimates the total number of ballasts to be ninety-five (95)

The estimated cost for the disposal of PCB-containing ballasts within the first floor of Building 5 is **$1,400.00**. This cost includes only removal and disposal of PCB ballasts and does not include ballast replacement, administrative and report preparation costs associated with the activities. ATC inspected only a representative number of fixtures and ballasts and cannot attest to the PCB content of those fixtures not inspected. An accurate inventory of fluorescent light fixtures and ballasts can only be achieved by a comprehensive survey in which all each fixture is inspected.