

# Abbot Hall Façade and Grounds Inspection & Assessment Report

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Town of Marblehead, Massachusetts



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Structures North   
CONSULTING ENGINEERS, INC.

June 30, 2017

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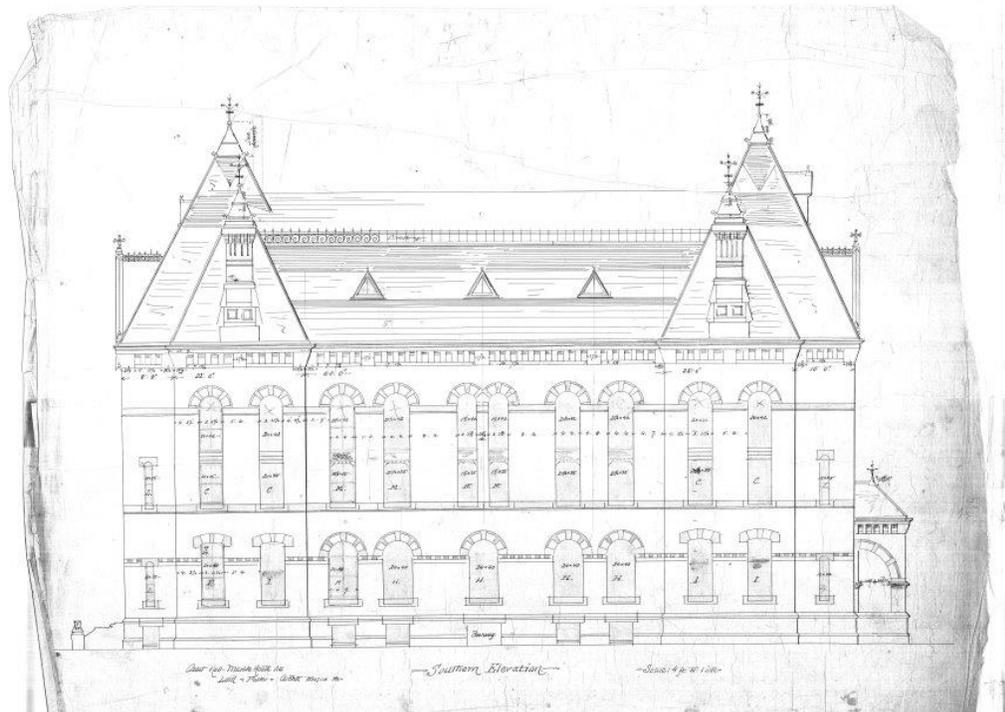
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In December 2016, the Town of Marblehead engaged the architectural firm McGinley Kalsow & Associates, Inc., with the structural engineering firm Structures North Consulting Engineers, to inspect and make recommendations for the repair and restoration of the brick and Nova Scotia Sandstone façade, slate and copper roof, and wood roof framing at Abbot Hall. Both firms have a long history in the repair and restoration of historic buildings listed either as National Landmarks, or listed on the National Register of Historic Places. Both firms worked on the assessment, design, and construction administration for the restoration of the Abbot Hall Tower in 2012-2014.

## **Background**

Through a \$100,000 bequest by Benjamin Abbot, Abbot Hall was constructed on the Marblehead Common. Designed by the architectural firm Lord and Fuller of Boston, the cornerstone was laid on July 25, 1876. Abbot Hall was dedicated on December 12, 1877 and replaced the “Old Town House” built in 1727, which had become too small to serve the needs of Marblehead.



*Original South Elevation Drawing*

Abbot Hall, located at 188 Washington Street, has a historical art collection in the Selectmen's Meeting Room that includes the original painting "The Spirit of '76" by Archibald M. Willard and the 1684 deed to Marblehead from the tribe of Nanepashemet. The building has a clock tower with a bell, cast by Meneely & Kimberly in Troy, New York and installed in 1876.

Abbot Hall was recognized as part of the Local Historic District (LHD) on March 11, 1968, and was included as an individual listing on the National Register of Historic Places (NRIND) on September 6, 1974. Abbot Hall was also listed as a contributing member of a National Historic District on January 10, 1984. An almost complete set of original drawings by Lord and Fuller are part of the Marblehead Historic Commission drawing collections.

### **Executive Summary**

#### Masonry:

The chimney on the south elevation is in very poor condition. All mortar joints have failed. An extension was built on top of the original chimney and is also in very poor condition. The bricks are loose and in a deteriorated condition, and the chimney needs to be disassembled and rebuilt before the winter of 2017-2018.

The Nova Scotia Sandstone has been covered with a white coating designed for concrete sidewalks. All areas of sandstone are experiencing sugaring and deterioration. The coating needs to be removed from all sandstone, and all loose sandstone should be mechanically removed. A breathable masonry coating should be installed to provide protection to the stone, while allowing moisture to escape the stone without damaging the stone.

Below the gutter there is a single header course of brick that extends from 1"-2 ¼" beyond the brick below. This course of brick was set with no backup and is loose in all locations. At the outside corners of the building the header course becomes a soldier course and the 3 ¾" width of the brick is cantilevered 2 ¼". This entire course of brick should be removed and rebuilt with solid masonry backup to lock the brick in with the wall.

The brick cornice on the building has areas of loose brick and deteriorated mortar. Selective areas of rebuilding are required, and all areas need deep cutting and repointing of mortar.

The field of brick is generally in good condition, but the mortar in the field is in poor to fair condition. There have been many isolated areas that have previously been repointed with improper hard Portland Cement-rich mortars. There are areas of spalled brick and vertical cracks that extend through brick on the lower portions of the building corners. Black glazed brick was used as a decorative element throughout the façade. The glazing is deteriorated and many of the bricks are cracked. All cracked and spalled brick should be replaced. All mortar should be cut out and replaced with a historically appropriate and compatible mortar.

#### Sculpture:

There are sculpted Nova Scotia Sandstone elements at the west, north, and east entrances. The elements vary greatly in weathering and deterioration. Some have completely lost all detail, the east gable finial is missing, and some locations have retained a high level of detail. There are three areas of sculpture at the east portico. There are decorative bird and grape leaf sculptures that wrap the pillars, medallions in the building wall above the roof, and columns with carved capitals above the medallions. At the north entry doorway there are sculpted bands at the door head, and the inscription “ABBOT HALL” and “1876” in the sandstone at the gable. The northeast gable windows have brick columns with sculpted sandstone capitals. At the west entry there are carved door heads, rosettes and column capitals. The pinnacle of gables are topped with sculpted Nova Scotia Sandstone finials. All the sculptures have been coated with the white, non-breathable coating that needs to be removed. The areas with high levels of deterioration should be replicated. The removal of the coating will show the detail of the sculpture, and highlight the level of deterioration.

#### Roofing:

The combination Black Munson and red slate roof was replaced/reset in 1977. There are areas that are performing well at the steeply pitched roof areas, but there is a high percentage of broken slate at the lower sloped roof at the top of the building. The copper gutter was replaced in 1977 and is in serviceable condition, but would have to be removed to perform the repairs to the brick

below the gutter. The copper skirt at the bottom of the low sloped roof area has many pin holes and needs to be replaced. The snow rails, which are badly rusting and causing deterioration to the copper skirt, also need to be replaced. The copper flashing at the dormers appear original and in poor condition. The valleys were replaced in 1977 and are in good condition. The ti-coated sheet steel finials at the roof peaks are rusting. The original tin coating has worn off and the connections are deteriorated. Originally, there was steel cresting that decorated all the ridges and peaks on the building and large tin-coated ridge caps that have since been removed.

#### Windows:

The windows are aluminum replacement windows that are past their service life. All perimeter sealant has failed, there are multiple seal failures throughout the building, and many of the balances in the double hung windows have failed. The windows appear to not be thermally broken and each pane of glass is its own individual insulated glass panel. Each window should be replaced with a historically-accurate, energy-efficient window. Because of the Massachusetts Historical Commission (MHC) Preservation Restriction on Abbot Hall, a discussion with MHC will be needed to determine the type of acceptable replacement windows. On other similar projects, MHC has required wood windows.

#### Insulation:

There is currently no wall insulation at abbot hall. There is loose fill cellulose insulation in the attic floor that is performing well. We do not recommend adding insulation to the inside face of the exterior walls. The walls are constructed with 20" thick brick, as a mass masonry wall. This means there is no waterproofing in the wall, and the thickness of the masonry is what prevents water from getting to the interior side of the wall. By not having insulation at the walls heat from the building dries the walls from the inside out. If insulation is added the walls will not dry out as quickly and the backup will deteriorate quicker.

#### Grounds:

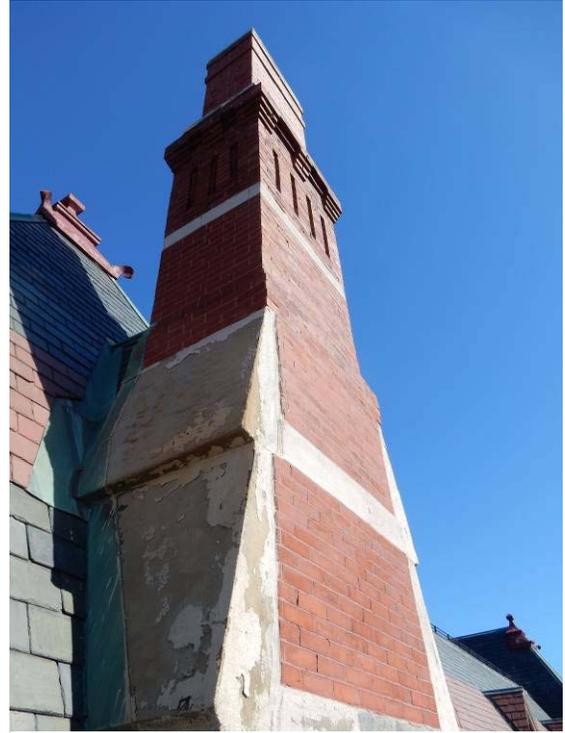
The training grounds of Abbot Hall are bordered by a granite post and iron rail fence. Washington Square Road borders the west, east, and south sides of the grounds, and Washington Street is to the north. The grounds encompass Abbot Hall and remembrance elm

trees are planted throughout the grounds. The grounds were originally a field for the training of Revolutionary War soldiers. After the construction of Abbot Hall, there were very few plantings on the grounds and no plantings next to the building. Many shrubs now surround Abbott Hall. The shrubs have grown to a height that blurs the line between the building and grounds, and remove some of the prominence originally intended for Abbot Hall. We recommend removal of this foundation planting. The granite and iron fence surrounding the grounds has many bent and broken rails that should be repaired and replaced. There are five cracked or broken granite posts, and three posts have been pushed out of plumb. On the west border of the grounds the fence sits above a granite site wall.

There has been significant movement of the stones of the site wall. The wall is still stable, but a majority of the mortar is missing. There is a large granite cap stone that has provided protection to the rubble wall below.

### **Masonry**

Abbot Hall was constructed as a three-story mass masonry brick wall, with Nova Scotia Sandstone and black glazed brick trim. The wall is typically five brick wythes, 20" thick and the window openings are masonry supported brick arches with Nova Scotia Sandstone base and key stones. Nova Scotia Sandstone is used throughout the building in conjunction with black brick as decorative bands, window sills, and water tables. Rockport Granite is used as the water table at and foundation cap stone the lowest level of the



*Existing Chimney*



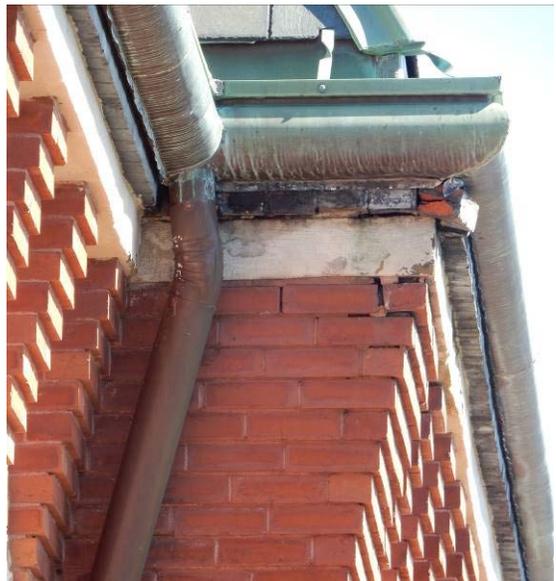
*Deterioration at Original Chimney*

building. Between the water table and cap stone the brick is 24" thick, and below the cap stone the rubble granite foundation varies from 28"-32" thick.

The chimney located on the southeast corner of the building is severely deteriorated. The original portion of the chimney was constructed with sandstone shingle stones, sandstone bands and decorative brick inlays. The mortar is very weathered and much of the mortar is missing. In the 1970's the chimney had a 10' brick extension installed on top of the original brick chimney. The extension was installed to provide the required height for draft above the adjacent roof. The chimney has two lined flues for the two natural gas boilers. The flue liners were installed in the original brick chimney flues and terminate at the top of the chimney with a metal chimney cap.

The chimney needs to be disassembled down to the gutter line of the roof, and the base Nova Scotia shingle stone should be reset or replaced. When the chimney is rebuilt it needs to meet current seismic code requirements. This will require the chimney to be braced back to the roof. With the current boilers, the chimney will need to be extended to the current 1970's chimney height extension. The flue liners need to be removed and reinstalled when the chimney is disassembled. If the boilers are replaced with modern high efficiency condensing boilers, the chimney could be rebuilt to the original chimney height.

There is a header course of black glazed brick directly below the gutter that supports the gutter. This course of brick is in very poor condition and is not tied into the Nova Scotia Sandstone band below. The brick has no masonry behind it and overhangs the brick cornice below up to 2 ¼". All of the mortar is deteriorated and all of the bricks are loose. At all outside corners the header course is cantilevered at both the head and long face of the brick. At this location the brick is cantilevered 2 ¼" out with a thickness of 3 5/8". These bricks are only held in place by the friction of the gutter above. To repair and stabilize this course of brick the



*Brick under Gutter at Outside Corner*

gutter will need to be removed. Full depth masonry should be installed to lock the brick to the masonry wall.



*Loose Brick Course Under Gutter*

The Sandstone band below the brick header course is supported by a continuous brick cornice. The cornice is composed of 12” wide corbels that are nine brick courses tall. The corbels are exposed on three sides and the deterioration of the mortar is great. All of the mortar has failed and many of the bricks in the corbels are loose. There have been multiple localized repointing campaigns over the years, but all of them were shallow and left deteriorated mortar behind the new pointing mortar. This caused the new mortar to rapidly deteriorate and put a lot of stress on the bricks of the corbels. Many of the brick have cracked, spalled and delaminated. All of the corbels need to have full depth repointing with many of them needed to be rebuilt.



*Open Cornice Joints at Corbel with Loose Brick*

There are thin, vertically oriented cracks at the building corners that span through the mortar joints and brick. The flat brickwork surrounding these cracks sounds “dead” when tapped on with a

hammer, meaning that the mortar and possibly wall construction behind them has become soft. However, the outer brick surface is generally planar, suggesting that it remains well bonded. Straight vertical cracks would not result from settlement or typically from overall building movements, as these are usually diagonal. Instead, the likely causes are high compression stresses and horizontal expansion of the brick backup wall construction as might occur from entrapped moisture and freezing and thawing. The outer wythe (course) of brick should be removed within the cracked zones to expose the mortared collar joint and backup construction, which should be examined. Any damaged or loose brickwork should be replaced and the outer wythe reinstalled. This should be done using a mix of the best of the removed original bricks and harvested replacements.

Throughout the façade there have been multiple campaigns of spot repointing and isolated repairs. The mortar is in poor condition with numerous hairline cracks, weathered surfaces, and areas where the mortar is missing or is badly deteriorated. Due to the generally poor condition and lack of uniformity we recommend that the entire building be repointed. The previous repointing campaigns did not cut back deep enough to remove all the deteriorated and weathered mortar. This causes the new mortar to fail quickly and allow water into the joints. The new repointing campaign needs to remove all existing mortar back to sound backup mortar and then have the new mortar installed in lifts no deeper than 1”

### **Sculpted Nova Scotia Sandstone**

At the three historic entrances to the building there are sculpted elements. All of these elements are Nova Scotia Sandstone, and have experienced different levels of weathering.



*Medallions*

## East Portico

The pinnacle of the gable is missing the original carved Nova Scotia Sandstone finial. At the east portico there are highly decorative bird and grape vine sculpted bands that wrap the pillars of the portico. In the 1970's glass doors and windows were installed to enclose the portico and the sculpture was cut for the installation of the glass. The condition of the sculpture varies significantly depending on the



*Detailed Band Sculpture*

quality of the piece of stone and the orientation of the grain. The sculpture inside the portico was not treated with the white coating and has been protected since the 1970's when glass doors and windows enclosed the portico. The sculpture in the interior has retained much of its detail. All of the sculpture on the exterior has been coated with the white non-breathable coating.

Directly above the portico roof there are sculpted medallions. Each medallion is unique, and the majority of the medallions are in very good condition. The medallions have mortar joints between each stone that have failed, letting water in. The medallions have been coated with the white non-breathable coating that should be removed to preserve the sculpture.

Between the windows above the portico are sculpted column capitals. The capitals sit on rectangular columns and support arched brick window openings. The north side capital is heavily weathered with very little detail remaining. The center capital has retained some detail but has significant weathering. The south side capital has retained most of its detail and is in good condition.



*Column Capitals*

## North Entry

The north entrance to Abbot Hall, designed as the main entrance to the building is located directly off Washington Street, while the east and west entrances are entered from inside the grounds. The projecting portico and gable are entered through a half round opening with a decorative sandstone trim that bears the inscriptions “ABBOT HALL” and “1876”. All of the sandstone at the entrance has been coated with the cementitious coating and needs to be removed. At the peak of the half round opening a corroding ferrous pin caused a softball size piece of sandstone to fall out in the summer of 2016. There are two additional ferrous pins and all of them should be removed. Sloped sandstone shingle stones serve as the roof of the portico topped with a decorative carved finial. The carved finial has weathered but still has retained some of its detailing. The sculpted band stone has retained most of its carved detail and is in good condition. The plantings at the north entry have overgrown the portico and put the entrance in the shade for most of the day. There is biological grown and staining on the majority of the stone and brick at the entrance.



*North Entrance*

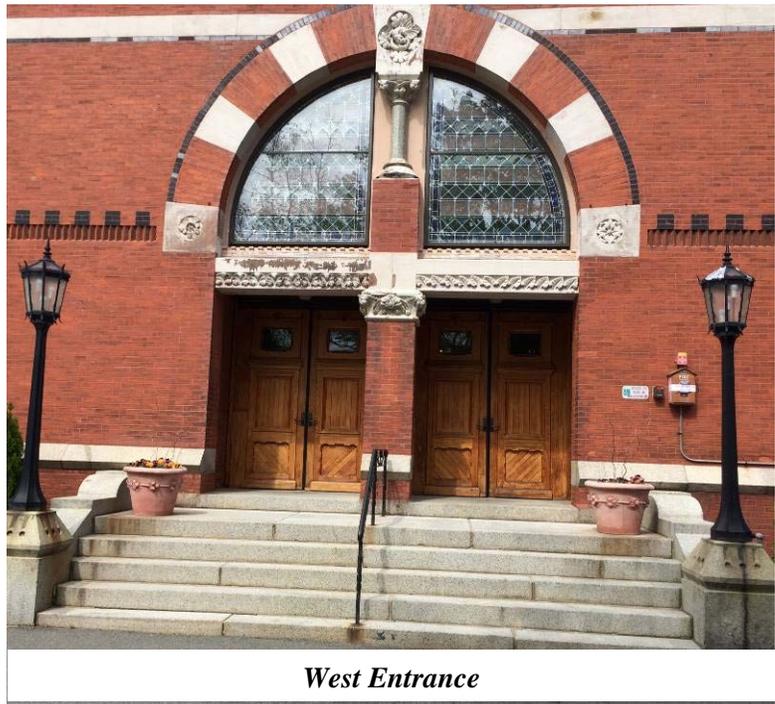
## East Entry



*Column Capital and Header Carvings*

The east entrance has two sets of double wood doors that are separated by a brick column with a carved capital, and a half round stained-glass window that is divided by a granite column with a carved sandstone capital. The half round stained-glass window has a brick and sandstone arch with carved sandstone rosettes at both sides of the base and one at the peak of the arch. Over both door openings entrances is a horizontal carved sandstone header with a detailed floral pattern.

The carved header stones over the entrances are in very good condition. There is the white cementitious coating over all the sandstone that needs to be removed. The capital on the brick column has retained a lot of it's detail but has areas that are flaking and spalling at the underside on the carvings. The granite column between the stained glass is identified on the original drawings as the only granite column on the building. The carved sandstone capital on the granite column has retained most of the carved details but has minor spalling of the elements below the undercut carvings. The rosettes in the arch are in good condition with a high level of detail retention.



*West Entrance*

## Roofing and Flashing

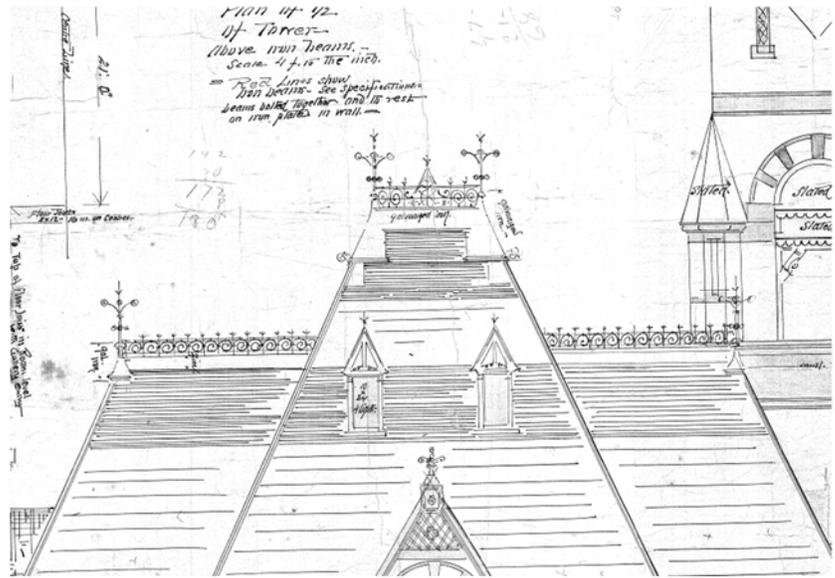
The original construction of the building was completed with only a black slate roof. The building was designed with the multi colored roof design that is currently on the building, but the pattern was not installed until some time after the original construction. The current



*Low Sloped Roof Deteriorated Skirt and Snow Guard*

roof was installed in the 1970's with the combination of salvaged slate from offsite, and reclaimed slate from the roof. The original slate was almost certainly Black Monson State quarried in Monson, Maine. This northern Maine slate was both very popular in New England when Abbot Hall was constructed and is considered to be the most durable slate ever produced. Although Black Monson is no longer available for roofing slate, a very similar black slate (North Country Black) is quarried just across the Canadian border. The red slate is still actively quarried out of two quarries that both align on the New York Vermont border. The slate on the steeply sloped roof are in fair condition. There are limited number of broken and cracked slate that should be repaired. At the top of Abbot Hall is a lower sloped slate roof. At this location the slate are in much worse condition. There is a large number of broken and missing slate, with many additional cracked slate. In the 1970's new copper valley's, skirt, and flashings were installed. The stepper valley are in serviceable condition with limited signs of wear. At the low sloped skirt that creates the transition from the low sloped roof to the steep sloped roof there are many pin holes and fastening separations. An iron snow rail was installed on the skirt and is causing the solders and attachments to open. The low sloping valleys at the edges of the low sloped roof also have signs of significant weathering and should be replaced.

The gutters at Abbot Hall were replaced in the 1970's and are generally in good condition. The proper ¼" copper support bar, twisted hangers, 20 oz. copper, and full sheet profile was used for the installation. The downspout connection at the northeast corner is clogged and appears to have been clogged for a long time. In the center of the north main roof gutter there was a copper patch that was installed. This patch has failed and is allowing water to go through a failed joint. The current gutters are in good condition but the brick directly under them has significant deterioration. To replace the brick below the gutters it is likely that the gutters will have to be replaced as well.



*Original Cresting Shown on Original East Elevation*

The finials at Abbot Hall are galvanized iron. The galvanization has been failing for a period of time that has allowed the steel to rust. The majority of the finials have a layer of rust on them and have started to stain the adjacent materials. Originally there was steel cresting that adorned all peaks and ridges of Abbot Hall with a heavy galvanized iron ridge. The current iron finials all have patches at the top surface from when the cresting was removed. The iron ridges were removed and replaced with smaller copper ridges. On the portico of the east elevation the only remaining piece of cresting remains. Galvanization has vastly improved since the original galvanized iron was used on Abbot Hall. Replication cresting can be expected to have a much longer service life than the original cresting that was installed.



*Existing Cresting East Portico Peak*

### Wood Dormers and Circular Wood Windows.

There are small dormers on the north south and east elevations of the building. They have wood window trim, casings, brackets and detailing with slate siding on the return walls. All of the wood has very high exposure and is deterioration. The sills of the windows in the dormers have had aluminum installed over the rotten wood. All wood at the dormers should be replaced. The slate needs to be removed and reset for the installation of the new wood.



Dormer Wood Trim

There are circular wood windows in the gables at the east and west elevations of the buildings. The circular wood window have rotten window frames and casings at the bottoms of the windows. The window sash is in serviceable condition. The frames and casing should have all rotten wood removed, all wood consolidated and restored, and the new glazing compound at all glass. All elements should be prepped primed and painted with new sealant at the perimeter.



Circular Wood Windows

## Marblehead Historic Background

### Historic Style Analysis



*Abbot Hall c. 1870s*

As stated in the National Register Nomination, “Abbot Hall is architecturally significant as a handsome and intriguing example of eclectic High Victoriana in a town whose structures are primarily 18th and 19th c.” Eclectic Victorian buildings can be characterized by the number of by their sampling of a range of historic styles (ex. Italianate, French Second Empire, and Gothic.) Most of the features on the exterior of Abbot Hall are characteristic of the Romanesque revival style. The tower, which reaches two stories above the main roof, was popular in Romanesque Revival designs contemporary with Abbot Hall. The large arched double doors (or the allusion to them on the west facade) and narrow arched windows also fit this style. The hipped roof, decorative floral medallions and polychromatic brick and stone exterior are all elements associated with other Victorian styles, bringing together the eclecticism referred to in the nomination.

In addition to its eclectic elements, Abbot Hall also exemplifies the Victorian value of connecting the indoors with the outdoors. Both the east and west facades face open green space (the Marblehead Common and the Abbot Hall Grounds, respectively.) The tower is visible over the surrounding buildings, accentuating its place in the skyline whether viewed from land or from the harbor.

### Marblehead in 1876

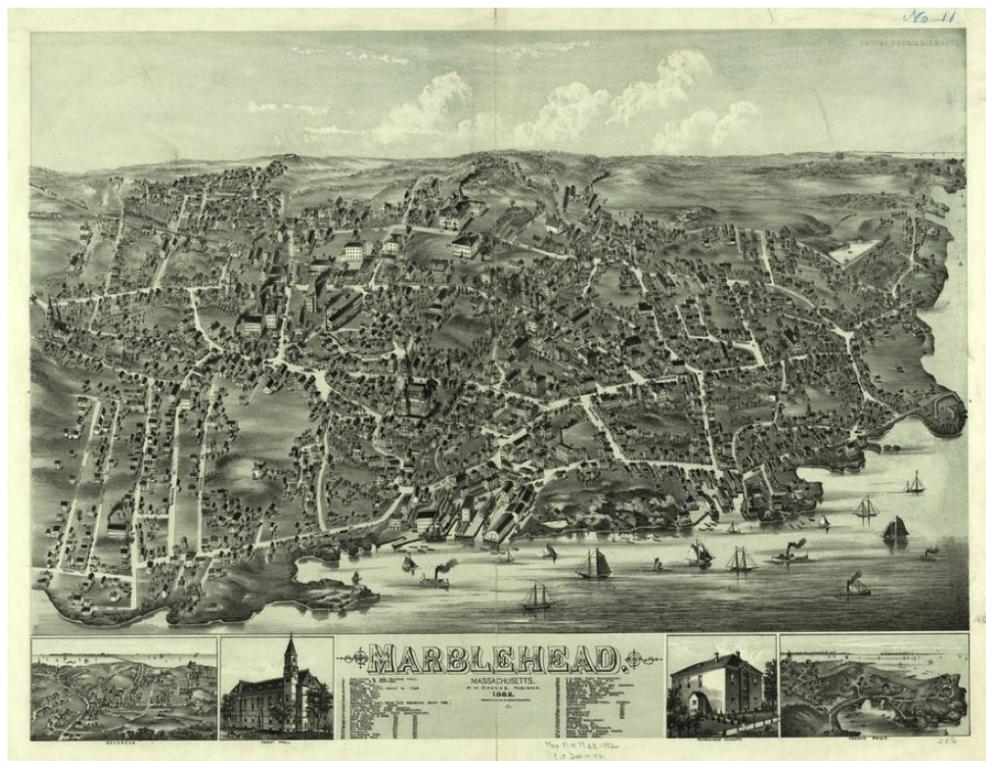
1876 was a time of great national and local pride, as the National Centennial focused on the revolutionary era history of Massachusetts. Though the Centennial Exposition, the First World’s Fair, was held in Philadelphia, small nods to the 100<sup>th</sup> anniversary of the signing of the Declaration of Independence, and to a recently reconciled union, took place in nearly every town in Massachusetts. Marblehead itself hosted a parade and dedicated a monument to the soldiers fallen in the Revolutionary, 1812 and Civil Wars, though some local controversy had kept the

celebration relatively small. The renewed sense of patriotism would inspire the creation of the Spirit of '76 painting, which would become a treasured collection item displayed in Abbot Hall.

Marblehead's economy was thriving with the end of the Civil War. Through the first half of the nineteenth century, much of Marblehead's economy was driven by the fishing industry. In the 1860s, shoe companies had begun moving into various town and cities on the North Shore, including Lynn and Marblehead. While shoemaking had been a trade in the town for decades, but this growth opened industrial factories, and brought enormous opportunity for employment.

Marblehead was also in the early stages of becoming a tourist destination in 1876. As Victorian-era Americans began to have a greater understanding for the need for leisure time and physical activity for one's health, seaside holidays became increasingly popular. While some of these holidays could be taken in the city (the 1870s saw the development and construction of Coney Island theme park in New York). The tourist trend would continue for Marblehead through the next several decades, boosting the economy and transportation opportunities in the area.

Marblehead had also experienced a small wave of rebuilding in the decade prior to the construction of Abbot Hall. A fire originating at the First Baptist Church spread to several buildings. Though a major disaster was avoided (unlike two more fires that would follow in the next decade), the damage done to the neighboring buildings meant that construction and development was changing the nature if the town.



## The Funding, Design and Construction of Abbot Hall

The funds to build Abbot Hall were bequeathed by Benjamin Abbot. Born in Marblehead in 1795, he was apprenticed as a cooper, or barrel-maker at a young age. He opened his own shop in Boston, and earned a small fortune making barrels there. He had a favorable reputation in the town of Marblehead as “a man of honor and integrity, a genial disposition and a ready sympathy that endeared him to a large circle of friends.” He died in 1872 in Boston, where he had lived in Charlestown with his wife Olivia since their marriage in 1828. He bequeathed the remainder of his fortune, after making several gifts, to the Town of Marblehead. This remainder amounted to \$103,000 in US bonds. His will read “I have made this provision for the Town of Marblehead because it was my birthplace. And it is my desire that a building shall be erected there for the benefit of the inhabitants of said town; but I do not intend to limit the use of the legacy...I desire that my name shall always be attached to said fund.” At the next town meeting, the Town authorized \$75,000 to be spent on the construction of the Town Hall. The remainder was to be made into an endowment for the maintenance of the building, including heating, lighting and grounds. The building was designed by architects Lord & Fuller.

George A. Fuller and George C. Lord had offices in Boston and Peabody. They designed several public buildings on Boston’s North Shore, including Topsfield Town Hall, Saugus Town Hall (particularly memorable in that building it on the swamp land necessitated that the land be filled, at an expense so great it put the town greatly into debt) and several residences. Their dedication to the Victorian eclectic style is obvious in their combination of Second Empire and Italianate styles on the Topsfield Town Hall, and their use of Tudor styles in this Manchester residence.



*Topsfield Town Hall*



*Manchester-by-the Sea Residence*



*Saugus Town Hall*

The City of Boston directory describes them as being “associated in the business for over twenty-five years and have erected many of the most prominent buildings all over the State, including school-houses, churches, town halls, and public work of all kinds, and in the city they have put up many buildings and stores. They know that the true architect must consider the all-important matters of drainage and ventilation, and, accordingly, they pay the greatest attention to these subjects, as well as to light, acoustics, etc., and it will be found that all the buildings of their construction are thoroughly healthy, and many of the largest landowners have all of their buildings erected under the guidance of these gentlemen, who devote their mature judgment and great experience to the interests of their many customers.”



*Late 19<sup>th</sup> Century View of Marblehead and Abbot Hall*

One of the most interesting stories associated with the building of Abbot Hall is the story of its site selection. When seeking a location for Mr. Abbot’s gift to the town, the common was the obvious centrally-located site with room to build. Several townspeople, however, felt that this was a misuse of the space. The common had been used as a training field for the revolutionary militia, and developing this historic land during the centennial year was met with resistance. The townspeople sued the town government, with the case being heard by the state supreme court. The townspeople argued that the common was owned by all town residents, and that the municipal government was not able to make any decisions regarding it without their consent. Associate Judge Ames, who heard the case, determined since they were unable to prove an adverse title, the Town was within their rights to build Abbot Hall on the grounds they selected.

## **The Spirit of '76**

The Spirit of '76, by folk artist Archibald M. Willard, hangs in what is currently the selectmen's room. It depicts an old man, a young man, and a young boy marching in a revolutionary battle. Originally painted comically as "Yankee Doodle," Willard was convinced to repaint it in a more serious, patriotic tone, fitting the mood of both 1776 and 1876. It was exhibited at the Centennial Celebration in Philadelphia, and toured the country before it was purchased and donated to the Town by John Devreaux, a Marblehead resident whose son had posed for the little boy in the painting. It's central presence in the selectmen's room is in keeping with the town tradition of using Abbot Hall as both a seat of government and an exhibition space for the artistic and historical collections of Marblehead.



Piece of Finial Found in Gutter



East Entry Portico Sculpture



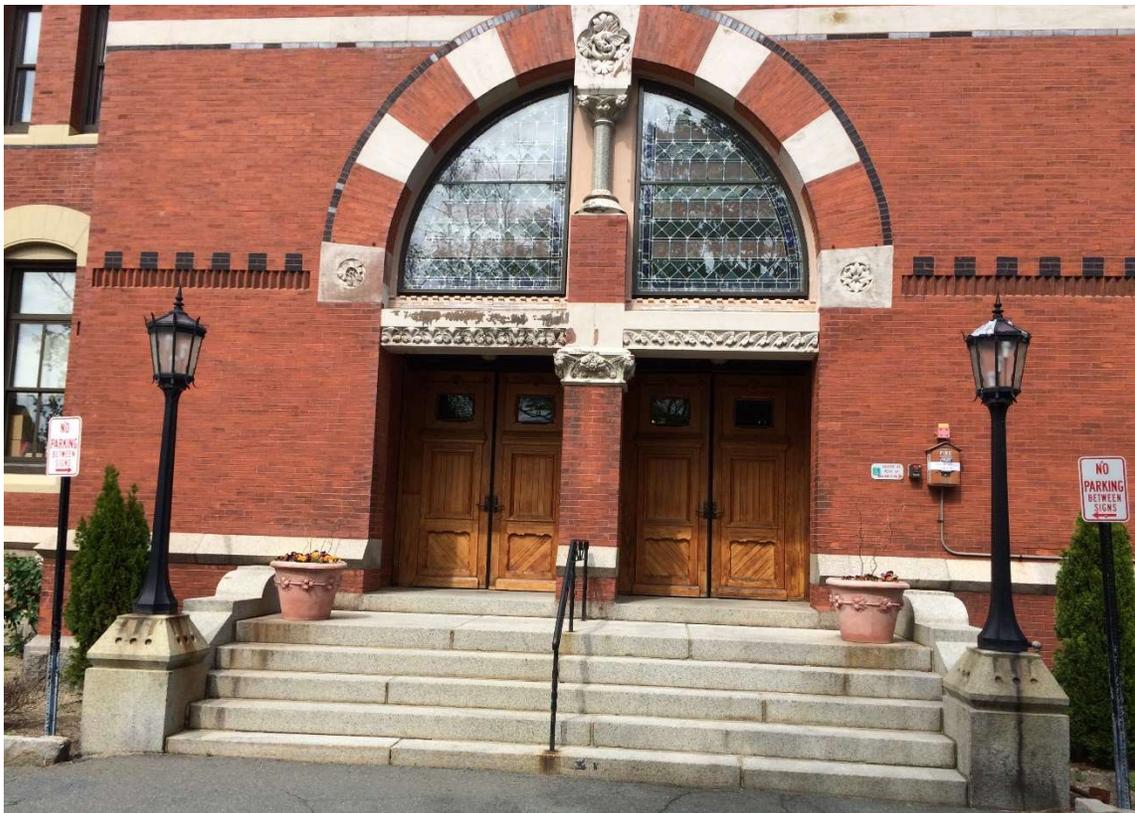
East Elevation Medallion



North Entry Portico



North Entry Sculpture



West Entry



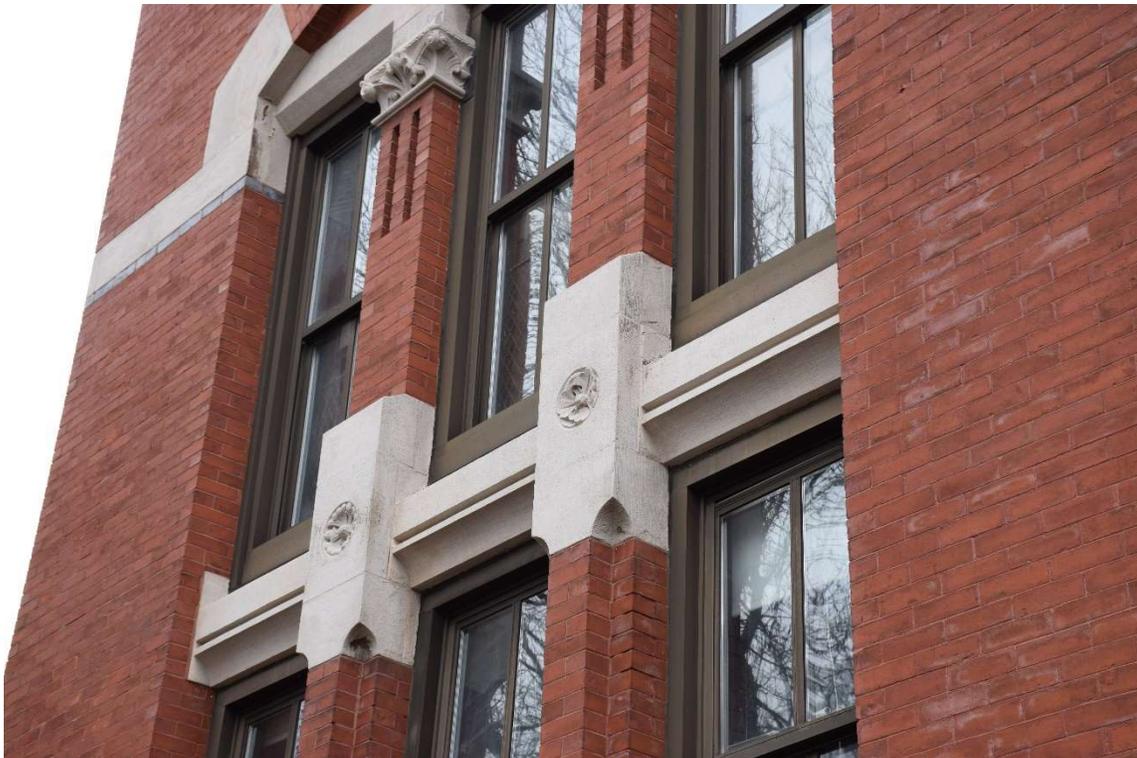
West Entry Capital



East Elevation Portico Finial and Original Cresting



East Elevation Gable Flashing



North Elevation Medallions



North Elevation Medallion Detail



North Elevation Capitals



North Elevation Capital Detail



North Elevation Light Bracket



North Elevation Light Wiring



Deteriorated Cornice



Missing Mortar at Cornice



Clogged DS and Gutter with Standing Water



Clogged Down Spout



West Elevation Finial



East Elevation Finial



East Elevation Circular Window



Sill Flashing at Dormers



East Elevation Carved Column Capitals



East Elevation Capital #1



East Elevation Capital #2



East Elevation Capital #3



Missing East Elevation Carved Finial



West Elevation Carved Finial



Failed Gutter Patch



Bent Section of North Gutter



Deteriorated Copper Skirt



Rusting Skirt and Broken Slate



Backside of Gutter and Brick Below



Deteriorated Brick Below Gutter



Loose Brick Below Gutter



Movement of Brick Below Gutter



Typical Valley



Typical Hip Cap



Delamination of Glazed Brick



Cracked Brick in Field



Cracked Sandstone



Failed Mortar with Hollow Backup



Delamination of Stone Behind Coating



Delamination of Stone Caused by Coating



Failed Sealant at Perimeter of Windows



Seal Failure at Window Glass and Window not  
Able to Close



Deterioration at Southwest Chimney



Mortar Failure at Southwest Chimney



Deterioration at Southwest Chimney



Mortar Failure at Southwest Chimney



East Elevation Circular Window



East Elevation Dormers



Cracked Granite Post



Bent and Dislocated Railing



Cracked Granite Post



Broken and Displaced Granite Post



Failed Mortar at Granite Site Wall



Movement of Stones at Granite Site Wall



# Abbot Hall - Exterior Envelope and Ground Assessment

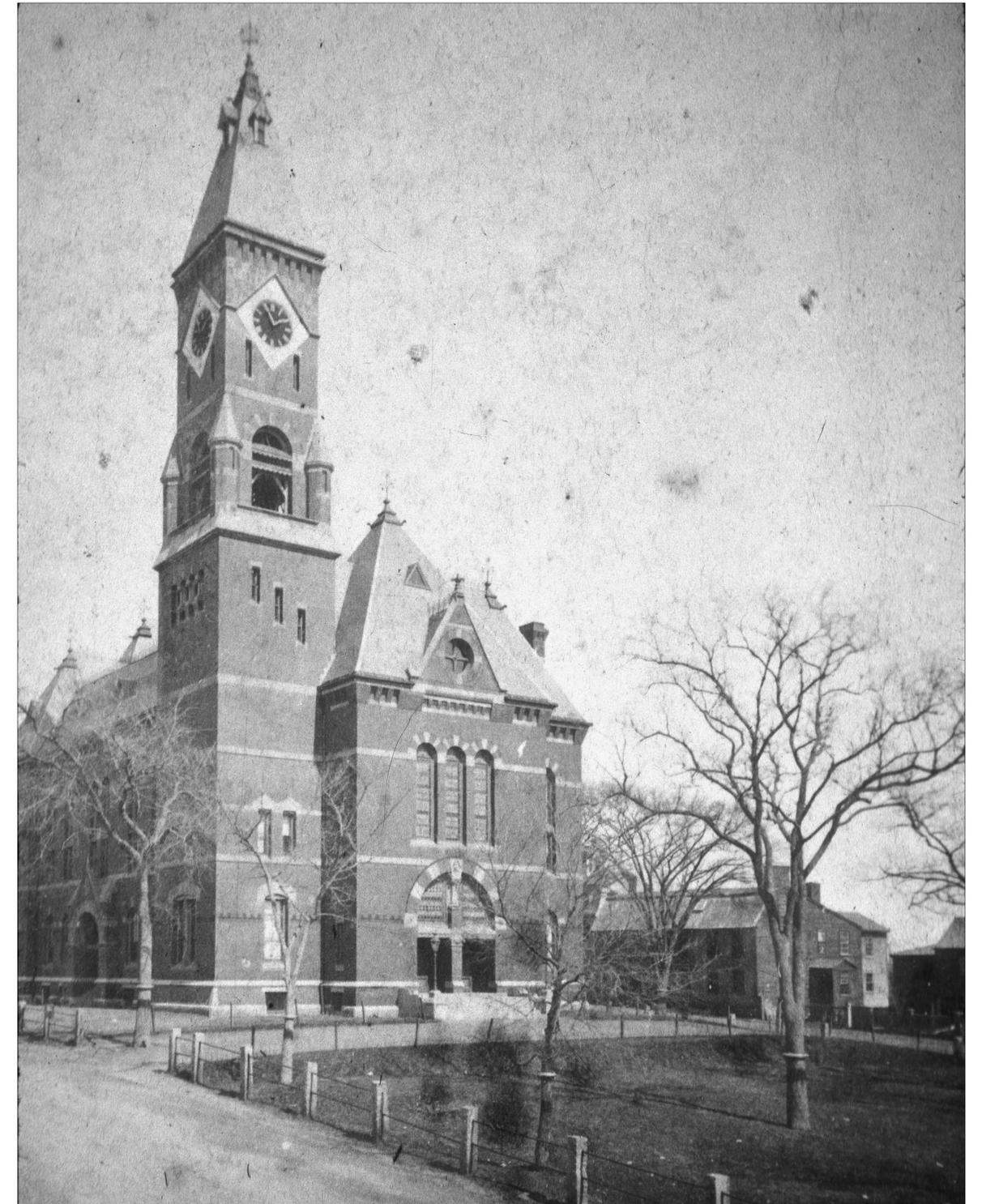
6/28/17

188 Washington Street  
Marblehead, MA 01945



## DRAWING LIST

Sheet Number	Sheet Name
A0.1	Site Plan
A1.0	Roof Plan
A2.0	North Elevation
A2.1	South Elevation
A2.2	East and West Elevations
A3.0	Details
A3.1	Chimney Details
X1.1	1977 North Elevation
X1.2	Original South Elevation
X1.3	Original West Elevation
X1.4	Original East Elevation



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Structures North   
CONSULTING ENGINEERS, INC.  
60 Washington street Suite 401  
Salem, MA 01970-3517  
T. 978.745.6817 F. 978.745.6067  
www.structures-north.com



**Abbot Hall Exterior Envelope  
& Ground Assessment**  
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 Marblehead, MA 01945  
 Town of Marblehead

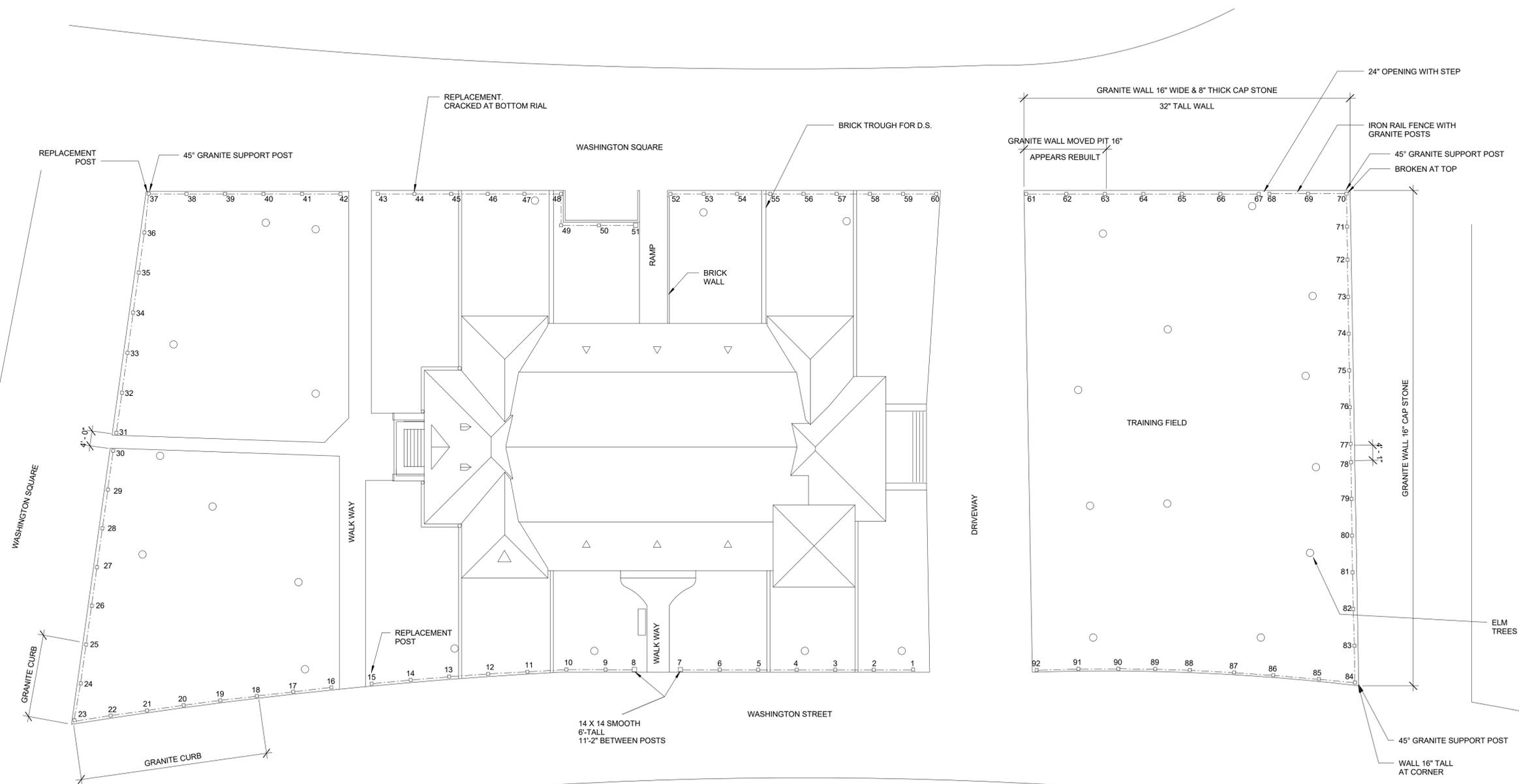
Date: 06/28/2017  
 Scale: 1/16" = 1'-0"  
 Drawn By: JMC  
 Reviewed By: RAF  
 Project No: 1762.00

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Site Plan

No.  
**A0.1**

GENERAL NOTES:  
 GRANITE POSTS TYPICALLY 10" X 10"  
 +/- 10' - 0" O.C.  
 1 1/2" STEEL RAILS



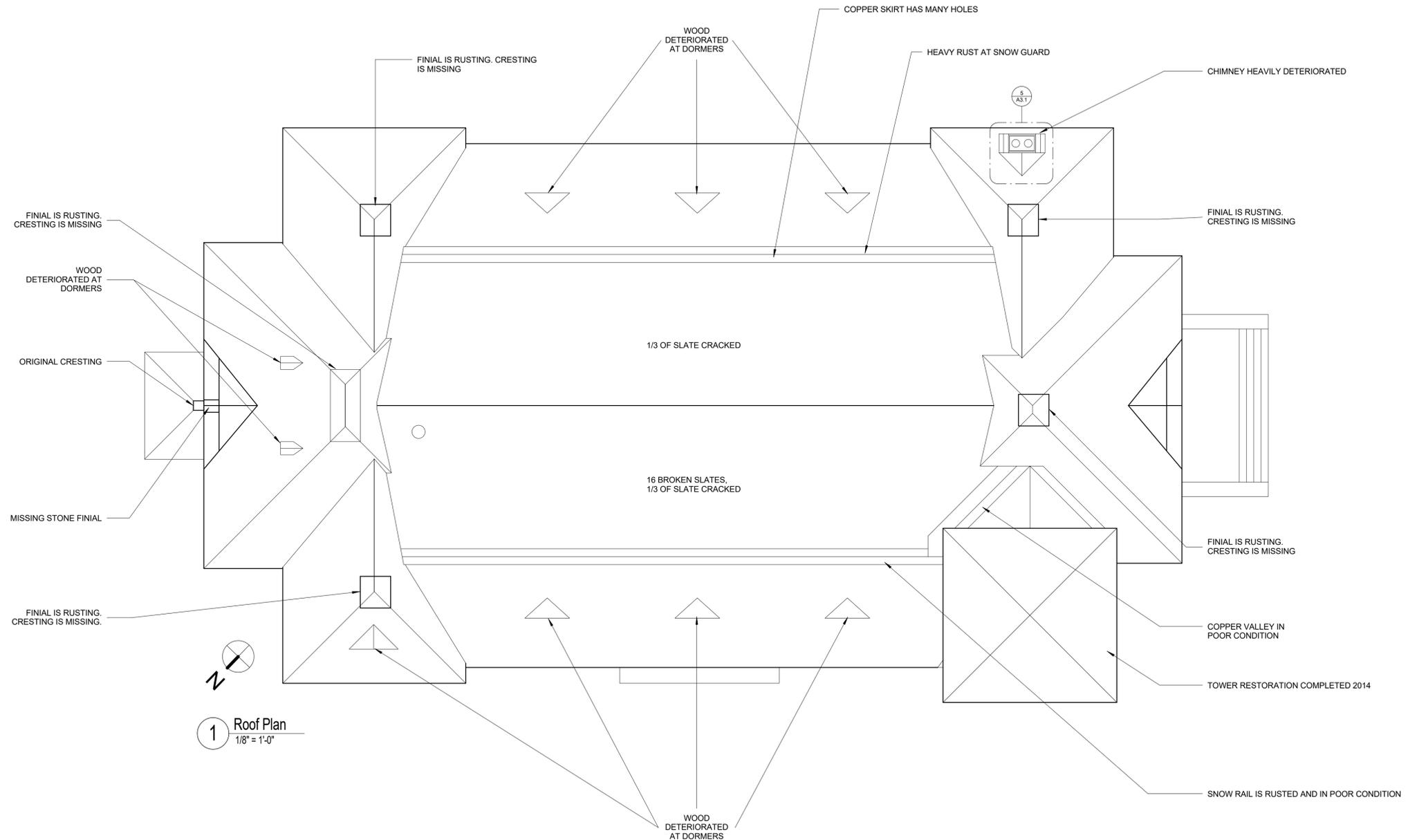
1 Site Plan  
 1/16" = 1'-0"





# Abbot Hall Exterior Envelope & Ground Assessment

188 Washington Street  
Marblehead, MA 01945  
Town of Marblehead



Date: 06/28/2017  
Scale: 1/8" = 1'-0"  
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Roof Plan

No.

A1.0

**General Notes:**

**Masonry**

- The chimney on the south elevation is in very poor condition. All mortar joints have failed. An extension was built on top of the original chimney and is in very poor condition as well. The brick are in loose and unstable condition.
- The nova scotia sandstone has been covered with a white coating designed for concrete sidewalks. All areas of sandstone are experience sugaring and deterioration
- Below the gutter there is a single header course of brick that extends from 1'-2 1/4" beyond the brick below. This course of brick was set with no backup and is loose in all locations. At the outside corners of the building the header course becomes a soldier course and the 3 1/2" width of the brick is cantilevered 2 1/4".
- The field of brick is generally in good condition. There have been a number of areas that have previously been repointed with improper Portland cement rich mortars. There are vertical cracks that extend through brick on the lower portions of the building.
- Black glazing on brick was used as a decorative element throughout the façade. This glazing is deteriorated and many of the bricks are cracked.

**Sculpture:**

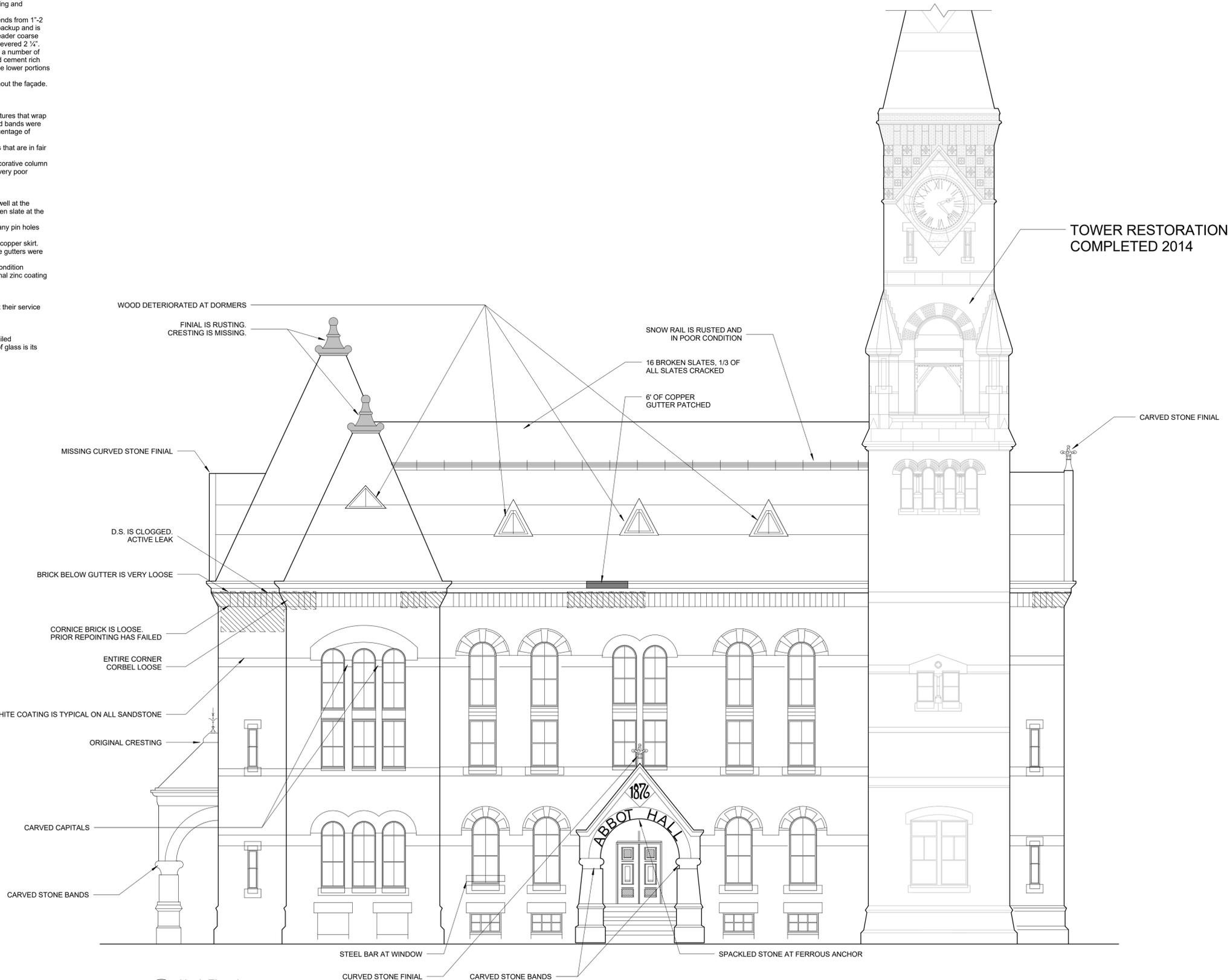
- At the west portico there are decorative bird and grape leaf sculptures that wrap the pillars. When the glass entry doors were installed the sculpted bands were cut. Areas of the sculpture are highly weathered with a large percentage of material loss.
- Above the west portico there are sculpted nova scotia medallions that are in fair condition
- Above the west portico there are three sculpted columns with decorative column capitals. The capitals vary greatly in condition with one being in very poor condition and the best one being in fair condition
- At the east entry doorway there are

**Roofing:**

- The combination Black Munson and red slate roof is performing well at the steeply pitched roof areas, but there is a high percentage of broken slate at the lower sloped roof at the top of the building.
- The copper skirt at the bottom of the low sloped roof area has many pin holes and is deteriorated
- The snow rails are badly rusting and causing deterioration to the copper skirt.
- The copper gutters are generally in good condition. It appears the gutters were replaced in the 1970's
- The copper flashing at the dormers appear original and in poor condition
- The zinc coated tin finials at the roof peaks are rusting. The original zinc coating has worn off and the connections are deteriorated.

**Windows:**

- The windows are an aluminum replacement window that are past their service life.
- All perimeter sealant has failed
- There are multiple seal failures throughout the building
- The majority of the balances in the double hung windows have failed
- The windows appear to not be thermally broken and each pane of glass is its own individual insulated glass panel.



1 North Elevation  
1/8" = 1'-0"



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North Elevation

No.  
**A2.0**

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**Sculpture:**

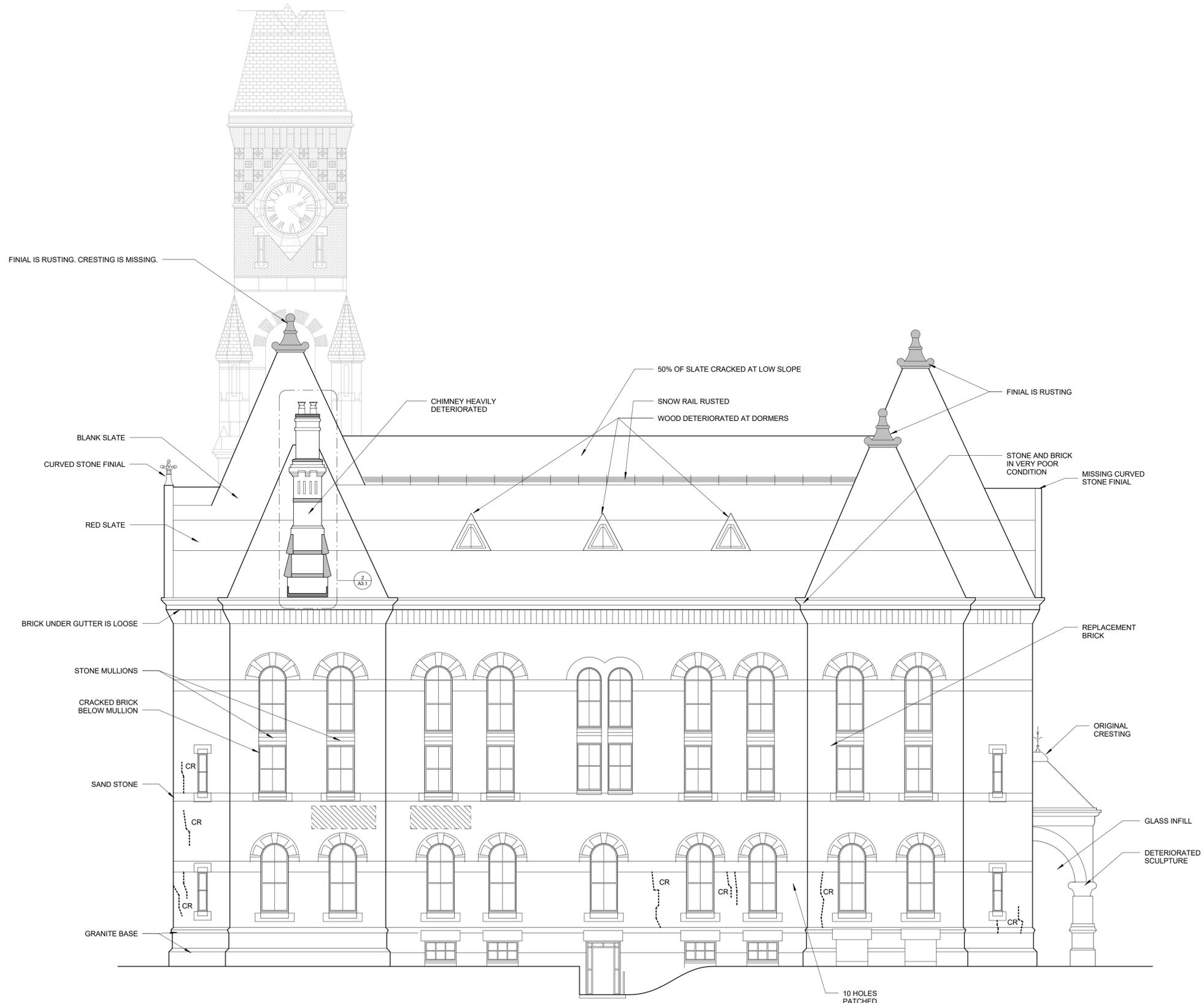
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1 South Elevation  
1/8" = 1'-0"



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South Elevation

No.

A2.1

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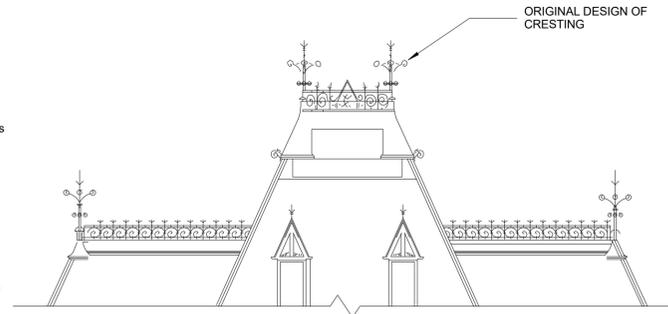
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**Roofing:**

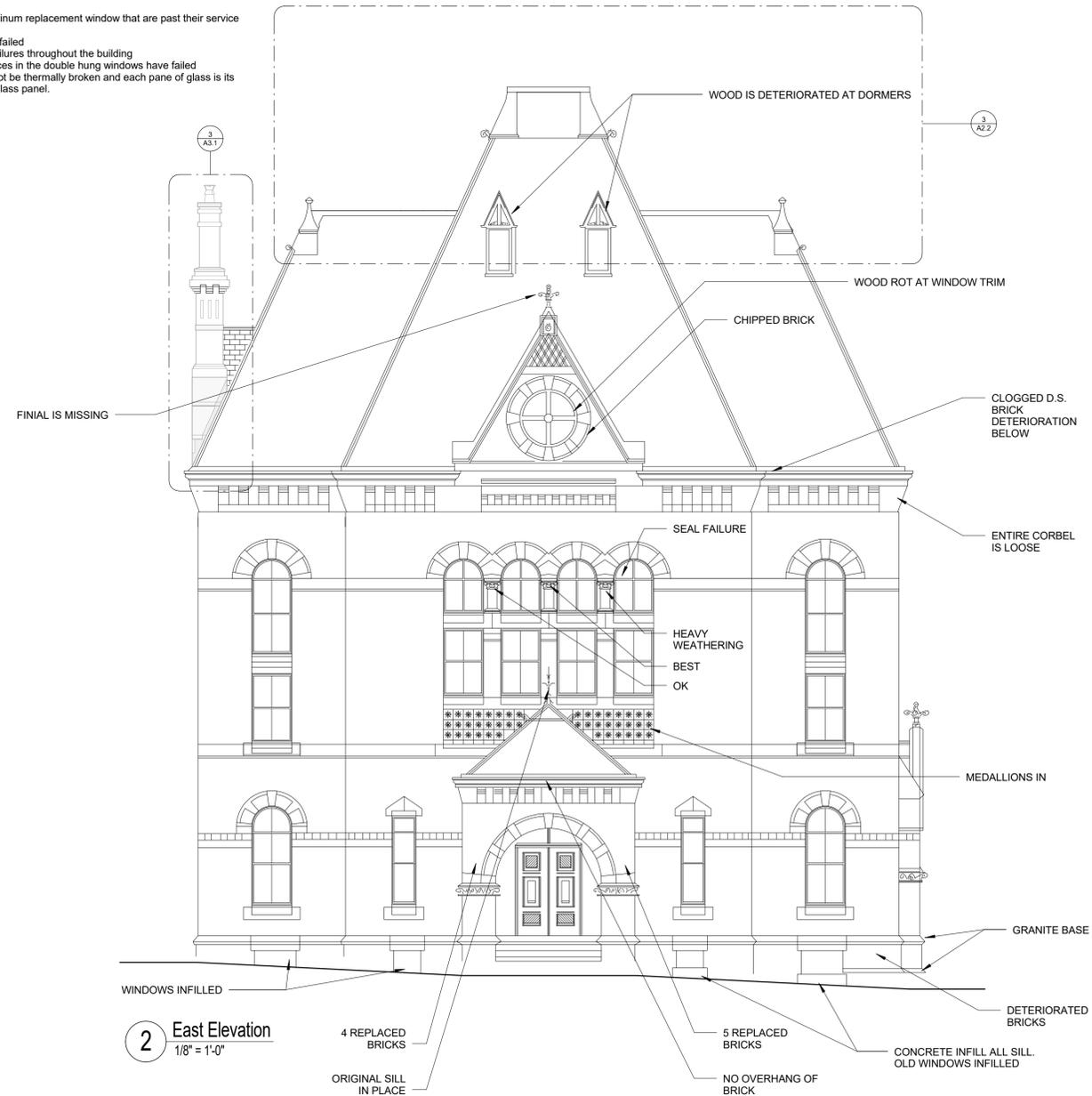
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**Windows:**

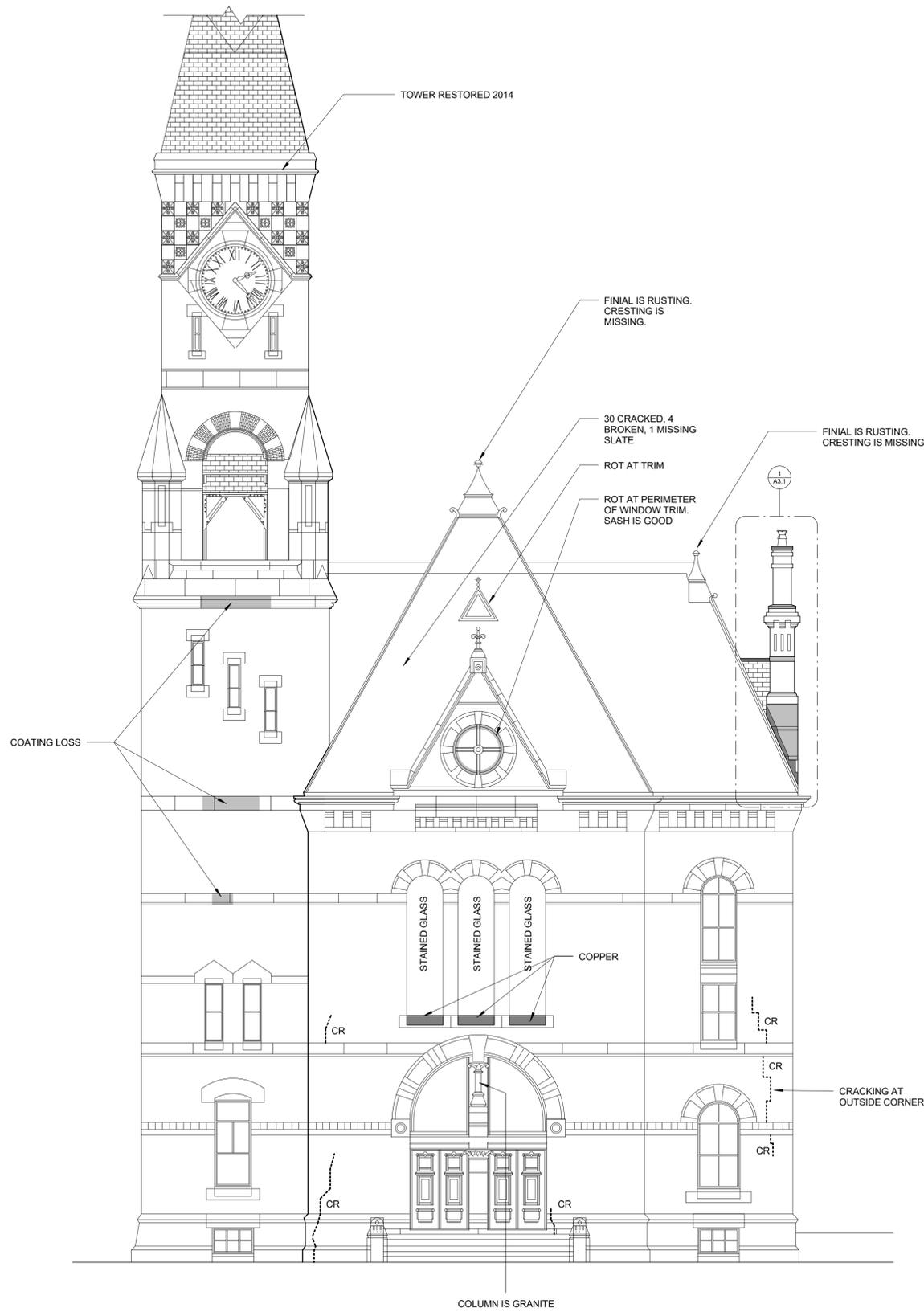
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**3 Cresting Elevation**  
1/8" = 1'-0"



**2 East Elevation**  
1/8" = 1'-0"



**1 West Elevation**  
1/8" = 1'-0"



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East and West Elevations

No. **A2.2**



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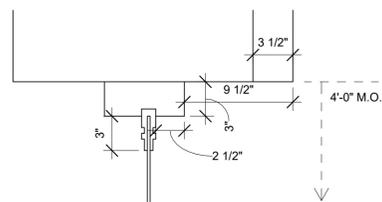
Date: 06/28/2017  
Scale: As indicated  
Drawn By: JMC  
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Project No: 1762.00

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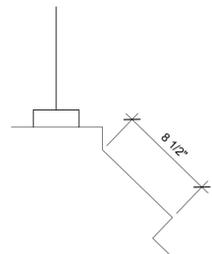
Details

No.

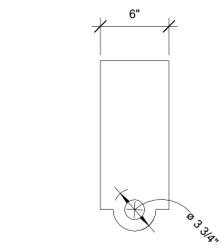
**A3.0**



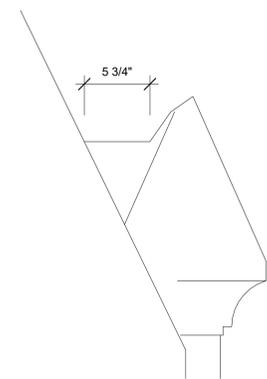
**5** South Elevation Window Jamb Detail  
1 1/2" = 1'-0"



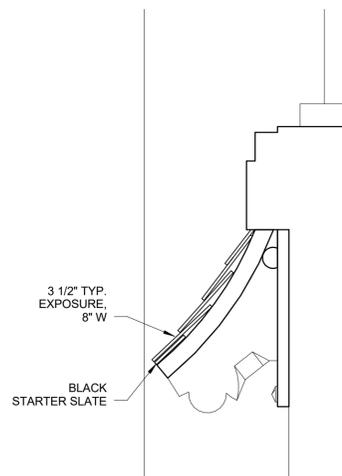
**4** West Elevation Window Sill Detail  
1 1/2" = 1'-0"



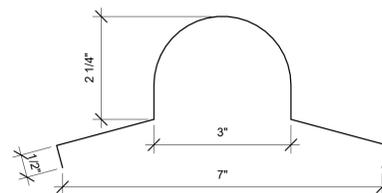
**7** Mullion Skirt Wood Detail  
1 1/2" = 1'-0"



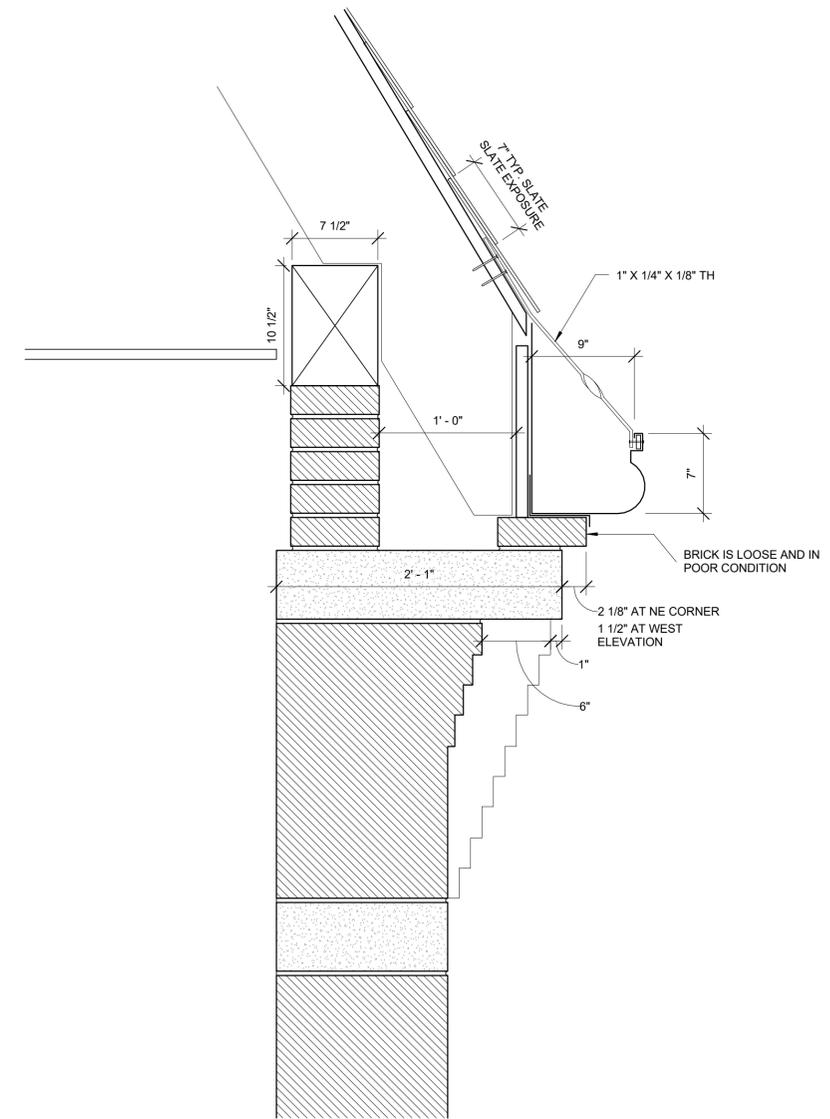
**2** Coping Stone Flashing Detail  
1 1/2" = 1'-0"



**6** Mullion Skirt Detail  
1 1/2" = 1'-0"



**3** Copper Ridge Detail  
6" = 1'-0"



**1** Eave Detail  
1 1/2" = 1'-0"



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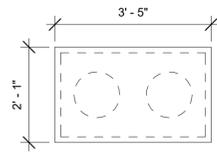
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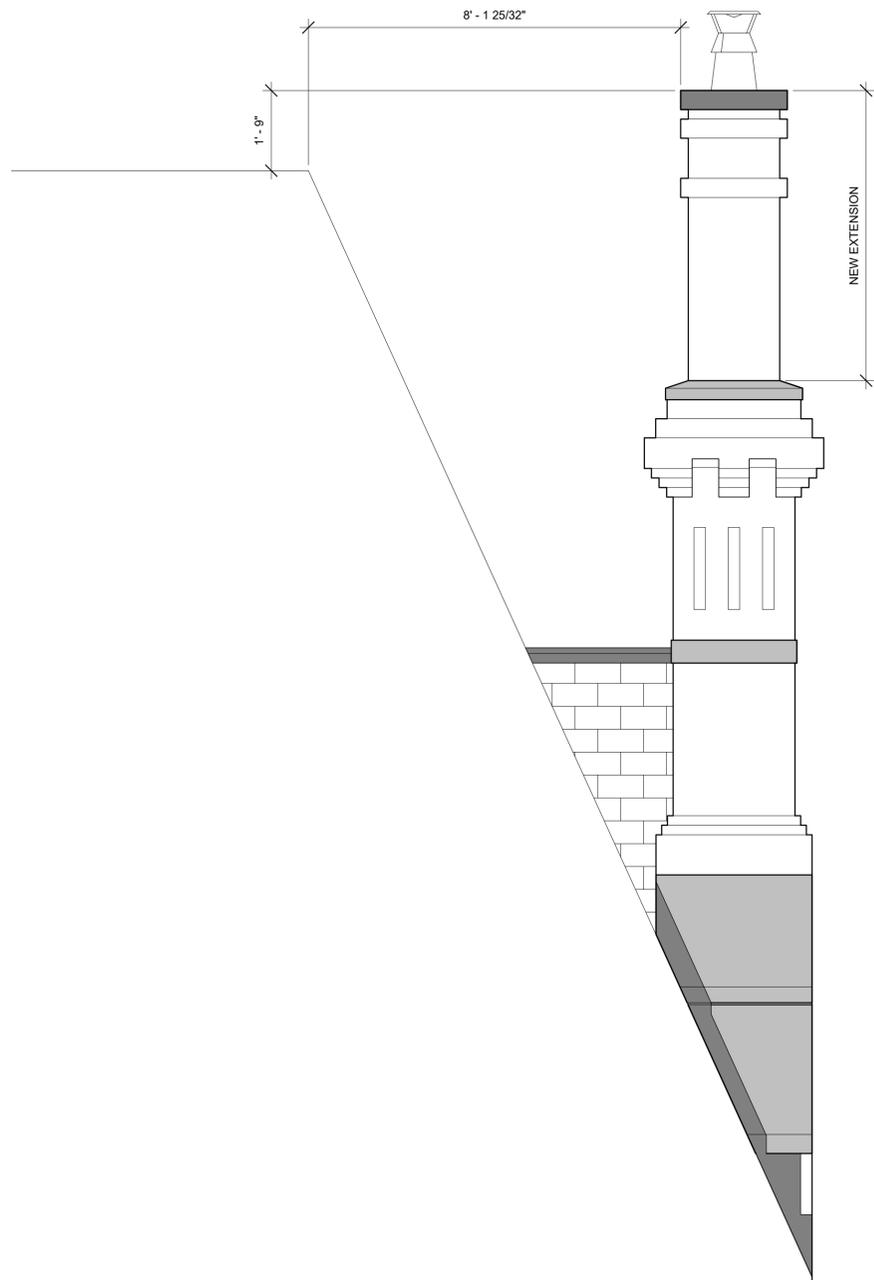
**Chimney Details**

No.

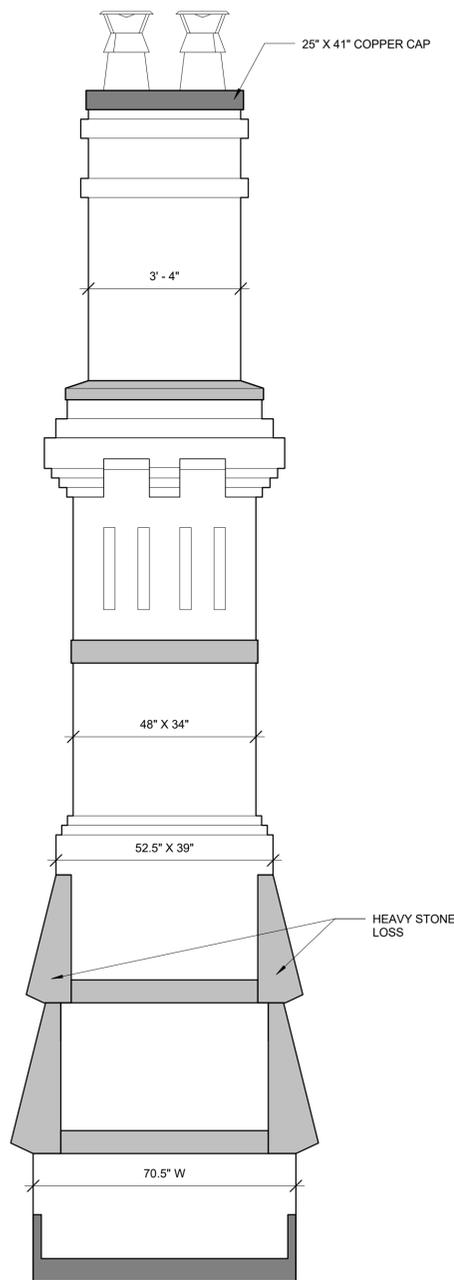
**A3.1**



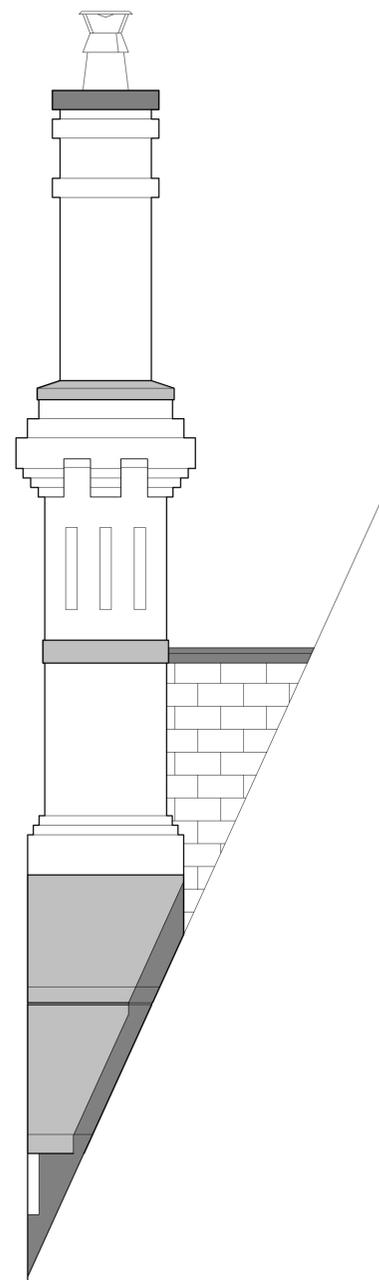
**5 Chimney Enlarged Plan**  
1/2" = 1'-0"



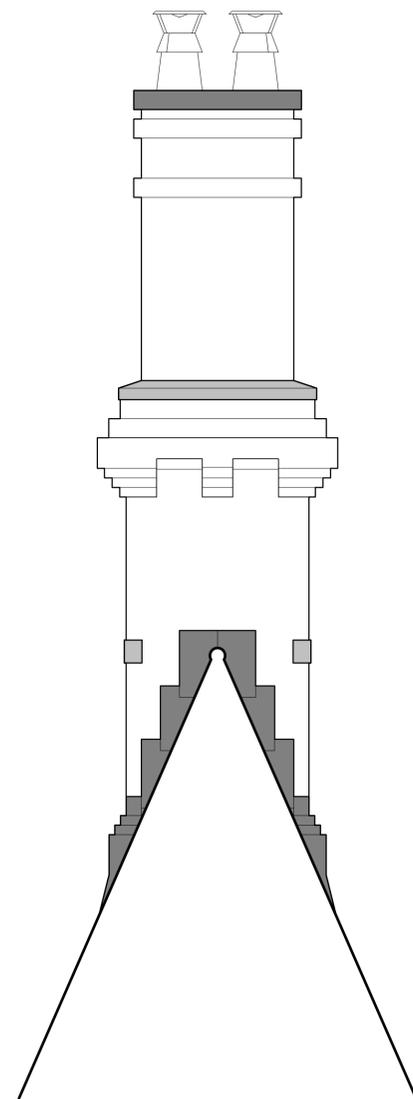
**1 Chimney West Elevation**  
1/2" = 1'-0"



**2 Chimney South Elevation**  
1/2" = 1'-0"



**3 Chimney East Elevation**  
1/2" = 1'-0"



**4 Chimney North Elevation**  
1/2" = 1'-0"



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1977 North  
Elevation

No.

X1.1



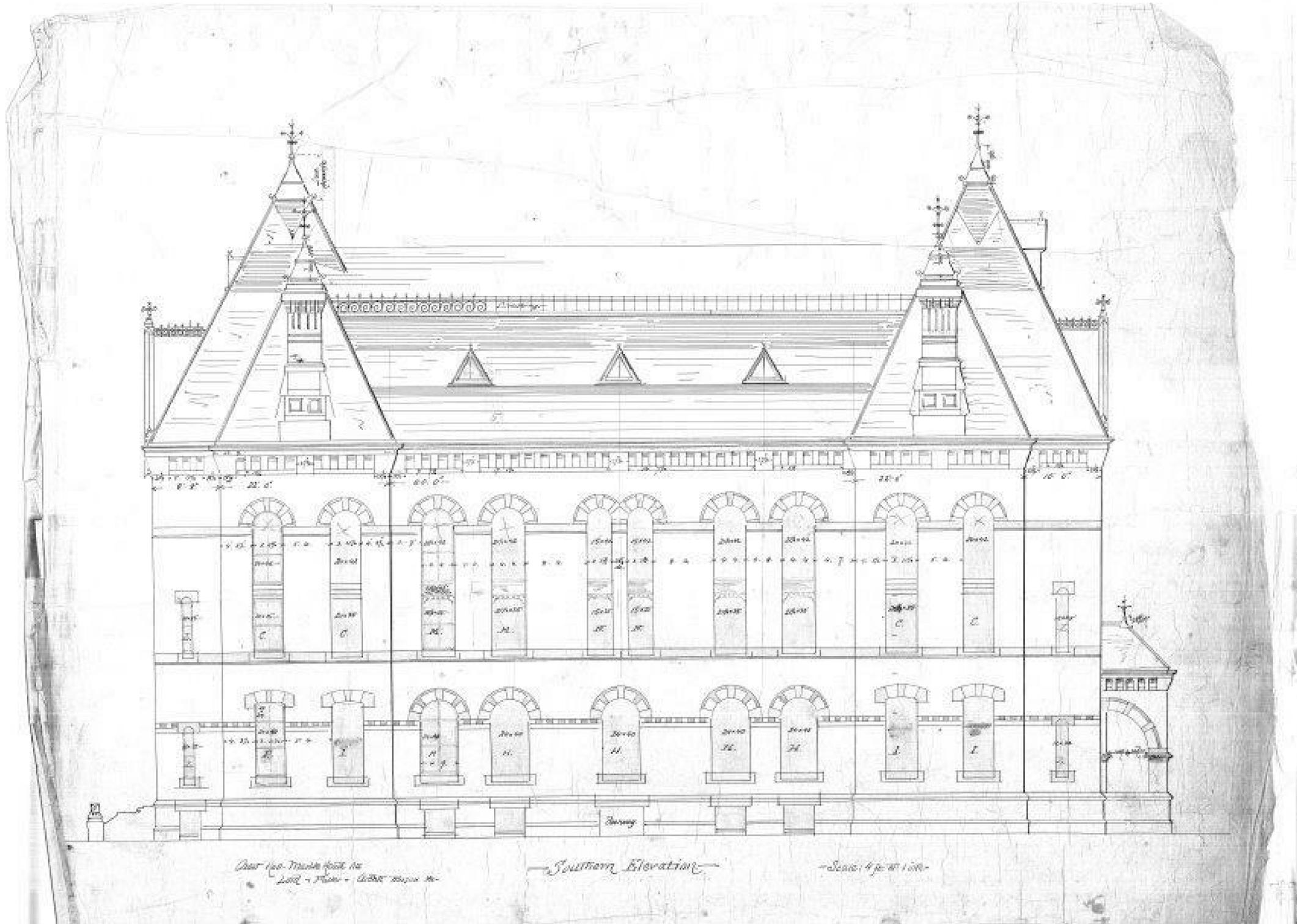
NORTH ELEVATION.

1"=16'



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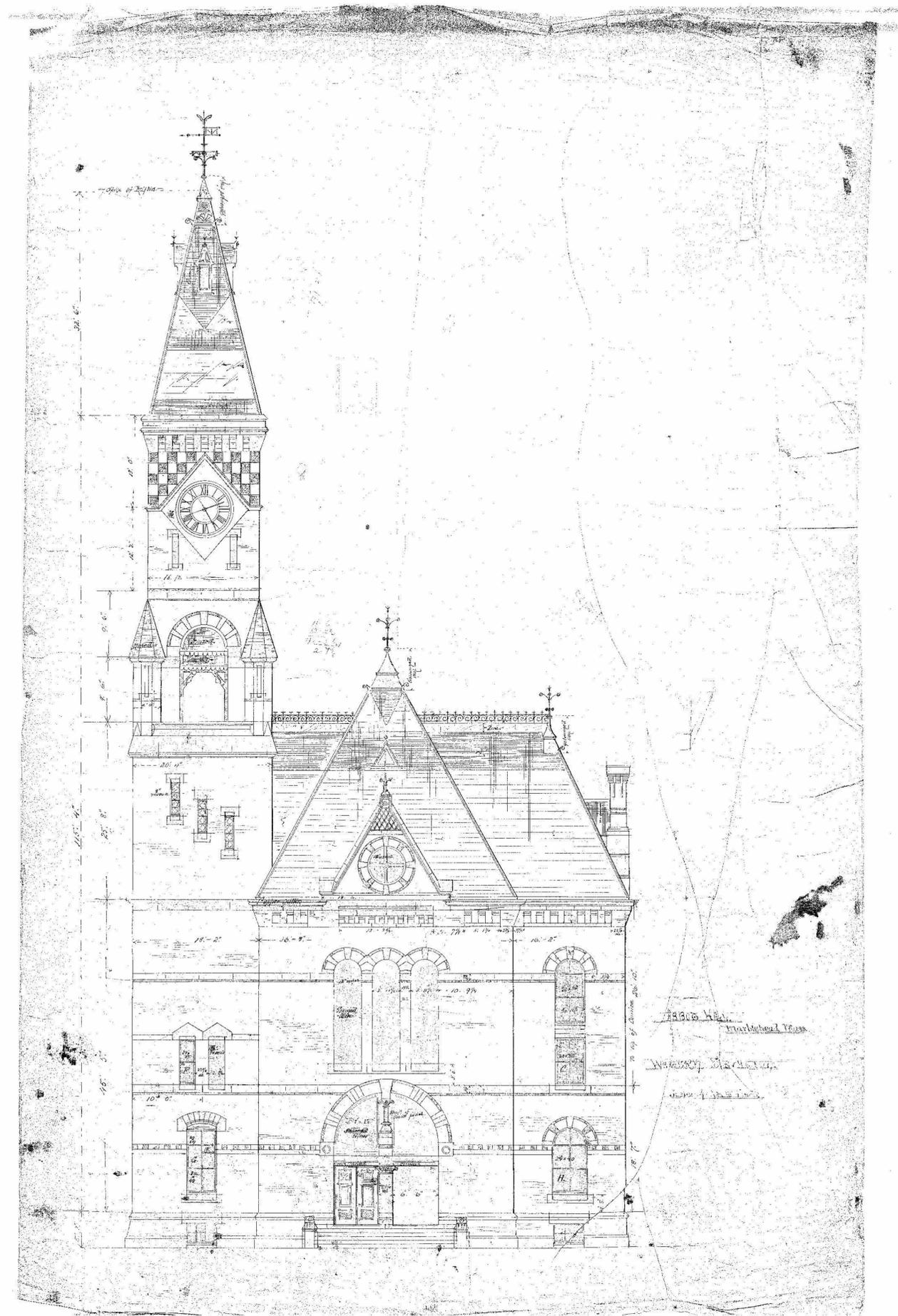
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Original South  
Elevation

No.

**X1.2**



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Original West  
Elevation

No.

**X1.3**



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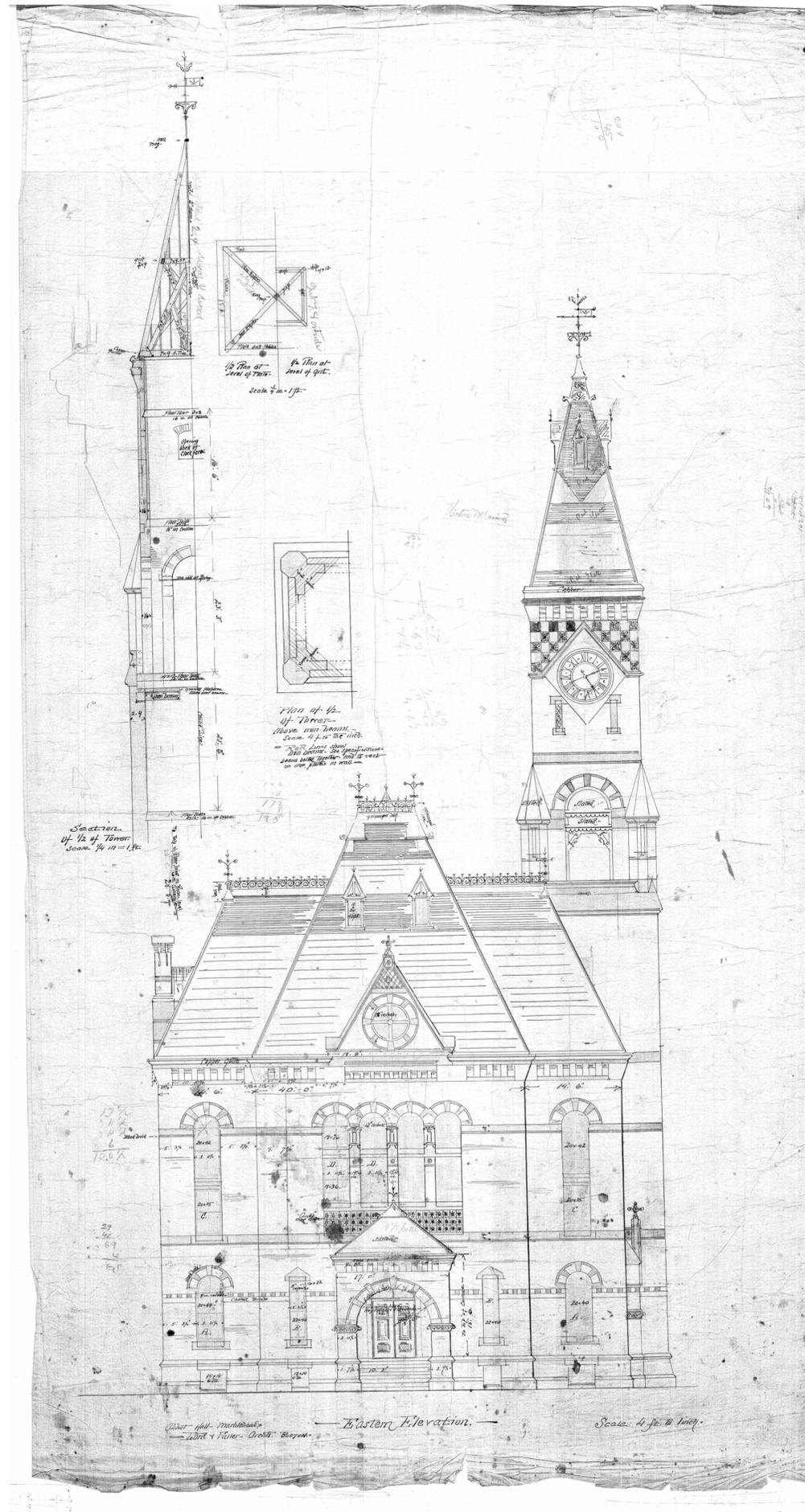
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Original East  
Elevation

No.

# X1.4



# ABBOT HALL

## SECTION 01520 - STAGING, LIFTS AND ACCESS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

The general provisions of the Contract, including General and Supplementary Conditions, and all Division 1 sections of the Specifications apply to the work specified in this section.

#### 1.2 SCOPE

- A. All staging, stairs, hoisting, rigging, lifts and access required to complete the work shall be provided as follows:
1. The General Contractor (referred to as Contractor) shall provide all staging, stairs, hoisting, rigging and access at the exterior of the building.
- B. The Contractor is responsible for obtaining and paying for permits, erecting and maintaining, in safe condition, all scaffolding, stairs and hoisting, and associated equipment required on the job. All work shall comply with OSHA requirements and the requirements of all applicable state and local laws, codes, regulations and ordinances. Specifically, the Contractor must designate a safety supervisor who is familiar with OSHA Publications 2202, 3077, and 3072, and those which concern construction industry safety standards, personal protective equipment, and sling safety and labor. No swing staging shall be permitted without specific written approval of the Owner.
- C. The Contractor shall control access to the work area and prevent unauthorized access to the work area and any area where there is danger from falling objects. The Contractor shall control access to the fenced side yards and enclose the work area with an eight (8) foot (min.) height chain link fence as required to protect the public. Posts for the fence shall be installed into the ground in both paved and lawn areas. The enclosed area shall be kept locked at all times except when workmen are at the site and have direct control over the construction area. 8 sets of duplicate keys shall be provided to the owner for all Contractor secured areas. Patch post penetrations to match adjoining material upon removal of enclosure fence.

Adjoining windows, roof and building surfaces shall be protected by the Contractor. The adjoining parking lot and walkways must be protected from falling dust, paint removal process, and general debris.

The Contractor shall allow access by the trades and coordinate scheduling and use.

## **ABBOT HALL**

### 1.3 SUBMITTALS

- A. The Contractor shall submit certification by a Massachusetts registered professional engineer certifying that the staging meets OSHA and applicable regulations and requirements.
- B. The Contractor shall be responsible for grounding the staging in compliance with UL requirements.
- C. The Contractor shall submit a written safety plan to the owner with detail for full protection along with a list of onsite competent persons.
- D. The Contractor shall submit a written schedule and work proposal identifying the proposed sequencing and coordination of the sub-trades' use of staging.

**END OF SECTION 01520**

# ABBOT HALL

## SECTION 04100 - MASONRY RESTORATION

### PART 1 - GENERAL

#### 1.1 INCLUDED IN THIS SECTION

- A. Selective dismantling and reassembly of designated and/or shifted masonry.
- B. Selective demolition and reconstruction of designated or failed masonry.
- C. Repair of structural cracks.
- D. Installation of masonry anchors and ties.
- E. Cutting and pointing of brick and stone masonry.
- F. Repair of damaged stone units.
- G. Replacement of carved sandstone units
- H. Masonry work related to installation of cathodic protection.
- I. Cleaning of existing masonry
- J. Removal of existing cementitious coating
- K. Installation of breathable masonry coating on all sandstone to remain and new cast stone elements to match the original sand stone color.
- L. Installation of water repellent
- M. Installation of lead T's at upward facing joints.

#### 1.2 SCOPE OF WORK

- A. The Work shall include all masonry work, the nature and quantities of which are detailed and described herein and on the contract drawings.
- B. The masonry Contractor shall be responsible for coordinating and insuring that all flashing and weep holes are installed.
- C. The masonry Contractor shall provide assistance in installation of the Cathodic Protection System via the cutting of slots and reglets, drilling of holes, and patching of the same.

#### 1.3 RELATED SECTIONS

- A. Section 04050 - Masonry Dismantling and Demolition

## **ABBOT HALL**

B. Section 02210 - Shoring, Bracing and Protection

### 1.4 REFERENCES

A. Comply with the following standard material specifications:

ASTM C33 - Concrete Aggregates

ASTM C141- Hydrated Hydraulic Lime

ASTM C144 - Sand for Mortar and Grout

ASTM C216 - Fired Clay Units

ASTM C270 - Mortar and Mortar Testing for Unit Masonry

ASTM C1713 – Mortars for the Repair of Historic Masonry

ASTM A276, Type 304 - Threaded Round Stainless Steel Bar Stock.

ACI 301 - Concrete Mix Design and Placement

ASTM C144 - Sand for Mortar and Grout

ACI 318 - Building Code Requirements for Reinforced Concrete for Buildings

ACI 530 - Building Code Requirements for Masonry Structures.

ACI 530.1 - Specifications for Masonry Structures.

ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.

ASTM A123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate.

ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.

ASTM A580 - Stainless and Heat-Resisting Steel Wire.

ASTM C216 - Facing Brick (Solid Masonry Units Made From Clay or Shale).

IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

UL - Fire Resistance Directory.

## **ABBOT HALL**

### **1.5 SUBMITTALS**

- A. Submit the following items to the Architect for review:
  - 1. Test reports required as per paragraph 1.6 - Quality Control.
  - 2. Product Data: Submit manufacturers' technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.
  - 3. Product data sheets and samples.
  - 4. Concrete mix design where needed.
- B. Submit shop drawings and samples for all masonry fabrications.
  - 1. Replacement stone sample where appropriate.
- C. Perform field-constructed mock-ups for review by the Architect:
  - 1. Samples of new structural pointing and patching mortars and grouts cured in same fashion as will be applied to structure.
  - 2. 24"x24" raking (joint cutting) test/sample patches for (as preparation for repointing work) to be provided by the Contractor at exterior and interior wall surfaces and located as agreed with Architect on site. No raking or joint cutting shall be started until samples are approved.
  - 3. 24"x24" pointing / repointing test/sample patches to be provided by the Contractor at exterior and interior wall surfaces and located at agreed with the Architect on site. No repointing shall be started until samples are approved.
  - 4. For each mason who will work on a particular task provide the following:
    - a. Mortar removal mock up for existing brick joints at brick harvest areas - 4' x 4'
  - 4. Work that does not match the approved sample panels shall be rejected and redone. The Contractor shall be responsible for producing as many sample panels as necessary to provide a match of existing adjacent work that meets the satisfaction of the Architect.

### **1.6 QUALITY CONTROL**

- A. Comply with all referenced standards for the products employed.
- B. Comply with requirements of Massachusetts State Building Code.

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- C. Coordinate times of Special Inspections to comply with Massachusetts State Building Code.
- D. All masonry work shall be performed by individuals with more than ten year well-referenced experience with historic brick and stone masonry restoration.
- E. All masonry work shall be performed by individuals with more than ten years of well-referenced experience with similar projects.
- F. During periods of cold or questionable weather, keep a log of work including air temperature and weather conditions, work started and completed per day, and tests taken. No work shall be done when the ambient temperature of the structure or the air is less than 45 degrees F.
- G. Produce mortar and grout samples in the form of 2" x 2" x 2" flat slabs, placed against wooden side forms and backing, for easy removal of cured sample. Provide 8 samples per mortar and grout type taken on different days and cured under conditions that match field conditions to testing laboratory for compression testing. Provide at least four 2" x 2" x 2" field cut samples of existing mortar to the testing laboratory for comparative compression testing. Contractor shall arrange for and pay for all testing and shall submit results at 7 days and at 28 days to the Architect. Adjustments in mix and re-tests shall be made as required at no additional cost to the owner. Test existing mortar samples and trial mixes at least three weeks before commencing masonry work.
- H. Masonry Contractor shall be a qualified, well-referenced brick and stone mason with at least 10 years of experience in masonry construction, repair, and restoration.
- I. Mortar colors and textures shall match existing cleaned stone and mortar surfaces. The contractor shall prepare an area of sufficient size to demonstrate the finish of tuck pointing mortar between the stones and stone filler mortar on the stones.

### **1.7 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.
- B. Protect mortar and other cementitious materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.
- C. Restore any damage to site caused by storage, mixing or construction work.

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- D. Packing and Loading of Materials: Carefully pack and load finished stone for shipment using all reasonable and customary precautions against damage in transit. Do not use any material that may cause staining or discoloration for blocking or packing.
- E. Store brick in a way that is conducive to pre-wetting and moisture acclimation, removing plastic wrapping. Spray with water at the beginning and end of each work day.
- F. Store cementitious materials off the ground, under cover and in dry location.
- G. Store aggregates where grading and other required characteristics can be maintained.
- H. Protect mortar materials and stone accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

### 1.8 SEQUENCING/SCHEDULING

- A. Order replacement brick units (if needed) at the earliest possible date, to avoid delaying completion of the Work.
- B. Utilize sequence that best suits the work.
- C. The existing exterior brickwork is in a dangerously unstable state. Schedule work to remove and/or at least brace all unstable masonry elements by the earliest possible opportunity in order to make conditions safe.

### 1.9 PROJECT CONDITIONS

- A. Do not repoint mortar joints or repair masonry unless air temperatures are between 40°F (4°C) and 80°F (27°C) and will remain so for at least 48 hours after completion of work. During periods of questionable weather keep a log of work including air temperature and weather conditions, work started and completed per day and tests taken.
- B. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.
- C. Protect sills, ledges and projections from mortar droppings.
- D. Protection: Protect and maintain all work in a dry safe condition for the duration of the work.
- E. Protection of Work: Cover tops of walls with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

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1. Extend cover a minimum of 24 inches down both sides and hold cover in place.
  2. Staining: Prevent grout or mortar from staining the face of stone to be left exposed. Remove immediately grout or mortar in contact with such stone.
  3. Protect surrounding surfaces from rain-splashed soil and mortar splatter by means of coverings spread on ground and over wall surface. Protect sills, ledges and projections from droppings of mortar.
- F. Remove all masonry determined to be frozen or damaged by freezing conditions.
- G. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface. Protect sills, ledges and projections from droppings of mortar.
- H. Protection During Cleaning: Protect persons, motor vehicles, construction site and surrounding buildings from injury resulting from stone cleaning work.
1. Protect all non-stone surfaces. Review all protective measures with Architect.
  2. Protect all non-masonry surfaces. Review all protective measures with Architect.
  3. Prevent cleaning solutions from coming into contact with pedestrians, motor vehicles, plant materials, buildings and other surfaces that could be injured by such contact.
  4. Do not clean stone during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
  5. Dispose of run-off from cleaning operations by legal means and in a manner which prevents soil erosion, undermining of paving and foundations, and damage to adjacent landscaping.

### **1.10 COLD WEATHER PROTECTION**

- A. Do not perform any wet masonry work when temperature of surrounding area is below 40 degrees F., or below 45 degrees F. and falling, or forecast by public news media to fall to or below 35 degrees F. within 24 hours without temporary heated enclosures or without heating materials or other precautions necessary to prevent freezing. Minimum temperature within heated enclosure shall be 40 degrees F. Do not use masonry materials which are likely to contain frost. Do not use accelerating ingredients with any mortar. Mortar shall harden without freezing and with no damage from frost. Protect all work against freezing for not less than 48 hours after installation.

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- B. Do not lay masonry units that are cold and wet or frozen. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen setting beds.
- C. Comply with requirements of International Masonry All-Weather Council's "Guide Specification for Cold-Weather Masonry Construction". Heat materials and provide temporary protection of completed portions of stone work.

### 1.11 MOCK UPS

- A. Submit the following mock ups for approval prior to starting the work in each section. Please note that some of the mockups must be performed by each mason working on that task. These mockups include: Raking out of joints, use of power tools, repointing and stone setting.
- B.
  - 1. Mortar removal mock up for existing brick joints - 4' x 4'
  - 2. Mortar removal mock up for sandstone joints - 4' x 4'
  - 3. Brick repointing mock up - 4' x 4'
  - 4. Sandstone repointing - 4' x 4'
  - 5. Sandstone Cleaning – 4' x 4'
  - 6. Brick Cleaning – 4' x 4'
  - 7. Removal of cementitious coating from sandstone 4' x 4'
- C. Mortar Approval: Submit as many samples in the existing wall as are required to obtain approval of sand stone and brick pointing mortars.
- D. Mortar color, texture and tooling: Match color, texture and tooling of existing mortars in areas indicated by project architect.
- E. Approved Mortar Sample: Protect and maintain approved mortar sample until all pointing work is completed and accepted.
- F. Washdown after Repointing: Test active chemical diluted 1:10 on scrap of sandstone. If initial application damages or etches sandstone, then notify architect prior to proceeding with additional mockups. Provide 6' x 6' mockups of washdown using specified product on repointed wall. Initial concentration to be 1:10. If additional mock-ups are required increase concentration of active chemical by one part per mock up: 1:9, 1:8 etc.
- G. Installation of lead joint covers. Provide mock up of one lead joint cover installed.
- H. Cleaning of brick and sand stone. Provide 4'-0" x 4'-0" mockups of brick and sandstone cleaning in areas designated by project architect.

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### 1.12 HOT WEATHER PROTECTION

- A. Protect masonry work in hot weather to prevent excessive evaporation of setting beds and grout. Provide artificial shade, wind breaks and use cooled materials as required. Use fresh mortar. Discard mortar that has stiffened due to hydration.

### 1.13 DEFINITIONS AND GOALS

- A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
- B. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.
- C. High-Pressure Spray: 800 to 1200 psi 4 to 6 gpm.
- D. Cleaning: The goal of cleaning is to remove surface soiling as well as active and inactive biological growth from the masonry.

## **PART 2 - PRODUCTS**

### 2.1 MASONRY UNITS

- A. Brick: Re-use existing bricks wherever possible, and only units that are in “good-as-new” condition. Otherwise, provide new ASTM C216, Grade SW, Low Absorption. Minimum strength shall be 8,000 psi, maximum water absorption shall be 8%. New units shall match size and shape of existing surrounding brick. Color shall be one shade darker than the existing brick in its present condition.
- B. Natural Stone: Clean, protect, and repair existing stone in accordance with this section. Replicate existing stone with new units only where indicated or original units cannot be salvaged and re-used.
- C. New Cast Stone: Provide new Cast Stone units in accordance with Section 04600: Unit Cast Stone, to be installed in accordance with This Section.

### 2.2 MORTAR AND GROUT

- A. Mortar and Grout Materials:

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1. Cement: Type 1 white and/or gray cement as follows: Portland Cement: ASTM C150 complying with staining requirements of ASTM C91 for a low-alkali cement having a maximum of 0.60% equivalent alkalies. Mortar shall show no efflorescence when cast in a 2" x 7" x 1/2" slab consisting of 1 part of the cement to be used, 2 parts Ottawa plastic mortar sand and distilled water, and subjected to a 7 day "wick test" conforming to ASTM C67.
  2. Hydrated Lime: ASTM C207, Type S.
  3. Coarse Aggregate For Grout: ASTM C-33, 3/8" dia. minimum gravel or stone.
  4. Fine Aggregate / Sand for mortar and grout: ASTM C144, washed, clean and free of salts. For use in mortar that will be used for pointing that is exposed to public view sand shall match the sand in the original mortar in color, coarseness and gradation, subject to review by the Architect.
  5. Water: Potable, clean, free of oils, acids, alkalis and organic matter.
- B. Provide mortar conforming to ASTM C1713 "Proportion Specification" in the formulation(s) as listed below.
1. Provide the following:
    - a. Structural mortar for Brick and Stone Masonry Reconstruction and Re-setting shall be 1 part Portland Cement, 1 part Hydrated Lime and 6 parts Bulked Sand.
    - b. Mortar for exposed Masonry Pointing / Repointing shall be 1 part Portland Cement, 2 part Hydrated Lime and 8 parts Bulked Sand.  
Sand shall be properly selected and blended to match the color, texture and appearance of the existing mortar sand, and when used, Portland Cement shall be a combination of white and gray cement that best suits the color matching of the existing mortar binder. Where additionally needed, up to 10% by mineral oxide pigment by weight of binder may be added to best match the color of the original mortar. Pigments shall be chemically pure mineral oxides, alkali proof and light fast, and shall be equal or equivalent to "Solomon Grind" as manufactured by Chem Services Inc, of Springfield, IL.
  2. The Contractor shall review test data and products with the Architect and any required adjustments shall be made. Contractor shall then submit a record mortar mix design along with product data sheets to the Architect for verification and review before beginning any mixing and/or setting.

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- C. Stone Repair Mortar for filling exposed holes, drill holes, surface joints and spalls in exposed granite shall be equal or equivalent to Jahn M70, Limestone, Sandstone and Brownstone Repair Mortar.
- D. Stone repair of cracked non-load bearing stones micro injection grout shall be equal or equivalent to Jahn M30, Micro Injection Grout for Brick and Softstone.
- E. “Restoration Grout” for filling voided collar joints behind projecting brick unit masonry and cast stone, for filling head joints between cast stone units that are too deep to point, for filling cavities within rubble stone and for filling any other masonry voids other than in concrete unit masonry shall be one of the following:
  - 1. “Pump X53iL” as manufactured by Edison Coatings of Plainville, CT (800-341-6621) with mid-range water content.
  - 2. “Jahn M40” Crack and Void Filling Grout as supplied by Cathedral Stone Products of Hanover, MD (410-782-9150), with mid to high range water content for flowability and strength reduction.
  - 3. “VoidSpan PHLc Grout” as manufactured by VoidSpan Technologies of Salem, MA (800-966-8643/ 800-966-VOID), with mixing water as specified by manufacturer.

Water content shall be adjusted only as allowed by the manufacturer in order to reach target values of shrinkage and compressive strength. Shrinkage shall not exceed 0.10 % and compressive strength shall be between 1,500 and 2,250 psi at 28 days as demonstrated by test or specifically documented by manufacturer’s literature.

### 2.3 MORTAR AND GROUT MIXING

- A. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
- B. Mix grout in accordance with ASTM C94 or thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 and/or manufacturer’s instructions.
- C. Mortar colors shall be chosen to match cleaned stone and mortar surfaces. Chemically clean an 18" square area of wall at a location to be designated in the field by the Architect for use in color comparison.
- D. Do not use anti-freeze compounds to lower the freezing point of grout.

### 2.4 REINFORCEMENT, ANCHORAGE AND ADHESIVE PRODUCTS

- A. Horizontal Joint Reinforcement: Truss type; extra heavy duty, stainless steel.

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- B. Provide stainless steel ties and anchors as indicated in accordance with Section 05500 – Structural Metals.
- C. Steel Tension Frames and Rods: See Section 05500 – Structural Metals.
- D. Sealant for Setting of Pins and Sealing Joints where indicated:
  - 1. Provide 2-component polyurethane complying with ASTM C-920 and Federal Specification TT-S-00227.
  - 2. Sealant shall be equal or equivalent to the Sika or Tremco product lines.
- E. Adhesive Anchoring System for Miscellaneous Embedded Items (pins, dowels and where indicated on the Contract Drawings as “Adhesive Anchors”) and Repairs:
  - 1. For anchorage to masonry: Equal or equivalent to Hilti HY20 Adhesive Injection System with properly sized Screen Tubes as manufactured by the HILTI Corporation of Tulsa, OK.
  - 2. For anchorage to large, non-porous solid masonry units (w/out crossing voids or cavities): Equal or equivalent to Hilti RE 500 Adhesive Injection System as manufactured by the HILTI Corporation of Tulsa, OK or Sikadur Injection Gel as manufactured by the Sika Corporation of Lyndurst, NJ.
  - 3. For pinning and bonding of stone dutchmen or fragments to parent units: Equal or equivalent to Sikadur Injection Gel as manufactured by the Sika Corporation of Lyndhurst, NJ.
- F. CINTEC Pinning Rods and Anchor Rods to Existing Masonry (location and diameter as indicated on the Contract Drawings as “Cintec Anchors”): Equal or equivalent to "Cintec Anchors" as detailed, manufactured and supplied by CINTEC America Inc., and available through Conspec Associates of East Haven, CT (203-467-4426).
- G. Dry-Set Helical Wall Ties (for anchoring existing veneers and wythes to back-up masonry): Equal or Equivalent to 8 mm "Helefix" dry set masonry anchors as available through Conspec Associates of East Haven, CT (203-467-4426).

### **2.5 MISCELLANEOUS PRODUCTS**

- A. Sealant and Backer Rods
  - 1. Provide 2-component polyurethane complying with ASTM C-920 and Federal Specification TT-S-00227E. Acceptable manufacturers: Equal or equivalent to Sika, Tremco product line.

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2. Provide closed cell backer rod at all sealant joints. Backer rod shall be carefully sized per sealant manufacturer instructions for each joint.
  3. Backer Boards shall be Preservative Pressure Treated (P/T) Southern Yellow Pine adhered to the interior faces of the step treads with an approved paste-type epoxy adhesive.
- B. Provide Plastic Shims as needed for initial leveling and floating of stone units into bedding mortar. These shall be a stone-suitable product that is equal or equivalent to those supplied by Korolath of New England, Woburn, MA.
- C. Epoxy Adhesive for Injection of Cracks in Damaged Stone Units and for adhering loose shards and repair Dutchmen: Equal or equivalent to “Sikadur Injection Gel” as manufactured by the Sika Corporation of Lyndhurst, NJ. or approved equal. Crack Sealant for Epoxy Injection: “Sikadur 33” as manufactured by the Sika Corporation of Lyndhurst, NJ, or approved equal, along with ports as required.

### 2.6 FINAL MORTAR WASHDOWN CLEANER

- A. For non-pigmented mortars, use equal or equivalent to “Sure Klean 600 Detergent” as manufactured by ProSoCo Corp.
- B. For pigmented mortars use equal or equivalent to “Vana Trol” as manufactured by ProSoCo Corp.
- C. Use only water where cleaning marble.

### 2.7 MASONRY CLEANER

- A. ProSoCo Inc. Light duty Restoration Cleaner diluted 1:5 with water – 5 minute dwell time.

### 2.8 WATER REPELLANT

- A. ProSoCo Inc. SLX 100 or approved equal

### 2.9 BREATHABLE MASONRY COATING

- A. ProSoCo Inc. BMC or approved equal.
- B. Tint BMC to match natural sand stone color.

### 2.10 CEMENTICIOUS COATING REMOVAL

- A. A pressure washer with variable fan tips.

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### **2.11 LEAD JOINT COVERS**

- A. Type A – Flat cap cover by Weathercap, Inc. sized to cover joint plus ¼” of stone on either side.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS OF THE WORK**

- A. An effort shall be made to minimize the need for on-site storage of masonry materials, close coordination of the field personnel, material suppliers and the general contractor shall be maintained to provide for a steady flow of materials on a close to as-needed basis.
- B. Document all existing masonry during dismantling, including masonry thicknesses, sizing and layout, openings and surrounds, bearing locations and critical coursing elevations. All documentation shall be recorded on sketches with scalable dimensions, stored both on site and offsite. All reconstructed work shall geometrically replicate the original construction.
- C. All dismantled work shall be fully documented and the original geometry of the structure (before bulging and sagging) be established. Reconstruction shall be done to replicate original geometry.
- D. Inspect all masonry within work areas; identify all required repairs and removals.
- E. Perform all other indicated masonry work in accordance with the requirements of this and all related section and references.

### **3.2 REMOVAL OF DESIGNATED OR DAMAGED BRICK MASONRY**

- A. Provide and install all temporary shoring, bracing and support to surrounding construction before beginning removal. Removal shall be done slowly and methodically to maintain stability to all remaining elements at all times. Contractor shall be responsible for maintaining integrity and safety of surrounding construction, in general, during work per the requirements of Section 02210.
- B. Carefully remove designated masonry, maintaining support to all surrounding and supported elements that are otherwise dependent upon the masonry being removed for support or stability. Following removal of the exterior grade veneer units, remove all remaining back-up masonry, storing both in separate locations. Clean and store all salvageable brick units for re-use, provide replacement bricks for units that cannot be re-used.

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- C. At all re-usable exterior brickwork, remove all mortar material from joints using a combination of hand tools and hand held grinders or specially designed mortar removal pneumatic tools. The use of hand held grinders or pneumatic tools will be allowed where, joint widths can accommodate a single pass of the blade without touching either edge of the stone and, where mortar joints can be mechanically cut without damaging the stone. Each mechanic must demonstrate proficiency in the use of hand held grinders or pneumatic tools. Electric or pneumatic demolition hammers, chipping guns or the equivalent will not be allowed for removing mortar from joints. Rake out mortar joints to a minimum depth of 1 ½” inch.
- D. Following removal of designated masonry, inspect and remove additional masonry that is loose, damaged or can be separated with unassisted hands.
- E. Clean the exposed surfaces of the remaining material, and remove shards of material which have become loose during work or have shifted from their proper positions. Notify Architect immediately of the number of brick wythes that need to be removed before preceding with work.
- F. Notify the Architect of any masonry beyond immediate work area, which becomes loosened during work. Stop work immediately, provide additional bracing and review with Architect before resuming.
- G. Protect the existing interior structure from the external weather and from dust and debris caused by these operations. Provide weather protection as needed until the external envelope is restored.

### 3.3 REMOVAL OF STONE MASONRY

- A. Identify the areas where shifted, damaged and/or designated masonry is to be removed, as designated on the Contract Drawings along with any additional areas.
- B. Clearly identify all stones that are to be reset by number. Photograph all existing work in place before removal.
- C. Evaluate each piece of finished stonework in place and determine the best, most gentle method(s) of removal for each unit. Locate and cut any anchors that are holding the units in place, providing support to the units while the anchors are being detached or cut so that the units do not fall or become stressed. If any of the units are found to be “headered” or irremovably locked into the back-up construction, stop removal work, brace the unit and notify the Architect of the condition.

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- D. Carefully remove designated stone units in proper sequence and demolish designated brick, rubble or grouted back-up construction. If any of the back-up or adjacent construction becomes destabilized during the removal process, stop work in the affected area and notify the Architect immediately. Meet all requirements of Section 02210 - Temporary Shoring and Bracing as well as Section 02050 - Structural Dismantling. Back-up construction shall be demolished where indicated and where found to be in unsound condition (schedule a site inspection with the Architect before proceeding with unsound masonry removal)
- E. After identifying and cutting demolition lines, carefully proceed with the required masonry removal, maintaining support to all surrounding and supported elements that are otherwise dependent upon the masonry being removed for support or stability. In the case of individual units that must be removed, limit sawcuts to joint lines in order not to damage the units.
  - 1. Carefully remove all stones by hand. Care should be taken not to cut the tops or bottom of the stones during disassembly or damage edges with prybars or other tools. Contractor to replace at no cost to the owner all units damaged during disassembly or reinstallation.
  - 2. Clearly label all required brickwork, sorting between bricks that must be discarded and bricks that can be re-used.
  - 3. Carefully remove all pins from all and mortar from salvaged masonry units without damaging units. Examine each unit for cracks and spalls. Verify repair treatments for each salvageable unit with the Architect.
  - 4. Safely lower and/or transport, store and protect all salvaged units on or offsite for re-use.
- F. Following removal of the units, inspect the remaining masonry along cut lines and/or wythe (collar) joint lines and remove all loose mortar or leftover broken units to expose flat, uniform surface and/or detaching each unit's anchors to the back-up construction and to the adjacent units. Additionally remove and re-set any loose or shifted masonry and notify the Architect of any such conditions before proceeding.
- G. Mechanically clean remaining surfaces and restore the exposed remaining masonry as needed per the requirements of this Section.
- H. Protect the interior of the existing structure from the external weather and from dust and debris caused by these operations. Provide weather protection as needed until the external envelope of the building is restored.

### **3.4 BACK-UP MASONRY EVALUATION AND EXCAVATION**

- A. Following removal of the exterior veneer, inspect all exposed back-up masonry and remove the following materials:

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1. All loose, weakened and/or shifted units.
  2. Internal back-up materials that are designated to be removed as part of overall reconstruction and stabilization.
  3. Cracked brick units that follow structural cracks that need to be replaced in order to stitch crack together.
  4. Mortar from all decomposed or cracked mortar joints.
- B. Clean the exposed interior surfaces of the remaining material, and remove shards of material, which have become loose during work or have shifted from their proper positions. Notify Architect immediately of the number of brick wythes that need to be removed before proceeding with work.
- C. Provide and install all temporary shoring, bracing and support as may be necessary to surrounding construction before beginning removal. Removal and replacement shall be done sequentially to avoid weakening too much of the structure at one time. Contractor shall be responsible for maintaining integrity and safety of surrounding work as well as the tower, in general, during work per the requirements of Section 02210 – Temporary Shoring and Bracing.
- D. Notify the Architect immediately of any adjacent masonry or supported elements beyond the immediate work area which become loosened during work, of rotten wooden elements, or of excessively rusted steel elements that become exposed during the work. Stop the affected work and await Architect's instructions should these conditions be encountered.

### **3.5 REPAIR OF EXISTING BACK-UP MASONRY**

- A. Remove all loose masonry units, mortar and residue from surface of back-up construction without disturbing or weakening or destabilizing the masonry. Employ a "pressure washer" and regulate the nozzle pressure to clean but not damage the surfaces. Nozzle pressure shall be in the range of 600 psi with a 15 degree fan at the tip.
- B. Identify and remove loose units and re-set them with new mortar slushed into surrounding voids. Add bricks as may be appropriate to re-stitch the wall or pier to a sound, unfragmented condition.
1. Locate damaged and/or loose brick or stone units to be removed. Pull unit(s) out of wall with a gentle rocking action, driving wedges into surrounding joints only as required to snap this joint off. Bricks may be removed up to 4 at a time.

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2. Set new replacement brick units into wall in orientation and locations of existing damaged units. Pre-wet existing construction and fully butter all contact surfaces of new units during setting, striking mortar at distance of 1" back from the ashlar face of the masonry to allow for final tuck pointing.
- C. Grout-inject cracks and small voids encountered, and fill hollow cavities encountered in existing masonry to remain in accordance with this Section.
  - D. Fill hollow cavities encountered in existing masonry to remain with extended lime-cement grout or mortar per the requirements of this Section.
  - E. Inspect all joints and rake deteriorated or softened mortar joints to a minimum depth of 1", or as deeply as necessary to reach sound mortar, but not to exceed one half of the thickness of the joint without supplementary means of support. Employ tools that are sharp and will completely cut out joints at intersections without splitting or damaging stones. Drive hardwood shims into joints that will be cut more deeply than 1 1/2" to prevent the wall construction from shifting. Cut joints shall match the approved sample patch.
  - F. Push the new pointing mortar into the joints, evacuating air bubbles with the sharp end of a trowel, and strike surface of joints to match existing surrounding joints. Provide "shed joints" to shed water away from horizontal projections that may otherwise collect water. Hold mortar back from architecturally exposed surfaces by 1/2" to 1" to allow for final tuck of finished pointing mortar.
  - G. Moist-cure all work under a tarpaulin or plastic sheets. Following curing period, maintain weather protection to interior of structure until exterior wall system is replaced.
  - H. Work under this subsection shall only be done when the ambient air, material, and substrate temperatures are above 40 degrees F. by 9:00 AM and rising.

### 3.6 EXCAVATION AND REPAIR OF CRACKS IN BRICK MASONRY

- A. Diagonal and Vertical Crack Repair
  1. Except at cracks that run in the extreme corners of the building, carefully remove two wythes of brickwork along diagonal step and vertical cracks to expose remaining depths of cracks in back-up construction.
  2. Remove two brick wythes from each wall face, along with all loose mortar and residue from remaining surfaces within crack excavations without disturbing or weakening or destabilizing the masonry. Employ a "pressure washer" as needed and regulate the nozzle pressure to clean but not damage the surfaces. Nozzle pressure shall be in the range of 600 psi with a 15 degree fan at the tip.

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3. Working from the exposed back-up surfaces at all cracks, identify and remove any loose remaining units and re-set them with new mortar slushed into surrounding voids. Add new bricks in place of damaged bricks, tooting them into the surrounding work to re-create solid conditions within the walls.
4. Point the cracks in the remaining back-up wythes and insert regularly spaced ½' diameter plastic grouting tubes into the pointing mortar.
5. After the mortar has stiffened, gravity feed grout into the pointed cracks via a funnel and the plastic tubes. Vary the injection pressure by varying the height of the funnel with the plastic tubes. Randomly drill-test the grouted joints during the first stages of grouting to verify the effectiveness of the injection procedures.
6. Following internal re-setting and/or grouting of the back-up construction, re-set original bricks (or salvaged re-used replacement bricks) into the toothed openings along the crack locations, fully bedding all of the units (top, bottom, ends and back sides) in wet mortar. Strike and finish-point the work to match the existing surrounding construction.

### B. Horizontal Crack Repair

1. Mechanically widen and clean horizontal cracks in brickwork being careful not to sever the self-support of the wall by cutting all of the way through it.
  - a. Remove mortar from sides of cracks to expose ends of bricks at each side of widened horizontal joints.
  - b. Flood cracks with water at 10 psi maximum pressure and allow deleterious materials and any sand or residue to flow out at bottom.
  - c. Temporarily shim widened cracks that may cause the supported masonry above to shift downward after cleaning.
2. Clean and inspect back surfaces of walls for corresponding horizontal cracks and rusted metal embeds and notify the Architect of any and all such locations.
  - a. Look for embedded steel elements and inserts that are rusted and may have caused the horizontal cracks. Notify the Architect of any and all such locations and coordinate crack repair with rusted lintel replacements.
  - b. Where cracks are present in the back-up, restore the back surfaces of the wall in a fashion similar to what is described for back-up repair under Item "A" working from the back or front of the wall where appropriate.

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- c. “Sound-out” brickwork along vertical cracks to check for delamination from the backup. Remove and re-set loose, shifted or delaminated brickwork as described under Item “A” above.
  3. After cracks are cleaned and back-up wall surfaces are repaired (or inspected showing no damage), pressure-pack grout into the crack in advance of pointing.
    - a. Pack a pasty mix of grout into the cleaned and widened horizontal cracks, ramming the grout into place with metal or wooden packing tools.
    - b. Start at one end and progress to the other watching for the forward advancement of grout from deep within the crack during the packing and ramming process.
  4. Following grouting, point the horizontal cracks, pushing mortar deeply into any remaining recesses and voids. Tool to match the surrounding original construction. Clean all newly re-set and repointed surfaces after completion of masonry work.
  5. Perform all work incrementally and brace wall as needed to maintain safe vertical and lateral support.
- C. Work under this subsection shall only be done when the ambient air, material, and substrate temperatures are above 45 degrees F. by 9:00 AM and rising and less than 90 degrees F.

### 3.7 REPAIR AND PREPARATION OF DRESSED STONE UNITS FOR RE-USE

- A. Following removal, mechanically and chemically clean all salvaged stone units to be re-used. Identify all chips, spalls and cracks and soft or weathered areas, and notify the Architect of all such conditions.
- B. Document conditions of units before and during removal. The Contractor shall be responsible for replacement of any units that are irreparably damaged due to improper removal or handling and shall replace such at no additional cost to the owner.
- C. Remove all ferrous inserts and connectors from units and patch remaining holes.
- D. Trim and/or grind bearing surfaces and drill holes in units as needed for re-attachment as shown on the Drawings or per instructions given by the Architect. All cuts and modifications shall be made in a careful manner so as not to cause any damage to or weaken the units.
- E. Injection of Cracks in Intact Stones (both sides of crack in fixed position):

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1. Drill holes in crack and insert grouting ports at between 4" and 6" on center. Verify that crack width is equal to or less than 1/4".
  2. Seal surface of crack between and around grouting ports with crack sealant. Surface seal shall be pigmented to match surrounding stone.
  3. Pressure-inject crack with injection gel, starting from bottom port and proceeding upward as each successive port fills.
  4. Allow to cure, remove ports and grind off crack sealant.
- F. Re-attachment of Detached Stone Fragments:
1. Remove loose stone fragments from parent material. Install straight 3/16" diameter stainless steel threaded repair pins on a 4" by 4" pattern but at least 2" from any stone edges where stone shards are more than 6" wide or 2" thick. Hole shall be oversized for epoxy adhesive and shall be run through the loose shard into the parent stone. Follow procedures detailed in Subsection 3.6 of this Section for installation of adhesive-set pins.
  2. Clean contact surfaces between stone fragments.
  3. Pre-butter surfaces to be bonded with injection/ setting adhesive and adhere together in position, and immediately inject the repair pin holes and insert the rods to a depth of 1/2" from the surface of the stone shard. Refer to the Contract Drawings and Subsection 3.4 of this Section for this repair-pinning work.
- G. Spall, Hole and Chip Repair: Clean all spalls, holes and chips and inspect remaining material, removing any loose flakes, spalls or cracked material.
1. Edge spalls and chips shall be repaired in accordance with the Contract Drawings using matching stone Dutchmen. Carefully cut out the stone to the proper geometry (as indicated), not removing any more material than absolutely necessary. Adhesive-bond new dutchmen into the prepared recesses using gel type adhesive, recess adhesive by 1/8" to 1/4" on all exposed sides of the adhered joint, which itself shall not exceed 1/16" in width. Push matching stone repair mortar into the recessed joints and after curing the exposed joints shall be grind smooth to create a barely visible repair.
  2. Empty drill holes shall be repaired by coring or reaming to the smallest diameter that will allow the hole to be cleaned and rounded, and new matching cores of 1/8" to 1/4" smaller diameter shall be set into the holes with a neat mix of stone repair mortar and the cured circular joint shall be ground smooth on all sides to create a barely visible repair.

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3. Surface spalls that do not cross any edges shall be prepared and repaired using stone repair mortar in accordance with the repair mortar manufacture's instruction and requirements.

Follow the requirements and procedures of all adhesive and repair products employed in this work.

- H. Filling of Voids, Nicks and Recesses in Stones: Hand-rub a latex cement paste slurry on surfaces to be bonded to and hand trowel or form matching plug and filler mortar on surface immediately thereafter. Moist-cure.
- I. Carefully core-drill holes in units to receive setting pins, avoiding cracks, repairs and fissures in stones that could cause further damage. Pin hole locations should be coordinated with field-set pin locations and any modifications to the layout shown on the Contract Drawings shall be presented to the Architect for review.
- J. Before, during and after work, store units in a dry and safe location.
- K. Work under this subsection shall only be done when the ambient air, material, and substrate temperatures are above 40 degrees F. by 9:00 AM and rising.

### 3.8 INSTALLATION OF DOWELS, ANCHORS, TENSION RODS AND CONNECTORS

- A. Drill holes for embedded anchors, dowels and rods as follows:
  1. Locate holes within the existing masonry so that they are at least 2" from the nearest joint intersection and within the faces of existing units rather than in the joints.
  2. Monitor Conditions of brick or stone units as the drill is advancing into them. Check for vibration or movement of brick units halfway through each by tapping with the bit. Notify the Architect if the brickwork or stonework feels "soft".
  3. All holes greater than 1/2" diameter shall be drilled using a diamond tipped core drill, dry application on interior surfaces, wet or dry application on exterior surfaces. Do not use a rotary hammer or impact type hammer for holes greater than 1/2" in diameter.
- B. Install Adhesive-Set connectors, pins and dowels as shown on the Contract Drawings and as described below using the applicable Injection System.
  1. Carefully drill holes of the proper oversize diameter for the screen tube (in masonry) and for injection resin or sealants 1/8" larger in diameter than the anchor rod or pin, or as indicated on the Drawings or specified by the manufacturer of the injection system if different.

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2. Locate and size anchors and pins in as indicated in the Contract Documents and as needed per Architect's field instructions following exposure of hidden conditions.
  3. Provide embedments as noted or instructed but not less than 8" embedment at 1/2" diameter and larger anchors or 4" embedment at anchors of less than 1/2" diameter.
  4. Incrementally core-drill all holes being careful not to damage or loosen substrate and being careful to avoid embedded metal if any.
  5. Simultaneously with injection of holes, pre-butter rods' surfaces with injection resin so that there is a uniform coating all around the rod of between 1/16" and 1/8" in thickness and insert rods immediately thereafter.
  6. Wipe off excess resin and clean out remaining hole depth. Do not allow resin to leak out of holes and stain stone surface(s). Remove resin immediately if this happens!
  7. Monitor progress and quality of work, adjusting techniques as may be necessary with approval of the Architect. Check that annular space is filled around the end of each rod following insertion. If properly installed, resin should be oozing out beyond end of rod all around annular space, showing that the annular space and the hole are completely filled. Supplementary injection may be necessary due to the presence of voids.
- C. Provide stainless steel pins and anchors for re-setting and setting of stone units as follows:
1. Provide metal dowels as specifically detailed on the contract drawings (modified if necessary to suit field conditions) or per the field instructions of the Architect based upon existing conditions that must be uncovered for setting of stone units.
  2. Provide 3/16" diameter all-threaded repair pins to cross all cracks in stone units. Locate these at least 1" from the nearest edges and within middle portions of cracks, with a depth of at least 3" to each side of the crack, quantity= one pin per nine square inches of crack. Actual configuration and locations of pins to be determined by the Architect in the field during removal of the units, assume at least 10 pin installations.
- D. Install Cintec Anchors in accordance with the following:
1. Coordinate design and installation of Cintec anchoring system with manufacturer.

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- a. Forward contract drawings, required load information and description of conditions to a representative of Cintec America, Inc. and arrange site visit to observe existing conditions and review installation.
  - b. Cintec America shall provide written verification of design load and installation and shall provide additional installation requirements and instructions. Submit to Engineer for review before proceeding with installation. Adjustments shall be made if necessary to the anchor design at no additional cost to the owner but no adjustments shall be made in diameter of rod nor reduction in embedment.
  - c. Satisfy Cintec contractor training and certification requirements and successfully complete at least 4 trial anchor installations in field satisfaction of a qualified Cintec representative (unless more are required to obtain certification).
  - d. Successful trial installations may be used as permanent installations.
2. Install anchors in arrangement indicated on the contract drawings and by the size indicated on the contract drawings and verified or modified by the manufacturer in accordance with the approved procedures. Coordinate anchor rod installation and layout with layout and installation of connected elements and within required tolerances. Cut-off or remove grouting ports following installation.
  3. Comply with requirements of Quality Control under Part 1 of this specification for installation of Cintec Pinning Rods and Anchors. No pullout testing shall be done as would cause irreparable damage to surrounding structure.
  4. Fill any exposed installation holes in exterior stone units in accordance with the requirements of this section.
- E. Install Dry Set Helical Anchors in accordance with the following:
1. The following work shall be performed by an experienced mason who had at least 10 years of practical experience with work on older brick and stone structures and who has been successfully trained in the installation of the "Blok-Lok" system. The following requirements apply to anchoring of existing veneers and wythes to back-up masonry.
  2. Carefully drill lead holes through external veneer of wall and into back-up masonry to the depths and diameters specified in the general notes on the contract drawings and in the spacing(s) and arrangement(s) indicated on the wall elevations or by the Architect.
    - a. Locate holes within the faces of masonry units so that they are at least  $\frac{3}{4}$ " of all free edges of brick units, 2" from all free edges of stone units and 3" from the nearest crack or spall.

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- b. Monitor Conditions of brick as the drill is advancing into the wall. Check for vibration or movement of brick units halfway through each by tapping with the bit. Notify the Architect / Engineer if the brickwork feels “soft”.
  - c. Incline the lead holes at an angle of 30 degrees from perpendicular in the vertical and horizontal directions. Randomly vary the direction of each lead hole over the wall area so that all four directions have been included.
  - d. See additional limitations on drilling under Item E.
3. Anchor Installation: Install Anchors as follows:
- a. Place end of helical tie at hole and vibrate into hole using a rotary hammer with anchor installation tool that fits around the anchor to brace it against buckling during installation.
  - b. Change tools during advance of anchor to successively shorter lengths but not too short that anchor will buckle.
  - c. Complete anchor installation using finishing tool to set end of anchor into veneer with 1/4” to 1/2” recess.
  - d. Install anchors in quantity arrangement and size as indicated on the contract documents following any required adjustments in lead hole diameter and following completion of trial load test procedure.
4. Fill installation holes in exterior veneer with matching “plug mortar”.
5. Additional Limitations on Drilling: Do not drill more than ten holes on any given wall surface until at least 5 consecutive anchors have been completely and satisfactorily installed 3 consecutive trial load test have been successfully completed on that wall surface. If the 5 successful installations and 3 successful load tests have not been completed, then the lead holes may either be too small (anchors bending during installation) or too large (anchors pulling out under load). Stop work and notify Manufacturer’s representative and Architect to modify lead hole diameter. See Item F for load test procedure.
6. Trial Load Test Procedure: Drill 3 initial lead holes in each type of veneer installation and perform 3 pull-out load tests using the procedure set forth by the manufacturer and as follows: install test anchor 3 3/4” into veneer and place test gage around anchor to press against wall surface. Place test cap on anchor and screw tight. Apply test load of at least 250 lbs on anchor and adjust following initial creep. Sustain test load for 2 minutes and release. Complete installation load tested anchor after completion of test.

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### 3.9 MASONRY RECONSTRUCTION

- A. Establish lines, levels, and coursing indicated. Protect from displacement. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Document and match existing masonry bond as viewed from the exterior.
- C. Set masonry units as follows:
  - 1. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
  - 2. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
  - 3. Remove excess mortar as Work progresses.
  - 4. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
  - 5. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges. Prevent broken masonry unit corners or edges.
  - 6. Masonry units shall be laid in Running Bond except where there are multiple wythes, full header units shall be provided on a 16" x 16" pattern, whether of block or brick.
  - 7. Pilasters shall be constructed in a woven pattern that is fully toothed into the main liner walls, with interlocking header units making up 50% of the total vertical cross-sectional area in each direction.
- D. Inter-wythe Tying of Masonry
  - 1. For tying between re-set brickwork and remaining backup construction in bonded collar joint construction, provide custom adhesive set stainless steel wire ties as detailed on the drawings, on a 16" x 16" max. width x height pattern.
  - 2. For tying between wythes of re-set brickwork, provide extended wire ties (as described above) and joint reinforcing, in addition to perpendicular header bricks on a 16" x 16" max. width x height pattern.
  - 3. For tying between re-set stonework and remaining or re-set brickwork and/or stonework, provide custom stainless steel ties as detailed on the drawings.

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- E. Install horizontal joint reinforcing per notes and details on structural drawings. Lap reinforcing to develop full tension capacity of bar (50 bar diameters or greater). Support and secure reinforcing bars from displacement.
- F. Match all original recesses, header and soldier coursing, either with full or rotated half-bricks and install all stone sills, stone lintels, metal lintels, flashing, accessories and other embedded items as indicated or as needed to match the original construction.
- G. Work around windows and doors, toothing and interlocking with existing brickwork to remain.
- H. Embed ends of sills in mortar; leave remainder of joint open until final pointing.
- I. Recess all mortar joints by 2 ½-times their widths in preparation for final pointing.
- J. Moist-cure all completed work for periods of not less than 72 hours.
- K. Remove excess mortar from the surface before it sets using a bristle brush or by rubbing the surface with burlap or clean sand. Dried mortar may be removed with chemical excess mortar remove by written permission of the Architect.
- L. Perform no mortar work in wet weather or when rain is predicted within two days unless work is protected within waterproof enclosures. Extend waterproof covers securely over work area at the conclusion of each work day.
- M. Work under this subsection shall only be done when the ambient air, material, and substrate temperatures are above 40 degrees F. by 9:00 AM and rising.
- N. The Architect reserves the right to reject any brickwork or stonework not meeting requirements of this section or matching the approved test panel and shall have rejected work removed and re-set at no additional cost to the owner.

### **3.10 SETTING/ RE-SETTING TOLERANCES**

- A. Maximum Variation from Plane of Wall: 1/4" in 10 feet or as required by elevator clearances.
- B. Maximum Variation from Plumb: 1/4" per story non-cumulative, 1/2" total, or as required by elevator clearances.
- C. Maximum Variation from Level Coursing: 1/8" in 4 feet, 1/4" in 10 feet.
- D. Maximum Variation of Joint Thickness: 1/8".

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### **3.11 SETTING OF STONE CAPS OR COPING**

- A. Measurement and Preparation:
  - 1. Clean contact surfaces of stones of all existing mortar or deleterious materials. Clean surfaces to expose stone below.
  - 2. Measure stones to establish existing geometry and for establishing proper relationship and orientation between stones when re-set. Proper Relationship shall be such that all three principle axes of each stone are parallel with the respective principal axes of the mating stone (or CMU backup). Orientation of stones shall be established for each unit so that the front and top direction is maintained constant between all interconnected units and to match the present orientations, and so that the pieces fit together like a puzzle and existing pins and holes align.
  - 3. Drill holes in units to receive setting pins according to the Contract Drawings and this Section.
- B. Size and arrange lead shims and on bearing surfaces. Shims shall be lead sheet of proper size and shall provide for full and symmetrical bearing of reset stone to within 1/16" tolerance of the indicated geometries.
- C. Fill setting pin holes on undersides of units with sealant and carefully set stones into proper final positions.
- D. Coordinate flashing installation and provide integral flashed "thimbles" over all setting pins.
- E. Following setting of stonework, point and/or flexibly seal the inter-stone joints as and where indicated on the Contract Drawings.
- F. Work under this subsection shall only be done when the ambient air, material, and substrate temperatures are above 40 degrees F. by 9:00 AM and rising.

### **3.12 PREPARATION OF JOINTS FOR REPOINTING**

- A. Rake mortar joints in existing construction in areas designated to be repointed to a minimum depth of 2.5 times the mortar joint width, 1", or as deeply as necessary to reach sound mortar (whichever is greatest), but not to exceed one half of the thickness of the stone thickness without supplementary means of support. Employ tools that are sharp and will completely cut out joints at intersections without splitting or damaging stones or bricks. Raking work shall match the approved test sample.

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- B. Gently drive wedges or hardwood shims into wide, deep cracks in masonry where there is a possibility that the vertical and in-plane lateral support of masonry work will be compromised during deep raking of the joints. This should at least be done where more than half of the length of a specific joint is removed to a depth of more than one third of the thickness of the stone.
- C. Cut flashing reglets in new or existing masonry as indicated on the Contract Drawings.
- D. Wire brush clean and then pre-wet the joints and allow for the existing mortar to dry or saturate to a dull, non-glossy finish immediately before applying new mortar.
- E. Where applicable, lead-abate all immediate lead-painted masonry surface areas that will be affected by cutting and pointing work, prior to starting masonry operations.

### 3.13 MORTAR JOINT POINTING

- A. Pre-wet prepared mortar joint surfaces until they are saturated but surface dry. At flashing reglets, verify that flashing has been fully installed and is stable.
- B. At new or re-set masonry and deeply cut mortar joints Apply a 3/8" base lift of tuck pointing mortar, and allow to cure. Base lift shall have a struck recess for tuck-pointing to lock into.
- C. Apply final "tuck" lift of pointing mortar, tooling joints to exactly match the existing joint profiles that are adjacent to the work.
- D. Where so specified, point joints and beds with specified sealant after first installing the specified backup material and applying primer if required, all in strict accordance with the printed instructions of the sealant manufacturer. Test all sealants for compatibility prior to use. Tool all sealants to insure maximum adhesion to contact surfaces.
- E. Moist cure all work, spraying with a water mist and cover with damp cloth or tarpaulin.
- F. Clean mortar from all surfaces following completion and curing of work.
- G. Work under this subsection shall only be done when the ambient air, material, and substrate temperatures are above 40 degrees F. by 9:00 AM and rising.
- H. The Contractor shall be responsible for matching the joints of the mock-up surrounding work and shall re-cut and replace any joints that are poorly formed or do not match the mock-up or the surrounding work, as determined by the Architect, at the Contractor's own expense.

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- I. Moist cure all work, spraying with a water mist and cover with damp cloth or tarpaulin.
- J. Chemically clean all surfaces following completion and curing of work, being careful to reveal the mortar aggregate but to not over-etch, weaken or discolor the mortar. Remove excess mortar from the surface before it sets using a bristle brush or by rubbing the surface with burlap or clean sand. If mortar is left on the surface, wash surface clean.
- K. Completed work shall match approved sample patch or shall be re-done at the Contractor's expense.

### **3.14 CLEANING AND PROTECTION OF COMPLETED MASONRY WORK**

- A. As work proceeds and upon completion, remove excess mortar, smears and droppings. Clean adjacent and adjoining surface of marks arising out of execution of work in this Section.
- B. Sweep up and remove daily sand, cleaning compounds and mixtures, dirt, debris and rubbish. Sweep or flush away nightly, all residual washed materials. Keep the premises neat and clean at all times.
- C. After installation and pointing are completed, carefully clean all surfaces of all dirt, excess mortar, grout splatter, stains and/or other site incident defacements. Clean soiled surfaces using a non-acidic solution that will not harm stone or adjacent materials. Consult stone fabricator for acceptable cleaners. Do not use wire brushes, acid or other solutions which may cause discoloration. Use nonmetallic tools in cleaning operation. Apply in accordance with cleaner manufacturer recommendations.
- D. Mechanically remove all loose mortar and concrete splatter with hand tools without scratching, gouging or otherwise marring the existing substrate.
- E. Chemically clean stone following completion of work, and where specifically specified on the drawings.

### **3.15 INSTALLATION OF FLEXIBLE SEALANTS**

- A. Provide backer rod and sealant where indicated on the Contract Drawings.
- B. Install backer rod and sealant in strict accordance to manufacturer's instructions. Use primer where recommended by manufacturer.
- C. Size backer rod for each joint size.
- D. Install sealant to the depth recommended by the manufacturer for each width of joint. Joint profile shall match adjoining mortar profile. Face of joint shall be sanded so that color and texture shall match adjoining mortar joints.

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- E. Sealant at backer rod shall be installed at all locations indicated on Drawings and at all locations subject to structural or thermal movement.

### **3.16 CLEANING OF MASONRY**

- A. Perform cleaning to the standard established in the approved mockups.
- B. Protect window glass, woodwork and other adjacent finishes.
- C. Test pH of limestone in at least 5 locations prior to cleaning to establish a baseline for rinsing.
- D. Pre-wet surface with clean water.
- E. Apply cleaner using a brush or roller. Scrub gently to improve results.
- F. Let cleaner dwell for length of time established in approved mock ups. Scrub gently heavily soiled areas. Do not let chemicals dry on the surface.
- G. Rinse surface thoroughly with clean water using a low-pressure washer fitted with a 45-degree fan tip at no more than 400 psi. Power washer marks of any sort will not be acceptable.
- H. Repeat cleaning where necessary to achieve level of cleaning established in approved mockups.
- I. Test pH of substrate after rinsing in the same five locations. If substrate has not returned to original pH levels continue rinsing until original pH levels are reached.

### **3.17 APPLICATION OF WATER REPELLENT**

- A. Mortar cure: Allow pointing mortar to cure a minimum of 28 days before applying water repellent.
- B. Dry Surfaces: Do not apply water repellent directly after a rainfall or when masonry is still wet. Moisture content of stone and mortar must be below 15% before water repellent can be applied.
- C. Window Protection: Cover windows prior to application.
- D. APPLICATION

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Before applying, read “Preparation” and “Safety Information” sections in the Manufacturer’s Product Data Sheet for SLX100® Water & Oil Repellent. Refer to the Product Data Sheet for additional information about application of SLX100® Water & Oil Repellent. Do not dilute or alter.

### **Vertical Surfaces:**

1. Apply protective treatment in a single, saturating application. Use enough to thoroughly wet the surface and create a slight rundown below the spray pattern. Apply uniformly. Don’t over apply.
  2. Brush heavy runs and drips thoroughly into the surface.

### **Horizontal Surfaces:**

1. Apply protective treatment in a single application. Use enough material to keep the surface wet for about a minute before penetrating.
  2. Broom out all puddles thoroughly until they completely penetrate the surface.
  3. Wipe down excess with a clean, absorbent towel.

#### A. Porous Surfaces:

Two applications of protective treatment will provide superior protection. Apply the second coat within a few minutes after the first coat has penetrated and appears dry.

Note: Protect treated surfaces from rain and pedestrian & vehicular traffic for 4 hours.

### 3.18 APPLICATION OF BREATHABLE MASONRY COATING

- A. Apply Tinted BMC Fixative to sand stone and cast stone substrate that has been cleaned as per the specifications in this section.
- B. Demonstrate through testing that the surface of the cleaned stone has returned to its original pH level established during the cleaning tests.
- C. Apply coating before final lift of pointing is completed. Protect recessed joints from contamination by coating material.
- D. Apply two coats of BMC to all surfaces
- E. Protect coated surfaces from rain for 24 hours until base coat has set.
- F. Tint coating to match original sand stone color as approved by architect.

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### **3.19 INSTALLATION OF LEAD 'T' CAPS AT SKYWARD FACING JOINTS**

- A. Rake out deteriorated mortar joints to remove deteriorated mortar for the full height of the joint.
- A. Repoint joint, holding back mortar sufficient depth to install lead weathercap in specified sealant.

### **3.20 REMOVAL OF CEMENTICIOUS COATING**

- A. Use a high pressure wash to spray down the masonry. Start with the widest fan from the farthest distance away from stone. Progressively move closer to the stone with narrower fan tip until the coating is removed from the stone without damaging or marking the stone.

**END OF SECTION 04100**

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## **SECTION 07500 –ROOFING AND FLASHING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

The drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections and relevant sections of these Specifications, apply to the work specified in this Section.

#### **1.2 DESCRIPTION OF WORK**

- A. Provide and install all sheet metal roofing, pitch pockets, down spouts, flashing and sill covers.
- B. Provide and install replacement slate roof where indicated on the drawings
- C. Provide and install slate replacements where indicated.
- D. Maintain a watertight building at all times.
- E. Where materials are indicated as “replacement” on the Drawings, removal and legal disposal of the existing materials is part of this SECTION.
- F. Provide and install replacement copper gutters, stiffener bar, and twisted support bars.
- G. Provide and install replacement galvanized iron decorative finials
- H. Provide and install replacements copper flashings, hip caps, and misc. copper accessories.

#### **1.3 RELATED WORK**

- A. SECTION 06200 – FINISH CARPENTRY

#### **1.4 SUBMITTALS**

- A. Submit shop drawings detailing special joint or termination conditions, and conditions of interface with other materials.
- B. Submit product data for roofing products. Submit sample warranty prior to start of work.
- C. Submit full size sample of each detail and fabrication.

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### 1.5 QUALITY ASSURANCE

#### A. Roofing Contractor:

1. The subcontractor shall have not less than five years successful experience restoring copper and slate roofing. This experience shall include at least five (5) projects of comparable size and complexity on historically significant buildings during the last three years.

### 1.6 JOB CONDITIONS

#### A. Installation

Do not install copper or roofing material on snow or ice-covered or wet surfaces.

#### B. Field Conditions

The Installer must examine the roofing substrates and the conditions under which the roofing work is to be performed, and notify the Contractor in writing of any unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

## **PART 2 - PRODUCTS**

### 2.1 MISCELLANEOUS MATERIALS

- A. Ice and watershed: "Ice and Watershield" manufactured by W. R. Grace. Under all copper roofing and flashing, provide W. R. Grace "Ultra"
- B. Nailers, blocking and miscellaneous framing: #2 CCA treated (.40 lb./c.f.) S.P.F.
- C. Lead: 4 lb./s.f.
- D. Rosin paper: Type 1, Grade A, 6 pounds per 100 square feet.

### 2.2 COPPER AND ACCESSORIES

- A. All copper unless otherwise noted shall be 20 ounce copper. Copper shall be equal to Freedom Gray zinc-tin alloy coated copper by Revere Copper Products, Inc. and conforming to ASTM-B32. Zinc-tin alloy shall be applied by hot-dip process
- B. All fasteners shall be copper, brass or bronze.

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- C. All fasteners shall be concealed or protected from weather.
- D. Sealant shall be polyurethane manufactured by Sika or Tremco.
- E. Straps shall be cold rolled copper sized per drawing or if no specific information is given per Revere "Copper and Common Sense" or SMACNA's recommendations.
- F. Solder shall be pure tin or lead-free high tin per ASTM B32.
- G. All exposed edges shall be hemmed.
- H. Replacement wood ridge and hip poles: white oak; match profile of existing.

### 2.3 SLATE

- A. Slate shall conform to classification S-1 per ASTM C406-84. Slate shall be hard, dense, sound rock, punched for two nails each. Drilled slate shall have holes countersunk for nail heads. No cracked slate shall be used. No broken corners or covered ends which sacrifice nailing strength or the laying of watertight roof will be allowed.
- B. Provide Owner with a minimum of one square of surplus slate at the end of the job for use in maintenance.
- C. Nails for slate: 10 gauge hard solid copper chisel-point slater's nails with minimum 5/16" diameter head and sufficient length to penetrate into sheathing at least 1".
- D. New slate shall be equal to Unfading Red and North Country Black sized to match existing, with exposure to match.

## **PART 3 - EXECUTION**

### 3.1 HOISTING

Provide, set-up and maintain all required derricks and hoisting machinery and perform all hoisting required to complete the work. Comply with OSHA and other relevant safety regulations.

### 3.2 EXAMINATION

Examine substrate and conditions under which roof work is to be performed; notify Architect in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected.

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### **3.3 REMOVAL OF EXISTING MATERIALS**

All removal operations shall be in compliance with local, state and federal regulations. All roofing material to be removed shall carefully lowered to the ground and legally disposed of off site. No free fall of roofing materials is permitted. Carefully protect existing work.

### **3.4 SHEET METAL FABRICATION**

- A. Generally comply with SMACNA's "Architectural and Sheet Manual," and the requirements of NRCA's "A Manual of Roofing Practice."
  - 1. Teardrop hem all exposed, free edges.
  - 2. Fully solder non-moving seams. Neutralize flux after soldering. Prior to solder, the pre-weathered coating must be removed and surfaces to receive solder must be chemically and/or mechanically cleaned to produce bright, clean alloy.
  - 3. Fabricate to accommodate expansion and contraction. Provide sealant filled expansion control joints within 8 feet of ends of long runs and not over 20 feet on center in between.
  - 4. Fabricate to be free from buckles, waves, oil canning, tool marks, and appearance defects.
  - 5. Fabricate with sharp, even, true, and accurately aligned lines, joints, and seams.
  - 6. Turn and fabricate lock joints to best shed water.
  - 7. Fabricate work for maximum waterproofing and weathertight performance.
  - 8. Form work to fit substrates and field conditions.

### **3.5 SLATE INSTALLATION**

- A. Where there is variation in the shading of slate, the contractor shall blend slate batches to achieve a uniform, random mix of the shades of product prior to installation.
- B. Beginning at eaves, install slate roofing shingles in accordance with recommendations of manufacturer and with details and recommendations of NRCA Steep Roofing Manual. Provide continuous starter strip under slate at eaves. Provide minimum 3" lap between succeeding courses of slate shingles and break (stagger joints between courses a minimum of 3"). Do not allow a joint to be installed over a joint in the row immediately below. Cut and fit slate neatly around roof vents, pipes, ventilators and other projections through roof.
- C. Nail slate shingles so nail heads just touch slate lightly, do not drive nails "home" or draw slates downward.

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- D. Slates overlapping sheet metal work shall have the nails placed as to avoid puncturing the sheet metal. Exposed nails shall be permissible only in top courses when approved by the Architect.
- E. Cover all exposed nail heads with elastic cement.

**END OF SECTION 07500**

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### SECTION 08600 - WOOD WINDOWS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

A. Furnish and install the following items:

1. New wood replacement windows, where indicated on the Drawings.

##### 1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of minimum test size required by AAMA/NWWDA 101/I.
- B. AAMA/NWWDA Performance Requirements: Provide wood windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S. Rating DP 30.

##### 1.3 SUBMITTALS

- A. Product Data: For each of the proposed hardware pieces and for proposed glazing.
- B. Shop Drawings: Include the following:
1. Layout and installation details, including anchors.
  2. Typical window unit elevations at ¾ inch scale.
  3. Full-size details of typical and composite members.
  4. Hardware, including operators.
  5. Glazing details
  6. Accessories.

##### 1.4 PROJECT CONDITIONS

- A. Field Measurements: Check actual openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

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1. Carefully and accurately record dimensions, construction, and detailing of existing windows in good condition and replicate the existing windows to the greatest extent possible.

### **1.5 QUALITY ASSURANCE**

- A. Single source Responsibility: Provide windows produced by a single manufacturer or fabricator who is capable of documenting at least 10 years of successful production of units similar to those required.
  1. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

### **1.6 WARRANTY**

Special Warranty: The Contractor shall warrant and obtain from the manufacturer its warranty that the wood window assemblies as specified in this section shall be free from defects in workmanship for two years for the Date of Substantial Completion. Said manufacturer's warranty shall be in a form acceptable to and for the benefit of the Owner, and shall be submitted by the Contractor as a condition of final payment. The Contractor shall replace, at the sole option of and at no cost to the Owner, any work found to be defective within the warranty period. Such repair or replacement shall include the cost of removal and reinstallation.

### **1.7 RELATED WORK IN OTHER SECTIONS**

SECTION 06200 – FINISH CARPENTRY

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide windows with argon filled insulated glass, 7/8" simulated divided lights with BLACK spacer bar, and LoE272 glass. Products by one of the following:
  1. Marvin Windows and Doors
  2. Loewen
  3. Kolbe & Kolbe Millwork Co., Inc.
- B. Window Types: The project requires double hung and fixed windows.

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### **2.2 FABRICATION**

- A. General: Fabricate wood windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.
- B. Fabricate wood windows that are reglazable without dismantling sash or ventilator framing.
- C. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.
- D. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with glazing system indicated. Provide glazing stops to match sash and ventilator frames.
- E. Factory machine windows for all hardware and provide and install hardware.
- F. Brick moulding: Provide exterior wood brick moulding to match existing profile.
- G. Species: Vertical grain fir.

### **2.3 WOOD FINISHES**

- A. Shop-Primed Units: Provide 1.0 to 1.5 mil thick shop prime coat on all interior and exterior wood surfaces. Provide alkyd based wood primer which is compatible with the specified field finish (latex gloss enamel).

### **2.4 WINDOW 122**

- A. Window 122 shall be a fixed ½” insulated glazing unit directly glazed to a new wood frame.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- B. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

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- C. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weatherstripping for smooth operation and weathertight closure. Lubricate hardware and all moving parts.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.
- E. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- F. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

**END OF SECTION 08600**

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## SECTION 09900 – PAINTING (FILED SUB-BID REQUIRED)

### PART 1 – GENERAL

#### 1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Town of Essex at a time and place as stipulated in the "INSTRUCTIONS TO BIDDERS".

The following should appear on the upper left hand corner of the envelope:

NAME OF SUB-BIDDER: (Insert name of sub-bidder)

PROJECT:

SUB-BID FOR SECTION: 09900 – PAINTING

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the Town of Essex as required by Section 44F of Chapter 149 of the General Laws, as amended.
3. Sub-bids filed with the Town of Essex shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the Town of Essex in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

#### 1.2 SCOPE

Provide all labor, materials, equipment, supervision and related services and items necessary to perform all PAINTING work.

A. Work Included:

1. Preparation, priming and painting of all existing wood shingle siding to remain. Note that all new wood shingles shall be pre-primed and provided under SECTION 06200 FINISH CARPENTRY. For Alternate No. 1,

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- provide a deduct alternate price for deleting priming of existing wood shingles at the exterior.
2. Preparation, priming and painting of all new and existing exterior wood trim.
  3. Preparation, priming and painting of all exterior wood doors.
  4. Preparation, priming and painting of existing painted interior woodwork and painted doors.
  5. Preparation and painting of all new windows.
  6. Preparation, priming and painting of all new doors and frames and interior woodwork.
  7. Preparation and painting of all new and existing plaster and gypsum board walls and ceilings.
  8. Preparation and painting of all interior existing plaster, restored plaster, new plaster and gypsum board wall surfaces and other surfaces as indicated on Finish Schedules, drawings or needed for a complete project.
- B. Examine Contract Documents to determine full extent of painting, staining and finishing work required. Materials provided under other Sections that need painting, staining or finishing and are left unfinished under requirements of other Specification Sections, shall be painted, stained and finished to completion under work of this Section, unless specifically scheduled herein to be left unfinished.
- C. Preparatory work of materials and surfaces to receive paint or stain beyond that specified to be done as work of other Sections, shall be included as work of this Section. This preparatory work shall include preparation of existing wall, metal and wood surfaces to receive paint.
- D. Provide, operate and maintain all temporary hoisting equipment and provide, maintain and remove all staging and scaffolding, and rigging required for all painting work outside of the general contractor's scaffolding areas.

### 1.4 SUBMITTALS

- A. For information only, submit two (2) copies of manufacturers specifications, including paint label and analysis for each material specified and/or used.
- B. Submit samples for Architects review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor. On 12" x 12" hardboard, provide 2 samples of each color and material, with texture to simulate actual conditions. Resubmit each sample as requested until required sheen, color and texture is achieved.

### 1.5 DELIVERY AND STORAGE

- A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturers name and label.

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### 1.6 JOB CONDITIONS

- A. Do not apply paint materials when the temperature of surfaces to be painted and the surrounding air temperatures are below 50 degrees F, unless otherwise permitted by the paint manufacturers printed instructions.
- B. Do not apply paint materials in snow, rain, fog, or mist, or when the relative humidity exceeds 85%, or to damp or wet surfaces. Test all wood to be painted with a moisture meter and do not apply paint to wood with a moisture content greater than 12%.

### 1.7 RELATED WORK

SECTION 06200 – FINISH CARPENTRY AND MISCELLANEOUS WORK  
See SECTION 01030 – ALTERNATES

### 1.8 CONTRACTOR QUALIFICATIONS

- A. Painting Contractor shall be certified in the category “Painting” by the Massachusetts Division of Capital Asset Management.

## **PART 2 - PRODUCTS**

### 2.1 COLORS AND FINISHES

- A. Paint colors, stains and wood finishes are to be selected and approved by the Architect prior to application. Submit samples, as specified herein, before proceeding with the work.

### 2.2 MATERIAL QUALITY

- A. Provide the best quality of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Material not displaying the manufacturer’s identifications as a standard, best-grade product will not be acceptable.
- B. Provide undercoat paints which are compatible with the finish coats. Use only thinners approved by the paint manufacturer and use only within recommended limits.

### 2.3 MATERIALS

- A. Paint Systems

The products listed are manufactured by Sherwin Williams. Equivalent products

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by other manufacturers may be submitted for review and approval by Owner and Architect.

1. Existing Exterior Woods and New Wood Work:

Prime all bare wood

1st Coat: Sherwin Williams A-100, Alkyd Exterior Wood Primer, Y24W20 at 2.2 dft.

2nd Coat: Sherwin Williams Duration Exterior Coating K Series at 2.8 mils dft.

3rd Coat: Sherwin Williams Duration Exterior Coating K Series at 2.8 mils dft. from the Sherwin Williams Preservation Palette

2. Existing Exterior Wood Shingles:

1st Coat: Sherwin Williams Woodscapes Exterior Acrylic Solid Color Stain (7 mils wet, 2.6mils dry)

2nd Coat: Sherwin Williams Woodscapes Exterior Acrylic Solid Color Stain (7 mils wet, 2.6 mils dry)

3. New primed wood shingles:

1st Coat: Sherwin Williams Woodscapes Exterior Acrylic Solid Color Stain (7 mils wet, 2.6mils dry)

2nd Coat: Sherwin Williams Woodscapes Exterior Acrylic Solid Color Stain (7 mils wet, 2.6 mils dry)

4. Newly patched raw plaster:

1st Coat: Sherwin Williams PrepRite Masonry Primer, B28W300 (7 mils wet, 3 mils dry)

2nd Coat: Sherwin Williams Duration Home Interior Latex Satin (4 mils wet, 1.5 mils dry)

3rd Coat: Sherwin Williams Duration Home Interior Latex Satin (4 mils wet, 1.5 mils dry)

5. Previously painted plaster:

1st Coat: Sherwin Williams Duration Home Interior Latex Satin (4 mils wet, 1.5 mils dry)

2nd Coat: Sherwin Williams ProMar 200 Latex Eg-Shel, B20W2200 Series (4 mils wet, 1.5 mils dry)

6. New plaster:

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1st Coat: Sherwin Williams PrepRite Classic Latex Primer  
(7 mils wet, 3 mils dry)

2nd Coat: Sherwin Williams Duration Home Interior Latex Satin (4 mils wet, 1.5 mils dry)

3rd Coat: Sherwin Williams Duration Home Interior Latex Satin (4 mils wet, 1.5 mils dry)

7. Previously painted interior wood:

1st Coat: Sherwin Williams ProClassic XP Interior Alkyd Semi-Gloss  
(4 mils wet, 1.6 mils dry)

2nd Coat: Sherwin Williams ProClassic XP Interior Alkyd Semi-Gloss (4 mils wet, 1.6 mils dry)

3rd Coat: Sherwin Williams ProClassic XP Interior Alkyd Semi-Gloss  
(4 mils wet, 1.6 mils dry)

8. New interior wood (opaque finish) :

1st Coat: Sherwin Williams PrepRite Wall and Wood Primer  
(4 mils wet, 1.6 mils dry)

2nd Coat: Sherwin Williams ProClassic XP Interior Alkyd Semi-Gloss (4 mils wet, 1.6 mils dry)

3rd Coat: Sherwin Williams ProClassic XP Interior Alkyd Semi-Gloss  
(4 mils wet, 1.6 mils dry)

9. Interior Wood (transparent finish) :

1st Coat: S-W A48 Series Oil Stain (stain/grain as required to match existing and/or adjoining wood)

2nd Coat: S-W A66 Series Oil Base Varnish

3rd Coat: S-W A66 Series Oil Base Varnish

B. Paintable Sealants:

Dupont Paintable Premier Silicone

GE Silicone II Paintable Silicone

Dow CRL paintable Silicone

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## PART 3 - EXECUTION

### A.1 INSPECTION

- A. The Contractor must examine the areas and conditions under which painting work is to be applied. Notify in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Contractor.
- B. Starting of painting work will be construed as the Contractor's acceptance of the surfaces and conditions.
- C. Do not paint over dirt, rust, scale, grease, moisture scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

### 3.2 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in strict accordance with the paint manufacturers instructions and as herein specified, for each particular substrate condition.
  - 1. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly painted surfaces.

Scrape with hand tools all surfaces exhibiting areas of loose paint or poor adhesion. Feather all rough edges with sandpaper to provide smooth transition between paint layers of substrate. A sample of the desired quality level of scraping and sanding and feathering shall be provided by the Contractor for approval by the Architect.
  - 2. Clean wood surfaces to be refinished before applying stain, varnish, shellac or other wood finishes.
- B. Wood:
  - 1. Remove all staples, fasteners, and non-historical unused appurtenances attached to trim, doors and woodwork or varnish.
  - 2. Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off.

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3. Scrape all loose paint or varnish and lightly sand all existing painted surfaces, fill all holes and voids with epoxy putty and sand smooth to contour of wood surface, being careful not to damage wood profiles. Prime and paint woodwork.

### **C. Sheet Metal:**

1. Lightly sand all sheet metal and rub down with acetone prior to application of primer. Apply primer within 4 hours of surface preparation.
2. Clean and prep new sheet metal surfaces prior to application of primer.

## **3.3 MATERIALS PREPARATION**

- A. Mix and prepare painting materials in accordance with manufacturers directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

## **3.4 APPLICATION**

- A. Apply paint materials in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied.
- B. Apply paint materials so as to completely cover all surfaces with an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, laps, refinish, or repaint work not in compliance with specified requirements.
- C. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
- D. Prime Coats: Apply a prime coat to those areas which are badly worn or where there is exposed bare substrate.
- E. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or paint work not in compliance with specified requirements.

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### 3.5 CLEAN-UP PROTECTION

- A. During the progress of the work, remove from the project daily all discarded paint materials, rubbish, cans and rags. No paint materials will be allowed to be kept within the structure itself for any reason.
  
- B. Protect all areas of the building and site, whether to be painted or not, against damage by painting and finishing work. Correct any damages by cleaning, repairing or replacing and repainting, as directed by the Architect.

**END OF SECTION 09900**