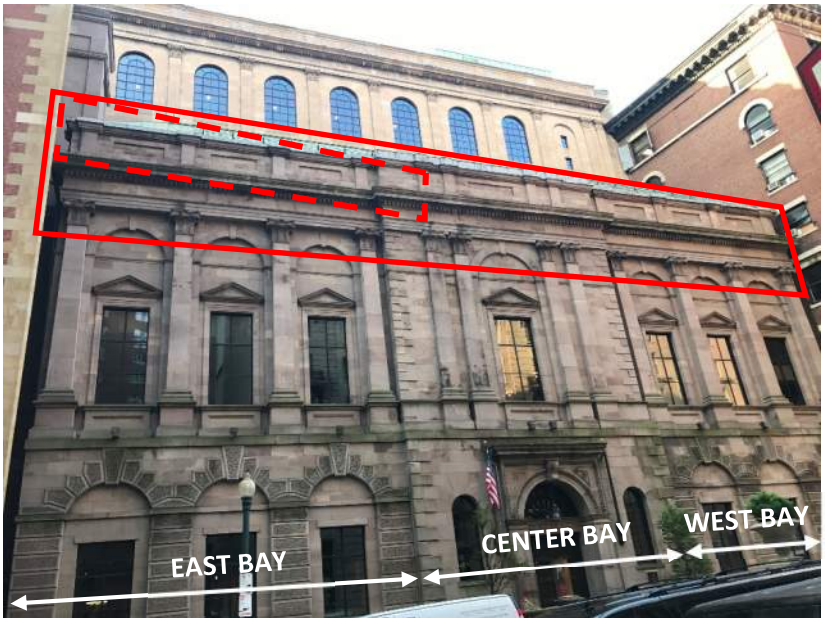


Photo 1

Overview of the Beacon Street (north) facade. The approximate location of interior humidified storage (lock) spaces is indicated by the solid red line. Refer to Photo 2 for close-up of the exterior masonry wall indicated by the red dotted line at the third floor in the east bay.

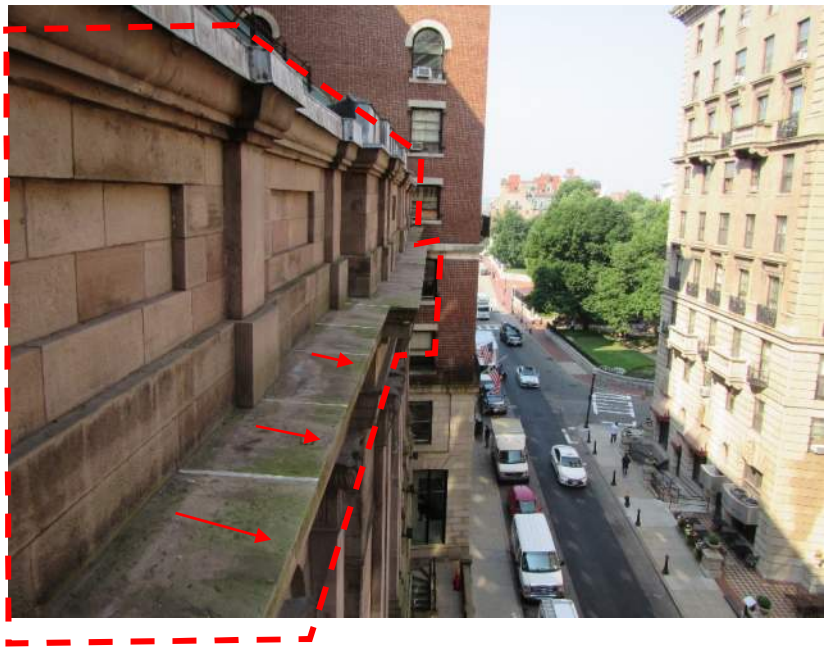


Photo 2

Close-up of the exterior masonry wall and projecting ledges (indicated in red dashed box) that are adjacent to the third-floor humidified lock spaces where leakage is reported. The projecting stone ledge is covered with biological growth and sloped toward the exterior (red arrows). Photograph taken from northeast corner looking west.

Photo 3

General view of paint peeling and staining at interior surfaces of exterior masonry walls adjacent to humidified lock spaces where recurring moisture-related issues are reported in the east bay.

Photo 4

SGH and VA identified and removed several masonry spalls along the underside of the sheet metal roof flashing during our hands-on masonry assessment.

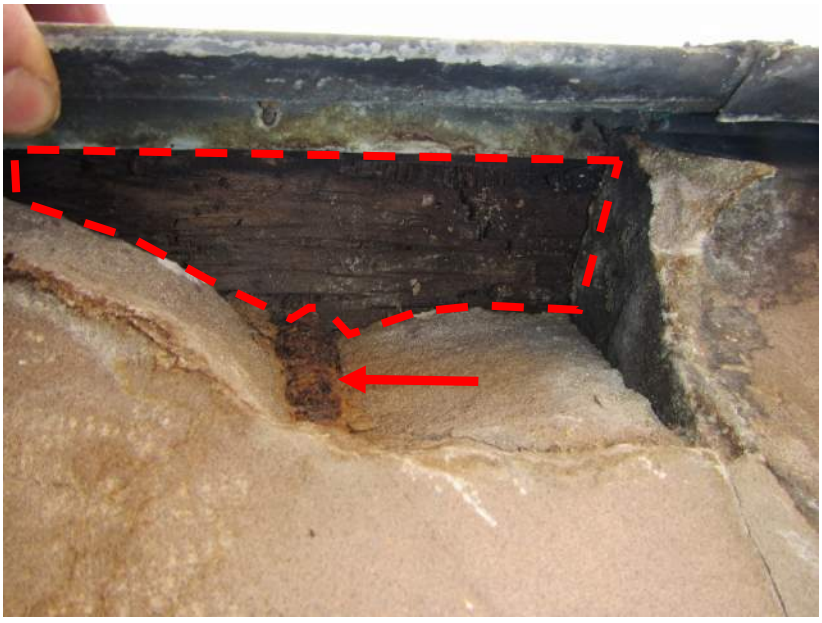


Photo 5

Corroded anchors (red arrow) and deteriorated wood blocking (indicated in red) are visible after removal of one of the stone spalls at the underside of the third-floor built-in gutter.

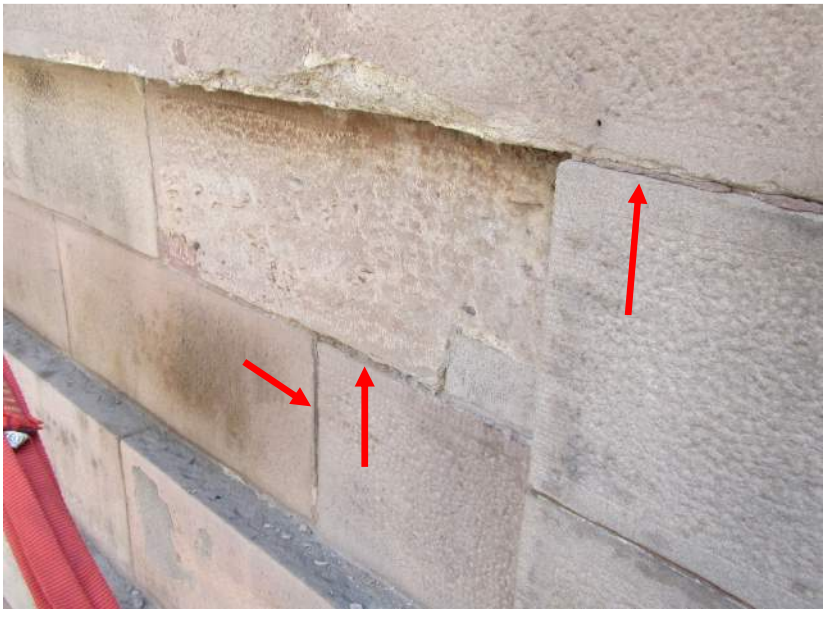


Photo 6

Arrows identify missing, loose, and deteriorated mortar within the field of the masonry wall adjacent to the lock spaces where moisture-related issues are reported at the east bay.

Photo 7

Overview of the standing-seam copper roof with built-in gutter located directly above the lock spaces in the east bay. The built-in gutter is sloped (red arrow) toward the east elevation to a single down leader that is obstructed by debris (indicated in red). Refer to Photo 9 for condition of down leader prior to water testing.

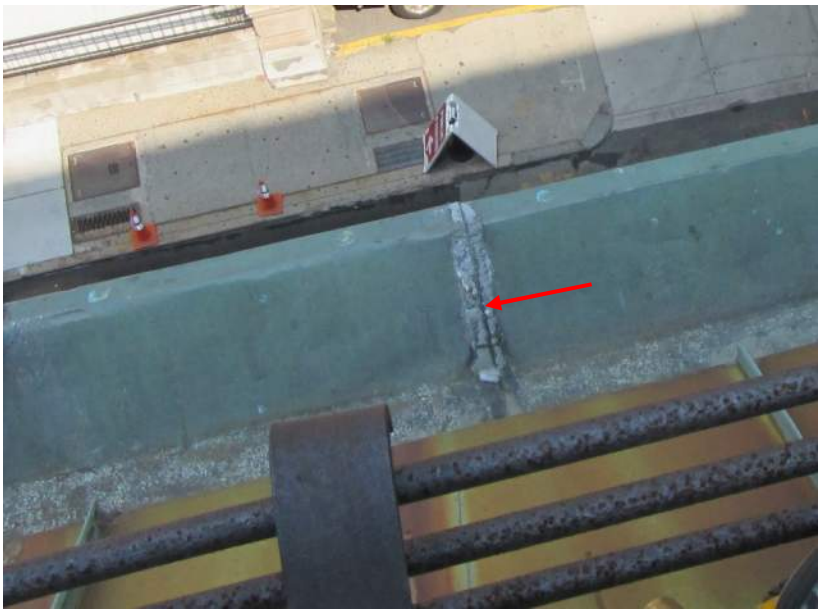


Photo 8

Cracked transverse seam (red arrow) at built-in gutter above lock spaces where moisture-related issues are reported.

Photo 9

A 2 in. diameter down leader is present (indicated in red) at the east elevation. Debris obstructs drainage in the down leader. Heat-trace cables (red arrows) are present, although cable operability is unknown.

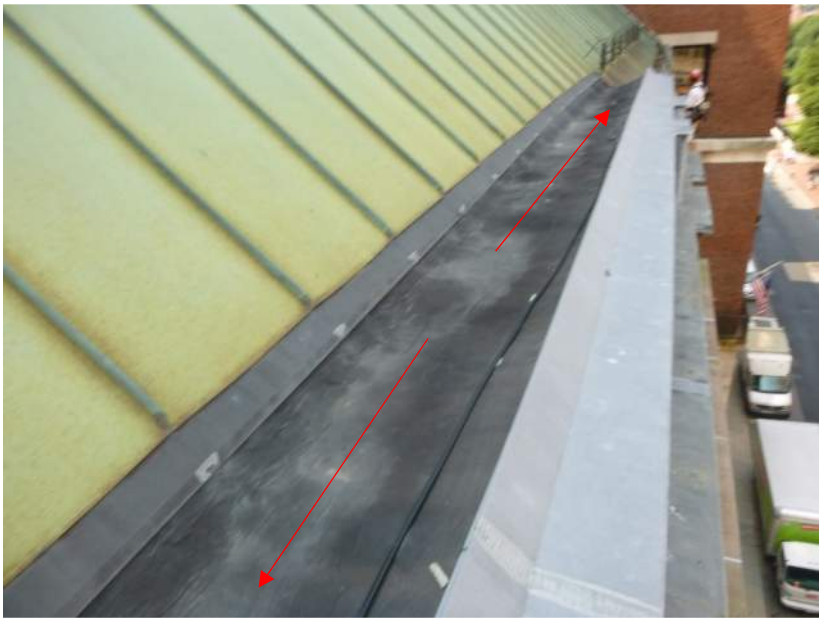


Photo 10

The standing-seam copper roof at the center bay at the north elevation above the main entrance drains into an EPDM-membrane-lined gutter. The EPDM membrane is sloped from the center toward the metal-lined built-in gutter on both sides (red arrows).

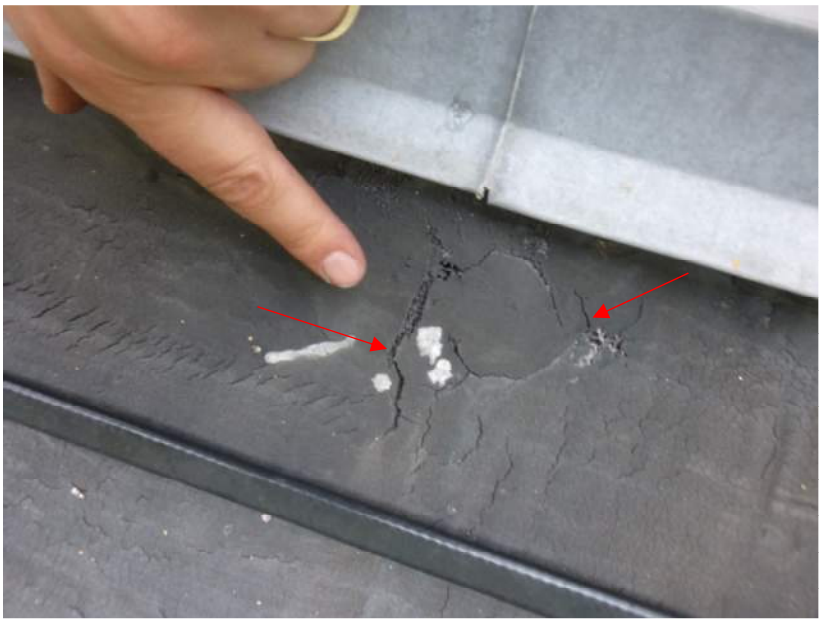


Photo 11

Arrows identify splits in the EPDM-membrane-lined gutter above the center bay at the north elevation.

Photo 12

Holes in the EPDM-membrane-lined gutter at the center bay at the north elevation.

Photo 13

Water Test No. 1 (indicated in red) in progress at the exterior masonry wall. Refer to Appendix B for an annotated third-floor plan with water testing and moisture-monitoring observations.

Photo 14

Water Test No. 2 in progress at a cracked solder joint of a transverse seam in the built-in gutter directly above one of the humidified lock spaces where leakage is reported at the interior.

Photo 15

Water Test No. 3 consisted of flood testing the built-in gutter located at the northeast corner of the third-floor roof, which is located directly above one of the humidified lock spaces where interior leakage is reported.

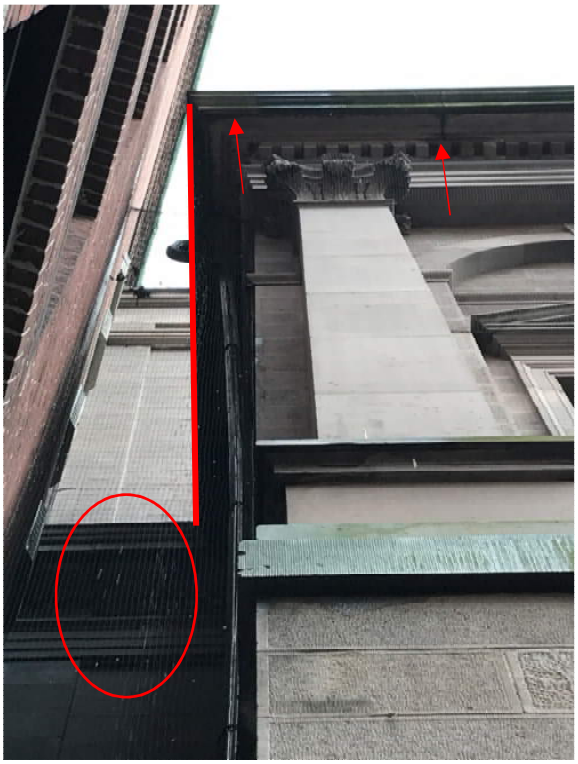


Photo 16

Due to the pitch of the built-in gutter at the northeast building corner, water overtopped the gutter on the east elevation (indicated in red) prior to completely filling the north gutter. Water is visibly dripping (indicated in red) at the exterior from the gutter overtopping. We also observed moisture (red arrows) at the underside of the projecting masonry ledge beneath the built-in gutter throughout Water Test No. 3.

Photo 17

Water-indicator paper (red arrow) turned pink when in contact with water leakage through cracks on the masonry wall on the east elevation during Water Test No. 3.

Photo 18

Eroded and soft masonry at underside of projecting masonry ledges.

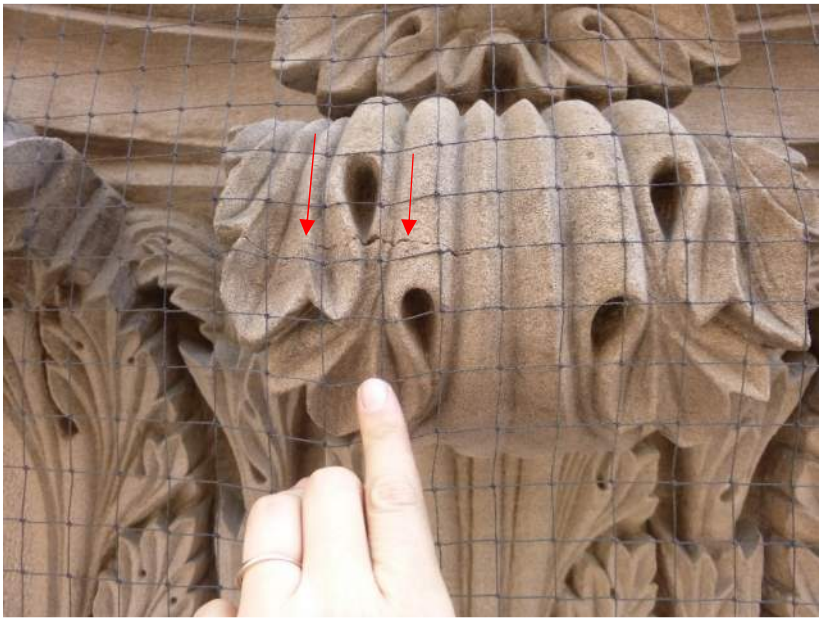


Photo 19

Eroded and soft masonry at carved column capitals. Cracks in masonry indicated by red arrows.

Photo 20

The skyward-facing surface of projecting ledges is generally exposed masonry that is covered in biological growth and sloped slightly toward the exterior.

Photo 21

Remnants of self-adhered membrane above second-floor windows at Beacon Street facade.

Photo 22

Previous repair does not aesthetically match the existing adjacent stone and is cracked (arrow).

Photo 23

Cracks (arrow) in masonry window sills are generally open.

Photo 24

Crack (arrow) in a spanning masonry lintel.

Photo 25

Dark carbon staining is present throughout the facade, particularly at the underside of projecting ledges and between carved elements and dentil moldings.

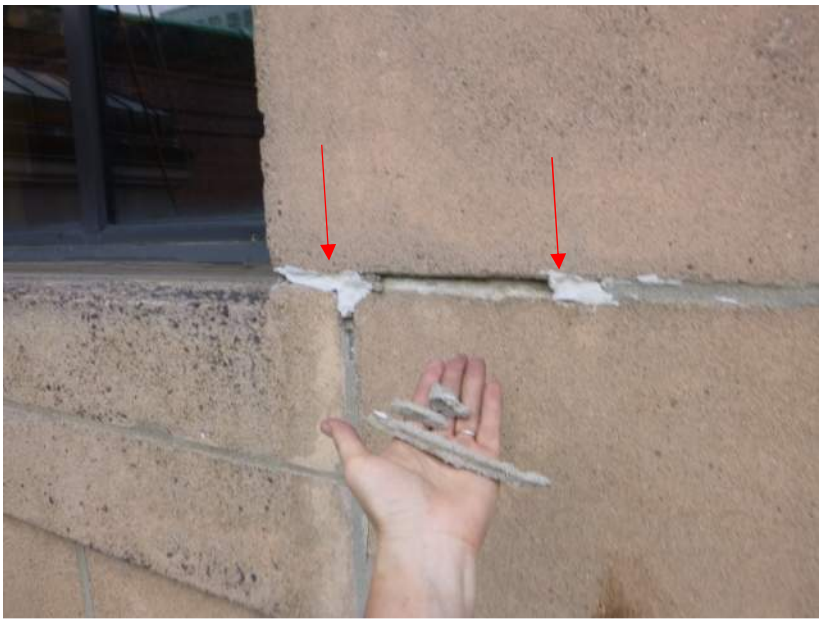


Photo 26

Loose mortar removal adjacent to previous sealant repairs (arrows).

BOSTON ATHENAEUM FAÇADE RESTORATION AND TERRACE REHABILITATION

Existing Conditions and Proposed Scope of Work

Supporting Documentation for Beacon Hill Architectural District Review

Prepared by: Simpson Gumpertz & Heger, Inc.

Submission Date: 26 March 2020

OUTLINE SCOPE OF WORK: All work is exterior restoration/rehabilitation, at the north façade and north terrace facing Beacon Street:

Façade Restoration: Restore brownstone masonry lower north façade:

- Repair cracked or deteriorated stone using new natural brownstone to match existing
- Repoint deteriorated mortar joints, with mortar to match existing
- Clean stained stone using gentlest means possible
- Replace failed sealant joints at window perimeters with new sealant that better matches the color of the brownstone, dusted with sand to match the brownstone color
- Install discrete copper flashing atop ledge above entry, with only narrow copper drip edge visible from the street
- Remove two conspicuous metal downleaders on either side of the main entry door, and install two new copper downleaders set back at a less conspicuous inside corner on the front façade, a few feet further away from the main entry door.
- Repair-in-kind or replace existing deteriorated or leaking copper gutters with new copper gutters
- Restore cast stone upper north façade (set-back above roof):
    - Repair cracked or deteriorated stone using new natural brownstone to match existing
    - Repoint deteriorated mortar joints, with mortar to match

Terrace Rehabilitation:

- Reconstruct leaning terrace retaining wall by dismantling the existing deteriorated and displaced brownstone wall, constructing a new structural reinforced concrete retaining wall behind, an installing a new 4" thick outer wythe of natural brownstone to match the original brownstone in size, color, and coursing/joint layout, with mortar to match existing
- Restore existing balustrade atop existing retaining wall by disassembling existing balustrade, including brownstone coping, and sand-painted cast iron balusters, restoring the existing balusters and coping off site, and reassembling and reinstalling atop the rebuilt retaining wall.
    - Cast iron baluster restoration to include cleaning and removal of corrosion scale and staining, and existing sanded-paint from all balusters, replacing the worst damaged balusters with "attic stock" originals in storage in the building, and repairing remaining less damaged balusters
    - Restore cracked or deteriorated brown stone using new natural brownstone to match existing
    - Obtain variance from City for the lower-than-code-required height and unknown strength of the refurbished historic balustrade. If variance is not granted, install new slender black metal railing behind the existing balustrade that meets current code requirements, and is in keeping with the character of other historic ironwork on the building exterior.
- Replace non-code compliant railing atop basement stairwell at employee entrance. Current 20th century pipe railing creates dangerous fall hazard to concrete stairwell below on busy street. Replace with code-compliant railing with traditional appearance that is in keeping with the original character of the building.

Terrace Rehabilitation (continued):

- Accessibility improvements to terrace. The west end (right side) of the north terrace to the front door is the accessible entrance path into the building. Adjust the way the brownstone tread and the sidewalk meet to eliminate the current vertical offset of more than ¼"
- The current terrace paving is predominantly historically inappropriate concrete pavers (approx. 90%), with slate paving (approx. 10%) near the front door. The slate paving is on both the accessible path into the building, and the emergency egress path out of the building. None of the paving drains well, increasing slip issues. Replace all terrace paving (concrete and slate) with granite paving (historically appropriate for a mid-19th century building in Boston) that is finished/textured to be slip resistant. Also replace all subbase and drainage layers for the terrace paving, to improve drainage, and install a concealed snow melt system to eliminate the need for deicing salts that are harmful to the lowermost portions of the brownstone façade.

Brownstone Facade Restoration: Existing Conditions

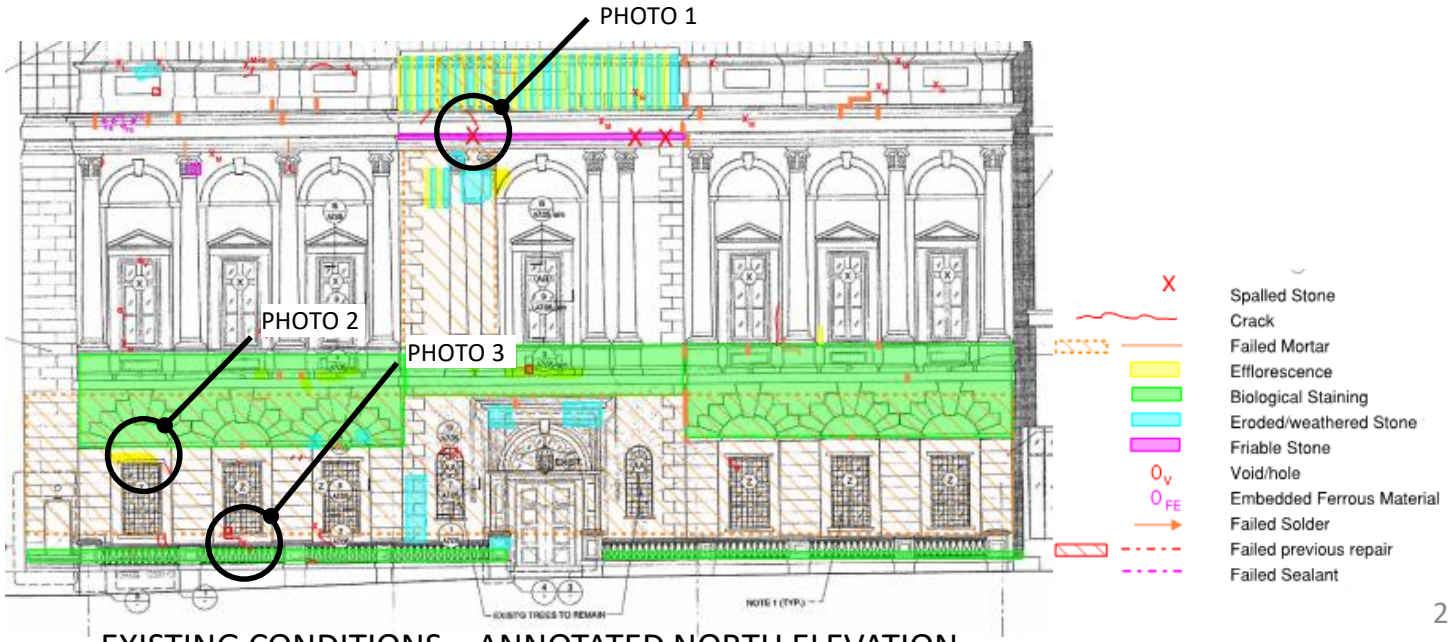
- Existing stone at north elevation is New Jersey Brownstone.
- Existing conditions consist of spalled, cracked or otherwise deteriorated stone and mortar that needs to be addressed for technical reasons, such as:
  - Spalled or delaminated stone pose potential life safety hazards (Photo 1).
  - Cracks in spanning stones alter the structural behavior of the stone (Photo 2).
  - Cracks and voids provide gross paths for water infiltration and increase the rate of future deterioration in the adjacent masonry (Photo 3).

PHOTO 1 – EXAMPLE OF FRIABLE AND SPALLED BROWNSTONE (ARROW) AT UNDERSIDE OF PROJECTING LEDGE.

PHOTO 2 – EXAMPLE OF CRACKED AND SPALLED SPANNING STONE (ARROWS).

PHOTO 3 – EXAMPLE OF CRACKED SILL STONE (ARROW).

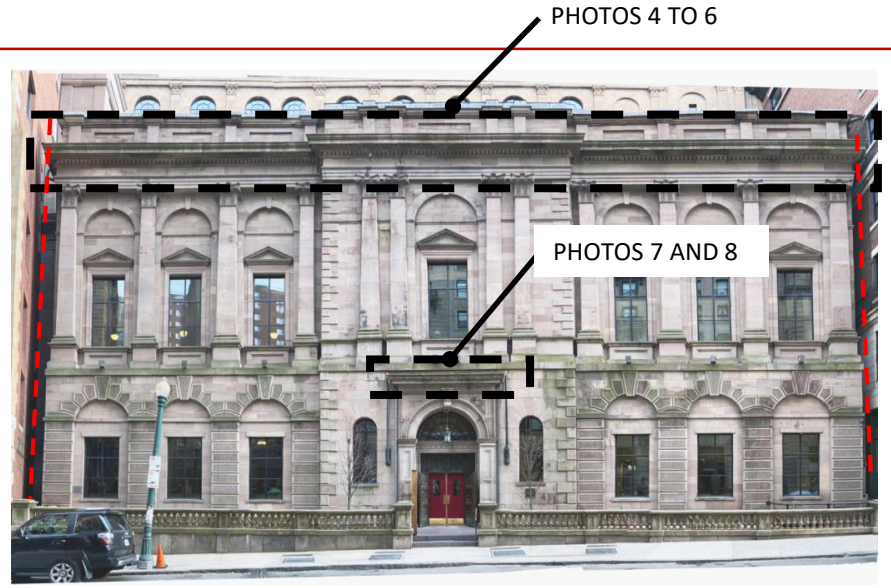
EXISTING CONDITIONS – PHOTOGRAPH OF NORTH ELEVATION



EXISTING CONDITIONS – ANNOTATED NORTH ELEVATION

Brownstone Facade Restoration: Existing Conditions

- In addition to scattered brownstone issues described previously (e.g. at lintels, sills, field stones), there are concentrated areas of spalled, eroded and delaminated brownstone are primarily due to:
  - Leakage at the third-floor gutter (Photos 4 to 6).
  - Unprotected sky-facing ledges, such as above the main entry (Photos 7 and 8).
- The fundamental cause for third-floor gutter leakage is inadequate provision for drainage (only two down leaders are present at small alleyways (returns) on the north elevation, indicated by red in the elevation at right, and inadequate provision for thermal movement).



EXISTING CONDITIONS – PHOTOGRAPH OF NORTH ELEVATION

PHOTO 4 – OVERVIEW OF THIRD-FLOOR GUTTER ABOVE MASONRY CORNICE.

PHOTO 5 – EXAMPLE OF SPALLED STONE BELOW THIRD-FLOOR GUTTER.

PHOTO 6 – WATER DAMAGE AT INTERIOR (WHERE SENSITIVE COLLECTIONS ARE STORED) FROM THIRD-FLOOR GUTTER.

PHOTO 7 – ERODED STONE BELOW UNPROTECTED LEDGE ABOVE MAIN ENTRY..

PHOTO 8 – VIEW OF TOPSIDE, UNPROTECTED LEDGE ABOVE MAIN ENTRY.

Brownstone Facade Restoration: Existing Conditions

- Previous repair campaigns relied on pigmented repair mortar mixes, rather than in-kind replacement with natural stone, and create a range of mis-match repairs on the primary north façade (Photos 9 to 11).
  - Some previous repairs are not durable and/or are already failed (e.g. eroded, cracked, debonded from the parent stone, etc.).
  - Some previous repairs provide a better visual match to the existing natural stone than others, both in color and texture.
  - Some previous repairs are more conspicuous due to their geometry and proximity to the main entrance and terrace.
- The brownstone features a variety of surface stains, such as biological growth, dark carbon staining, water staining, etc. (see elevation).

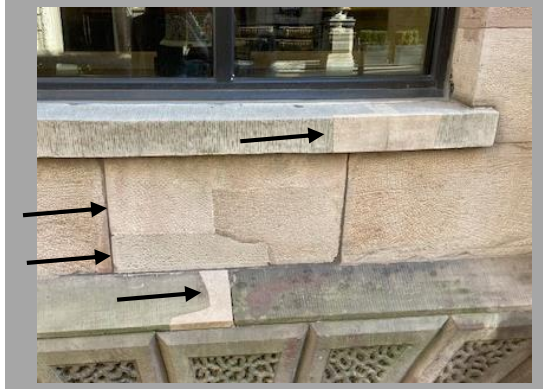


PHOTO 9 – EXAMPLE OF MIS-MATCH PREVIOUS REPAIRS (ARROWS).

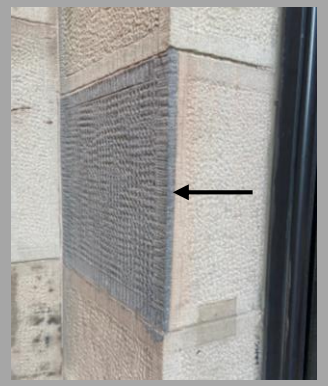
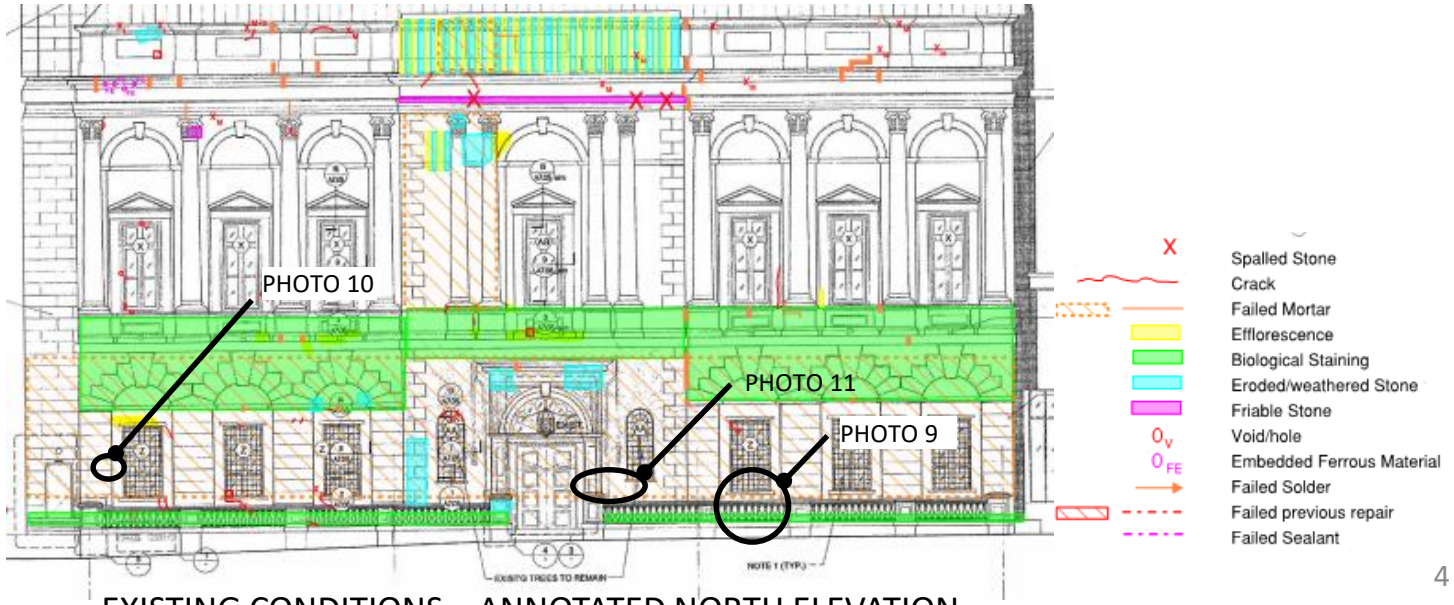


PHOTO 10 – EXAMPLE OF MIS-MATCH PREVIOUS REPAIR THAT IS SEPARATED FROM PARENT STONE (ARROW).

PHOTO 11 – EXAMPLE OF MIS-MATCH PREVIOUS MORTAR REPAIR (ARROW) NEAR MAIN ENTRY (AT LEFT).

EXISTING CONDITIONS – PHOTOGRAPH OF NORTH ELEVATION



EXISTING CONDITIONS – ANNOTATED NORTH ELEVATION

Brownstone Facade Restoration: Proposed Scope and Approach

- This project proposes to repair or replace existing deteriorated brownstone with new natural stone that provides a close match to the existing range of existing colors, surface textures and material properties (Photo 12). Thus, construction documents will indicate masonry scope on a stone-by-stone basis, like the stone restoration SGH recently completed at Trinity Church (Photo 13) and Harvard Hall (Photo 14).
- In-situ mockups and trials are required prior to wholesale construction to evaluate workmanship and establish standards for widespread construction.
- The base scope of brownstone repairs will be prioritized as indicated below:
  - Tier 1 (high priority): Address brownstone conditions that pose a life safety hazard, present a structural issue or provide a gross path for water infiltration, including replacement of failed previous repairs.
  - Tier 2 (medium priority): To the extent the budget and schedule allow, replace previous (intact) mis-match repairs that are highly visually conspicuous (e.g. do not provide a reasonable match to the existing stone color/texture AND are located within the vicinity to the main terrace and entry).
  - Tier 3 (low priority): Mis-match repairs not included in Tier 2 anticipated to remain.

PHOTO 14 – NATURAL STONE REPLACEMENT PIECES INSTALLED AT HARVARD HALL CORNICE, JOINT PATTERNING MATCHES ORIGINAL.

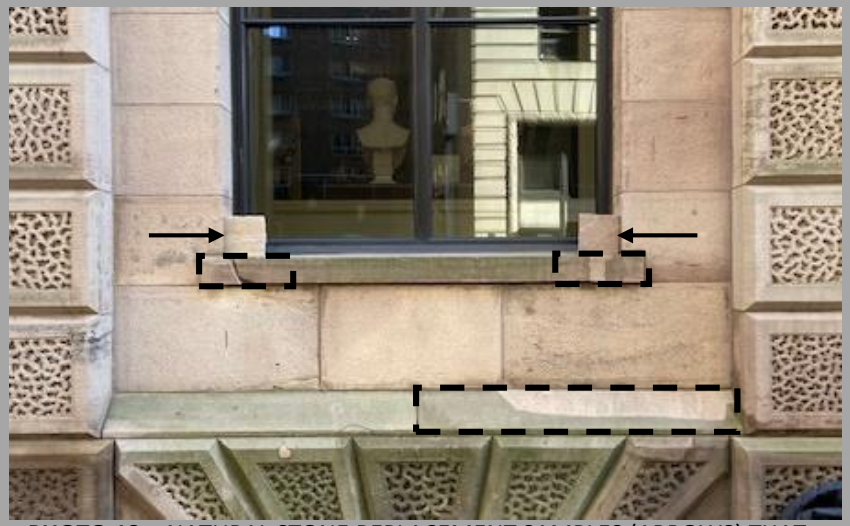


PHOTO 12 – NATURAL STONE REPLACEMENT SAMPLES (ARROWS) THAT PROVIDE A REASONABLE MATCH TO THE RANGE OF EXISTING BROWNSTONE COLORS AT BOSTON ATHENEUAM. STONE REPLACEMENT AND REPAIR WILL RESPECT EXISTING ASHLAR COURSING (DASHED LINES SHOW WHERE NEW STONE WOULD BE PROVIDED IN THIS AREA)

PHOTO 13 – NATURAL STONE REPAIR AND REPLACEMENT APPROACH IMPLEMENTED AT TRINITY CHURCH CIRCA 2016.

Main Terrace Rehabilitation: Existing Conditions

- The original terrace wall was a free-standing wall at the perimeter of a light well, and the sidewalk elevation was maintained up to the building entry (Photo 15). In the 1950's to 1960's, the lightwell was infilled to create the existing terrace and, as a result, the free-standing walls became a retaining wall for the new infill. At this time, the stairs were moved closer to the sidewalk to provide accessible entry at the terrace level.
- Due to lateral loads associated with the infill, the terrace walls are rotated out outward from the terrace, toward the sidewalk (Photo 16). Additionally, the terrace is not well designed to drain and currently requires frequent use of de-icing salts in winter months to reduce slip hazards, which adversely affects the condition of the adjacent historic masonry.
- Additionally, the following elements associated with the terrace are deteriorated:
  - Brownstone at or near grade is damaged and deteriorated in many locations, which is consistent with frequent use of deicing salts and snow removal at the sidewalk (Photo 17).
  - Cast iron balustrade is corroded, cracked and spalled in some locations, and much of the sand-finished paint is missing (Photo 18).
- The terrace features a non code-compliant railing and uneven walking surface (Photos 19 and 20).

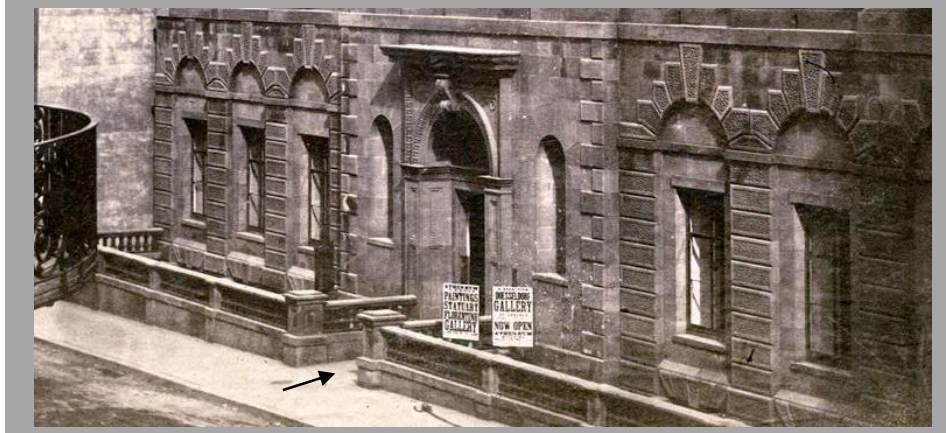


PHOTO 15 – HISTORIC PHOTOGRAPH FROM BOSTON ATHENEAUM WEBSITE INDICATING ORIGINAL LIGHTWELL AND FREE-STANDING PERIMTER WALL. NOTE THAT EXISTING STAIRS (ARROW) NOT PRESENT.

PHOTO 16 – LEFT: ORIGINAL FREE-STANDING WALL AT INFILLED TERRACE IS ROTATED (DOTTED RED LINE RELATIVE TO SOLID RED LINE) DUE TO LATERAL PRESSURES FROM INFILLING THE LIGHTWELL. RIGHT: EXISTING LOCATION OF STAIRS.

PHOTO 17 – OVERVIEW OF TERRACE WALL, WITH CRACKED STONE (ARROW) NEAR GRADE.

PHOTO 18 – VIEW OF CORRODED AND CRACKED BALUSTRADE.

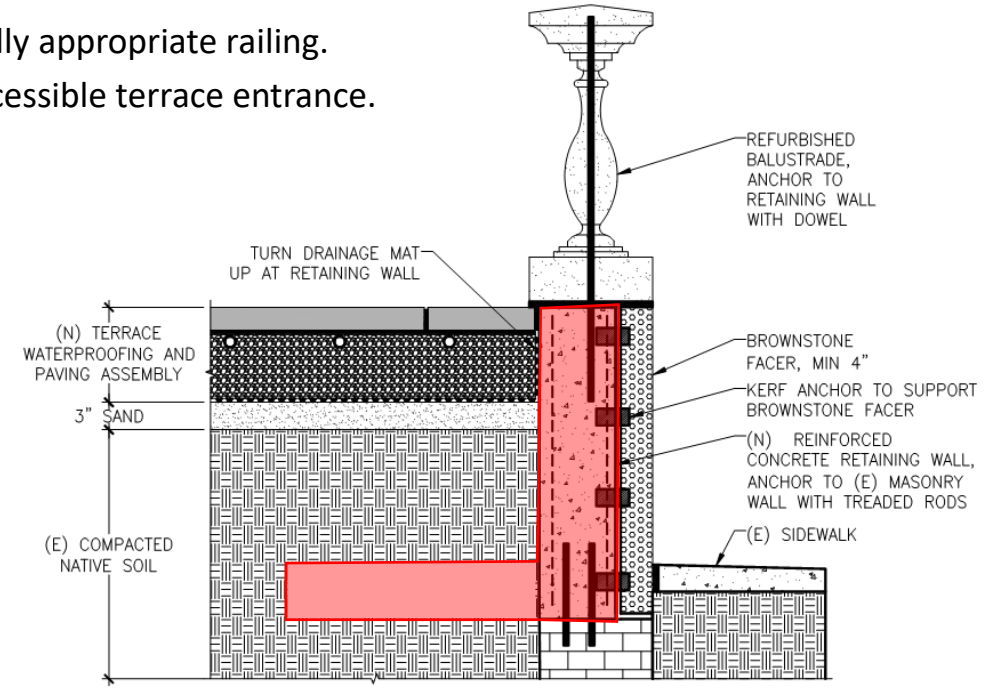
PHOTO 19 – NON CODE-COMPLIANT RAILING (ARROW).

PHOTO 20 – VERTICAL OFFSET BETWEEN SIDEWALK AND STONE TREAD (ARROW).

Main Terrace Rehabilitation: Proposed Scope and Approach

- The base scope of work will all be done from the terrace-side and includes:
  - Reconstruction of the terrace walls to resist lateral loads (Section A-A).
  - Refurbishment of the cast iron balustrade to address deterioration and provide supplemental mechanical anchorage (concealed within baluster).
    - Apply for variance to reinstall balustrade at existing height and configuration.
  - Replacement of the existing slate stair surfacing with new granite stairs, which are technically more durable in this climate and historically more appropriate (in-keeping) with contemporary building from the same era of construction in Boston.
  - Terrace reconstruction to improve drainage and implement a heat-trace system below natural stone pavers, which alleviates the future need to use harmful deicing salts at the terrace.
  - Replacement of non code-compliant railing at staff entry with historically appropriate railing.
  - Coordinated with City to adjust sidewalk elevation offset relative to accessible terrace entrance.

OVERVIEW OF TERRACE WALL



PROPOSED TERRACE WALL SECTION A-A

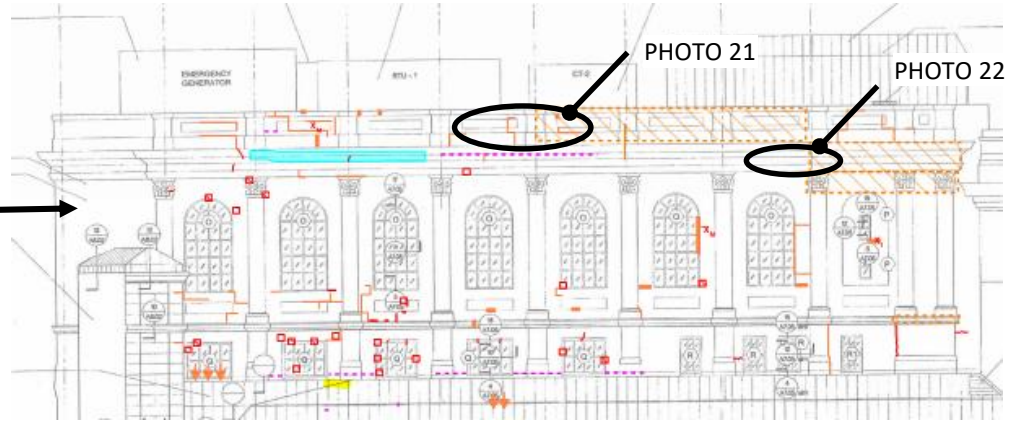
Cast Stone Façade Restoration: Existing Conditions and Repair Approach

- Cast stone is deteriorated and/or stained in several locations, as indicated in the annotated elevation.
- Cast stone, like the brownstone below, has undergone numerous repair campaigns (Photos 21); however, these repairs are less visually conscious due to the cast stone being several stories above and set back from grade.
- Thus, the base scope of this project includes:
  - Cast stone repair only where required to address potential falling hazards, structural issues, and improve the overall water-tightness of the façade.
  - Cast stone cleaning to address dark staining (Photo 22).

PHOTO 21 – EXAMPLES OF PREVIOUS CAST STONE REPAIRS, SOME OF WHICH ARE NO LONGER INTACT AND POSE FALLING HAZARDS.

PHOTO 22 – EXAMPLES OF HEAVILY STAINED CAST STONE AT UNDERSIDE OF PROJECTING LEDGES AND DENTILS.

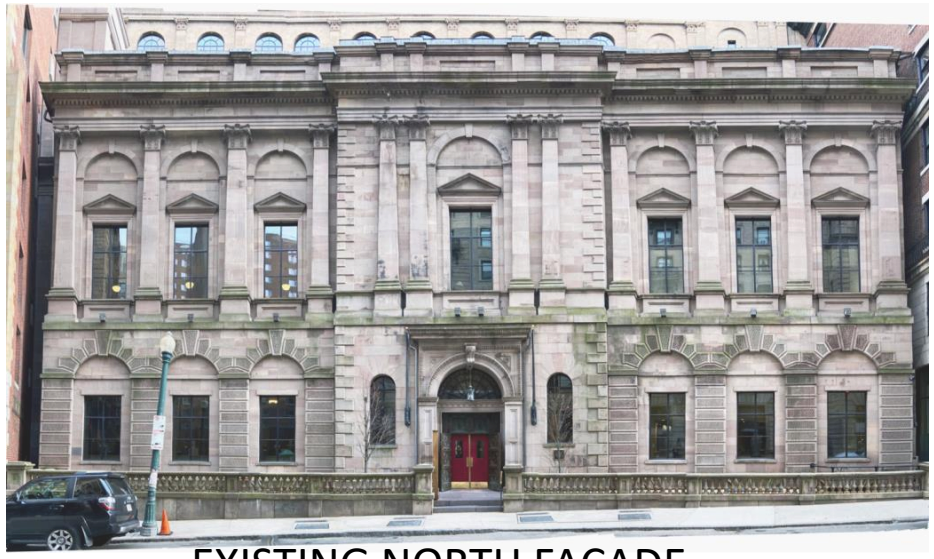
OVERVIEW OF CAST STONE FACADE



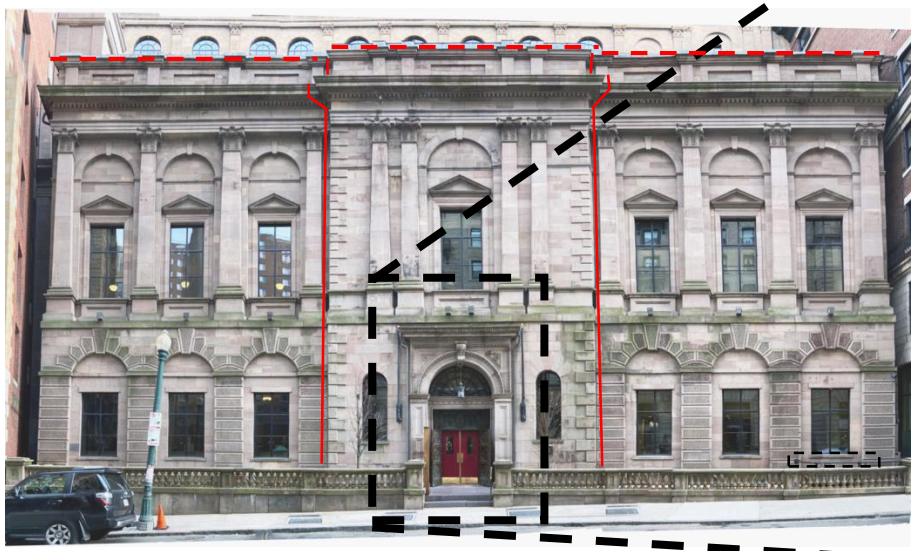
CAST STONE FAÇADE EXISTING CONDITIONS

North Facade Restoration: Aesthetic Impact Summary

- The approximate areas affected by this project are are indicated on the attached drawings.
- The aesthetic goal for the entire project is to match and maintain the existing appearance, with the following exceptions:
  - Provide new metal cap flashing, remove non-historic down leaders and replace non-historic main slate entry stairs with new, more durable and historically appropriate granite stairs at front entry (areas indicated in red at right photo).
  - Provide two new down leaders, concealed within the building return, as part of third-floor gutter repair (red in proposed façade photo).
  - Replace the non code-compliant and non historic railing at staff entry at main terrace (dashed in proposed façade photo).
  - If a variance is not granted to reinstall the balustrade in its current configuration, evaluate alternative options:
    - Raising the balustrade to code-compliant height
    - Providing an inconspicuous guard assembly inboard of the balustrade that is code-compliant



EXISTING NORTH FACADE



PROPOSED NORTH FACADE

BOSTON ATHENAEUM
FACADE RESTORATION AND TERRACE REHABILITATION
10-1/2 BEACON STREET
BOSTON, MA

SGH PROJECT NO. 200392.00

BEACON HILL ARCHITECTURAL DISTRICT SUBMISSION

MARCH 26, 2020

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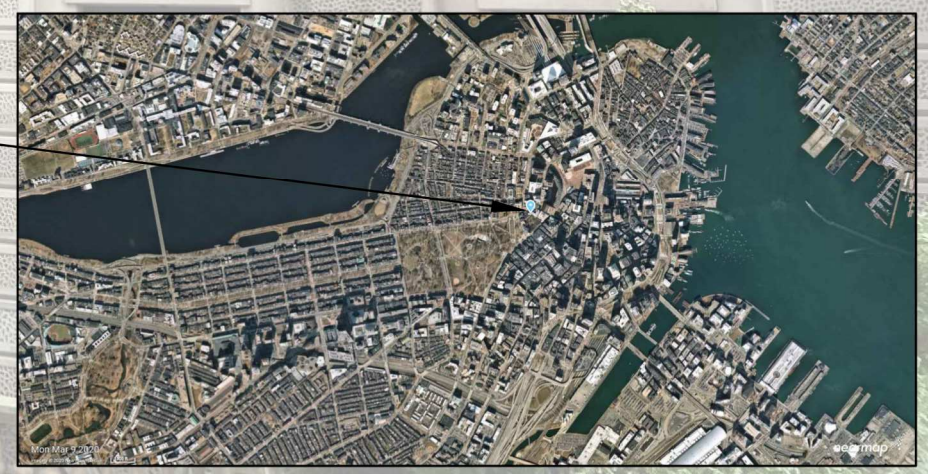
DRAWING CONTENTS:

ABBREVIATIONS:

- (E) = Existing (Items not specifically designated as existing are proposed)
- S.S. = Stainless steel
- NTS = Not to scale
- TYP. = TYPICAL
- SIM. = SIMILAR

PROJECT LOCATION



LOCUS PLAN

PROJECT NORTH

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No.	Date	Description	By

BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project: 10 1/2 BEACON STREET BOSTON, MA

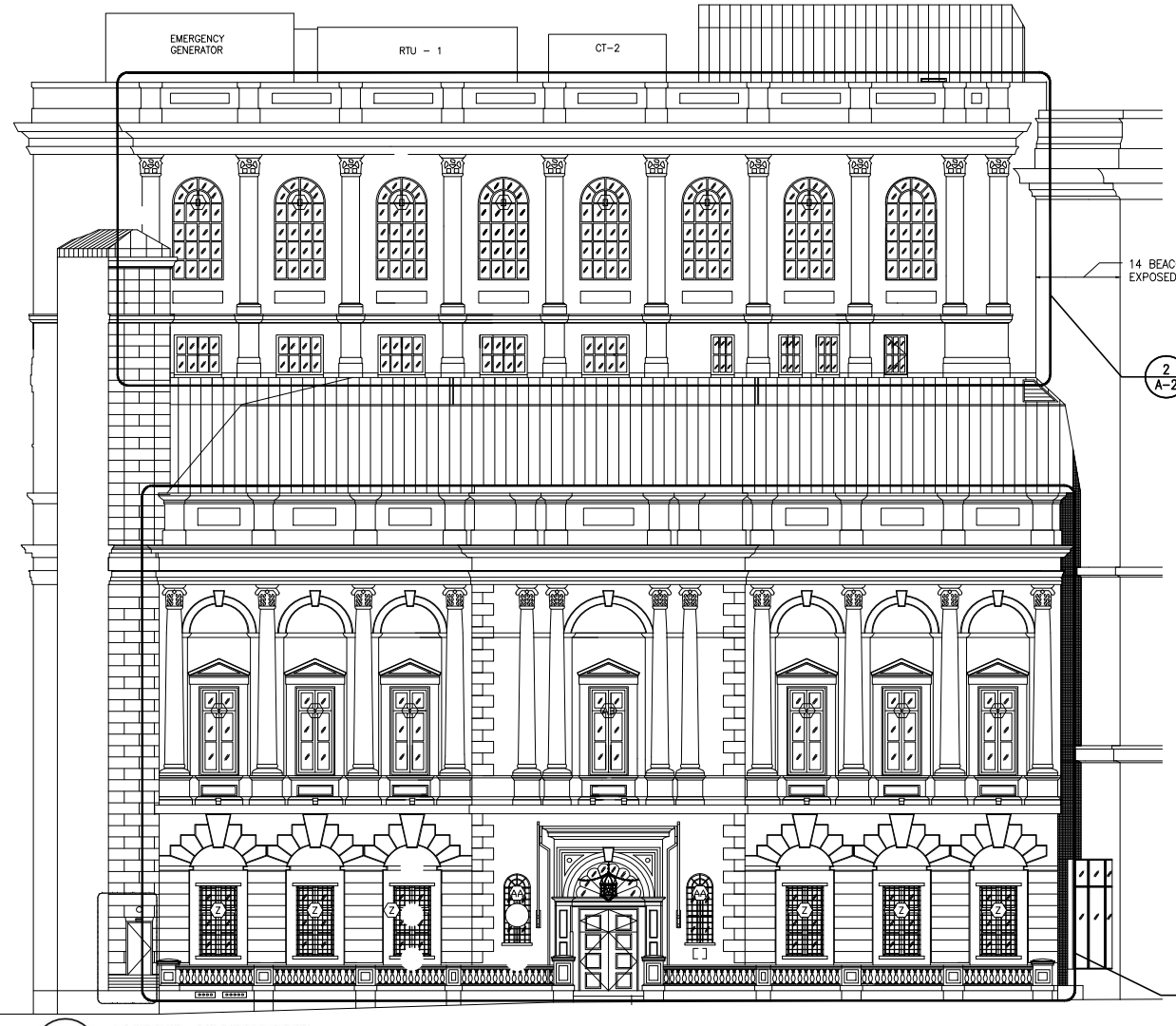
COVER SHEET

Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
Drawn: RML	Approved	Scale: AS NOTED

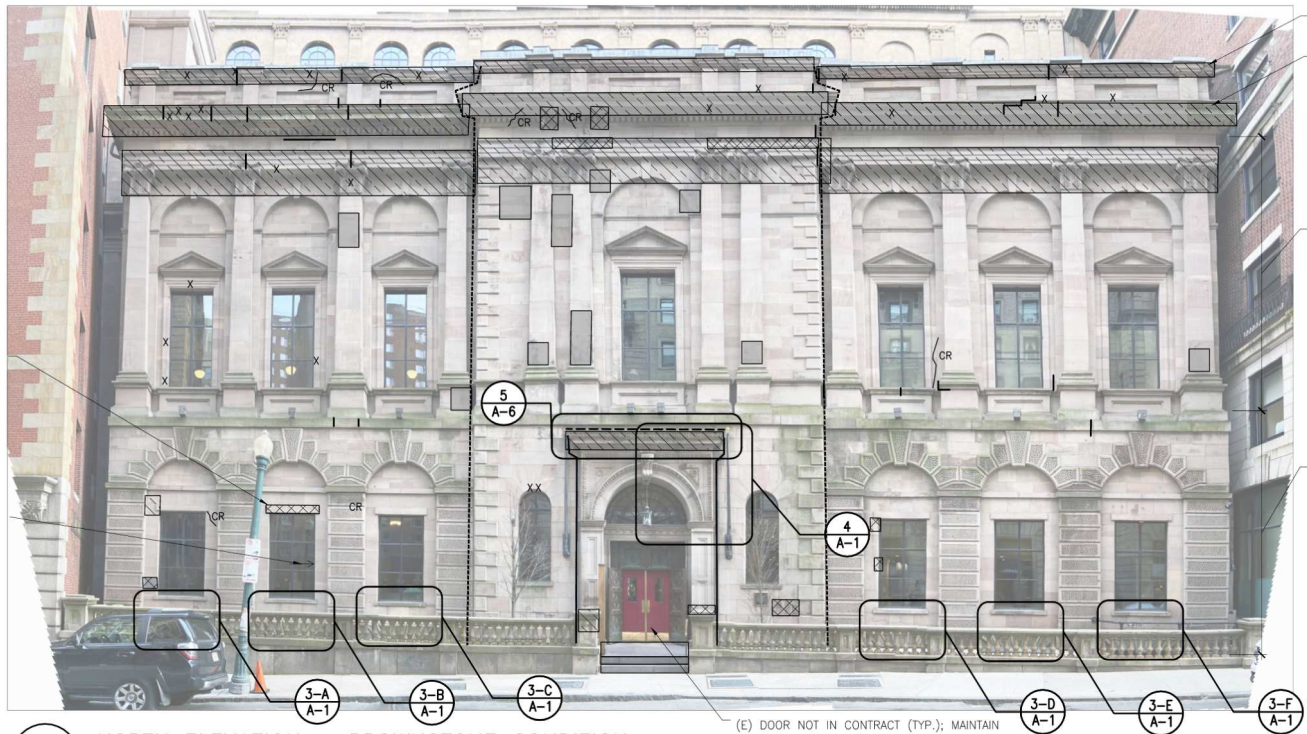
Drawing No.: ENV-1

Seal



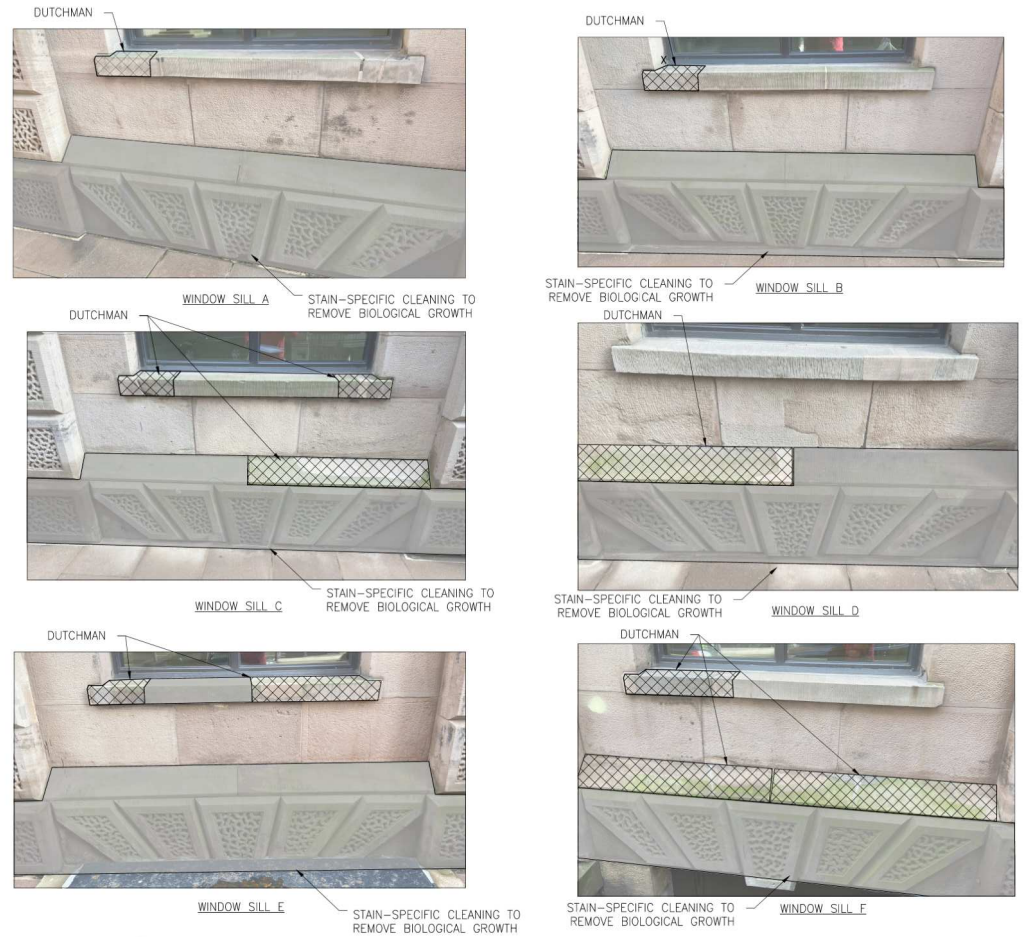
1 NORTH ELEVATION

N.T.S.



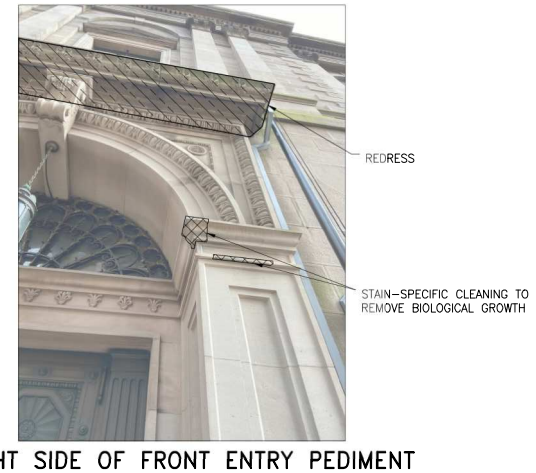
2 NORTH ELEVATION - BROWNSTONE CONDITION

N.T.S.



3 FIRST-FLOOR WINDOW SILL RESTORATION - ANNOTATED PHOTOS

N.T.S



4 RIGHT SIDE OF FRONT ENTRY PEDIMENT - ANNOTATED PHOTO

N.T.S.

LEGEND FOR BROWNSTONE RESTORATION			
———	REPOINT, REFER TO DETAIL 6/A-6	▨	REDRESS, REFER TO DETAIL 9/A-6
▩	STONE DUTCHMAN OR WHOLE STONE REPLACEMENT (DEPENDING ON SIZE, DEPTH AND EXTENT OF DETERIORATION), REFER TO DETAILS 3 AND 8/A-6.	|	REMOVE NON-HISTORIC STAIRS AND REPLACE WITH GRANITE
▭	CLEAN (EXACT PRODUCT/PROCEDURE DEPENDS ON STAIN) NO IN-SITU MOCKUPS/TRIALS TO DETERMINE THE MOST GENTLE AND EFFECTIVE METHOD FOR CLEANING EACH TYPE OF STAIN. DO NOT DAMAGE THE STONE.	|	INSTALL NEW DOWNLEADERS
X	MORTAR REPAIR (AT HOLES AND OTHER SMALL VOIDS, REMOVE METAL WHERE PRESENT), REFER TO DETAIL 1/A-6.	▭	REMOVE NON-HISTORIC DOWNLEADERS
CR	CRACK REPAIR (WITH S.S. PINS), REFER TO DETAIL 2/A-6	- - - -	INSTALL NEW METAL CAP FLASHING

GENERAL NOTES:
1. REFER TO ELEVATIONS FOR SPECIFIC LOCATIONS OF BROWNSTONE RESTORATION.
2. REPLACE SEALANT WITH NEW TO MATCH EXISTING AT ALL WINDOW PERIMETERS AND SHEET METAL FLASHING TO REMAIN.

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BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project **10 1/2 BEACON STREET BOSTON, MA**

BROWNSTONE RESTORATION- NORTH ELEVATION

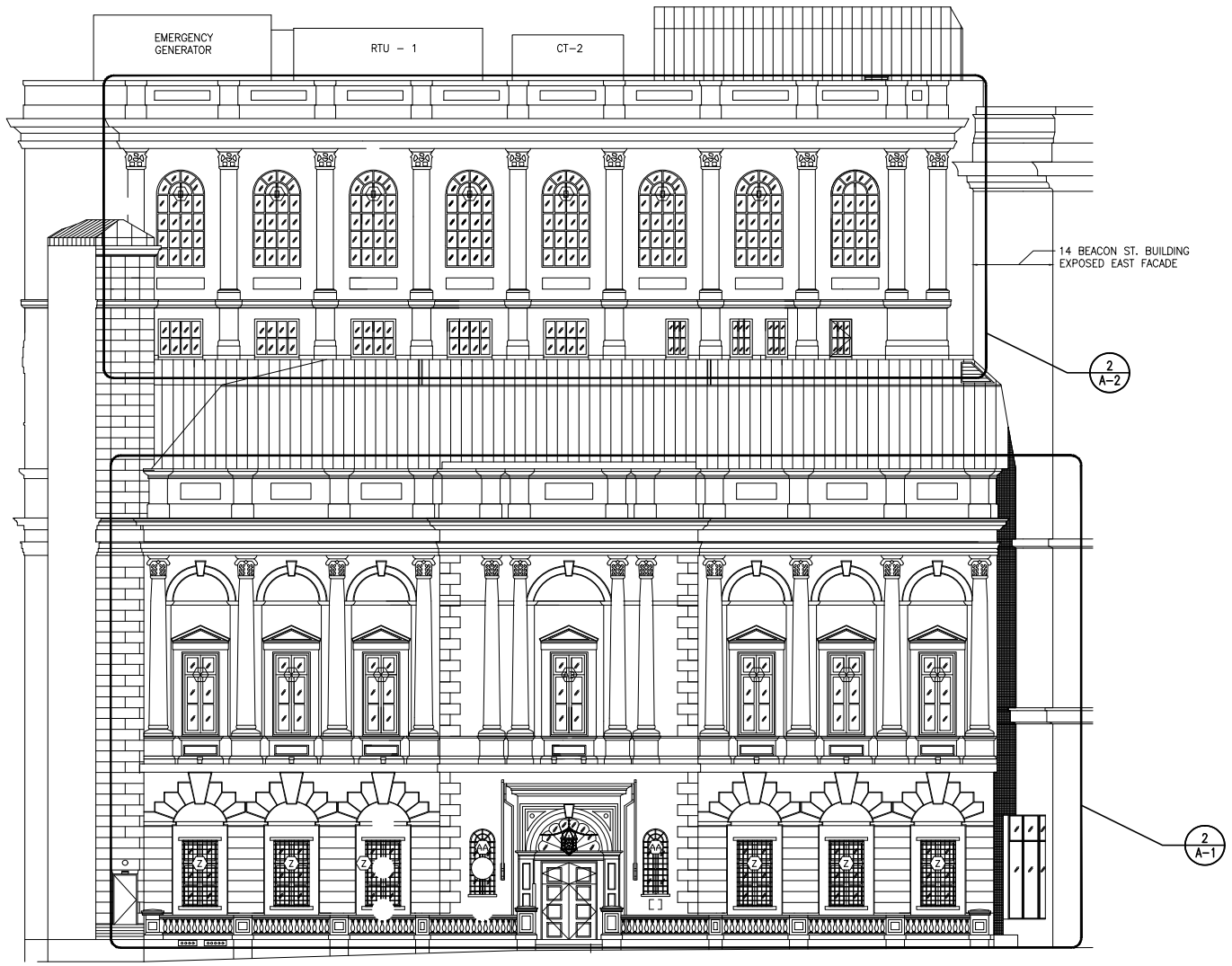
Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
Drawn	Approved	Scale
RML		AS NOTED

Seal

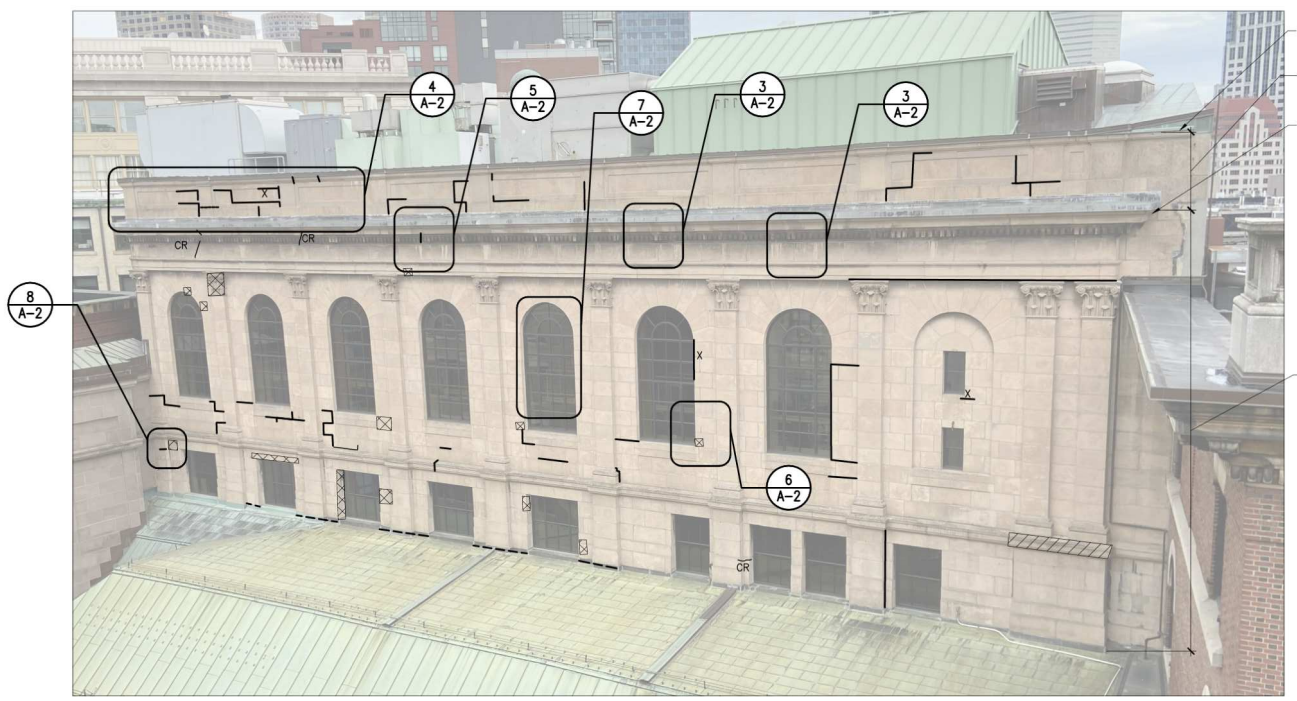
Drawing No.

ENV-2



1 NORTH ELEVATION

N.T.S.

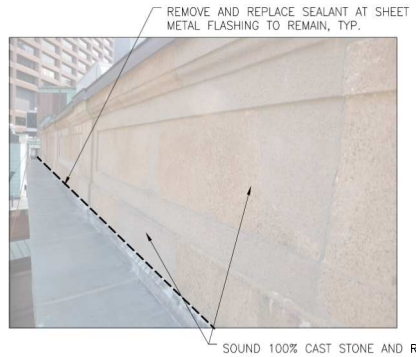


2 NORTH ELEVATION CAST STONE RESTORATION – ANNOTATED PHOTOGRAPH

N.T.S.

3 CAST STONE CONDITION – PHOTO A

N.T.S.



4 CAST STONE CONDITION – PHOTO B

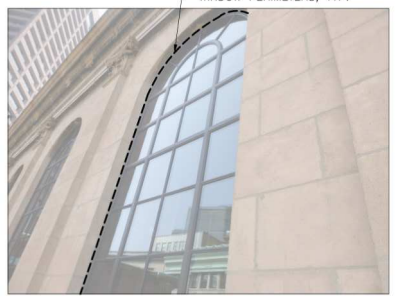
N.T.S.

5 CAST STONE CONDITION – PHOTO C

N.T.S.

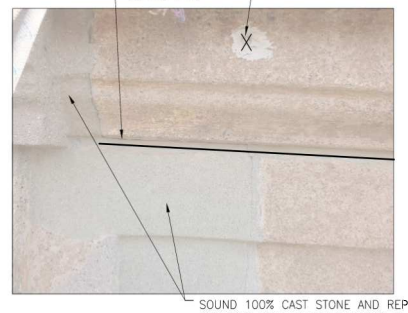
6 CAST STONE CONDITION – PHOTO D

N.T.S.



7 CAST STONE CONDITION – PHOTO E

N.T.S.



8 CAST STONE CONDITION – PHOTO F

N.T.S.

GENERAL NOTES:
1. CONTRACTOR TO PROVIDE HANDS–ON ACCESS FOR DESIGN PROFESSIONAL TO SOUND 100% MASONRY FACADE AND IDENTIFY EXACT REPAIR LOCATIONS PRIOR TO CONSTRUCTION.
2. REPLACE SEALANT WITH NEW TO MATCH EXISTING AT ALL WINDOW PERIMETERS AND SHEET METAL FLASHING TO REMAIN.

LEGEND FOR CAST STONE RESTORATION	
	REPOINT, REFER TO DETAIL 2/A–7
	CAST STONE REPAIR OR WHOLE STONE REPLACEMENT (DEPENDING ON SIZE, DEPTH AND EXTENT OF DETERIORATION), REFER TO DETAILS 3 AND 4/A–7
	CLEAN (EXACT PRODUCT/PROCEDURE DEPENDS ON STAIN) AND IN–SITU MOCKUPS/TRIALS TO DETERMINE THE MOST GENTLE AND EFFECTIVE METHOD FOR CLEANING EACH TYPE OF STAIN. DO NOT DAMAGE THE STONE.
X	MORTAR REPAIR (AT HOLES AND OTHER SMALL VOIDS, REMOVE METAL WHERE PRESENT), REFER TO DETAIL 1/A–6
CR	CRACK REPAIR (WITH S.S. PINS), REFER TO DETAIL 2/A–6 SIM.

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BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project **10 1/2 BEACON STREET BOSTON, MA**

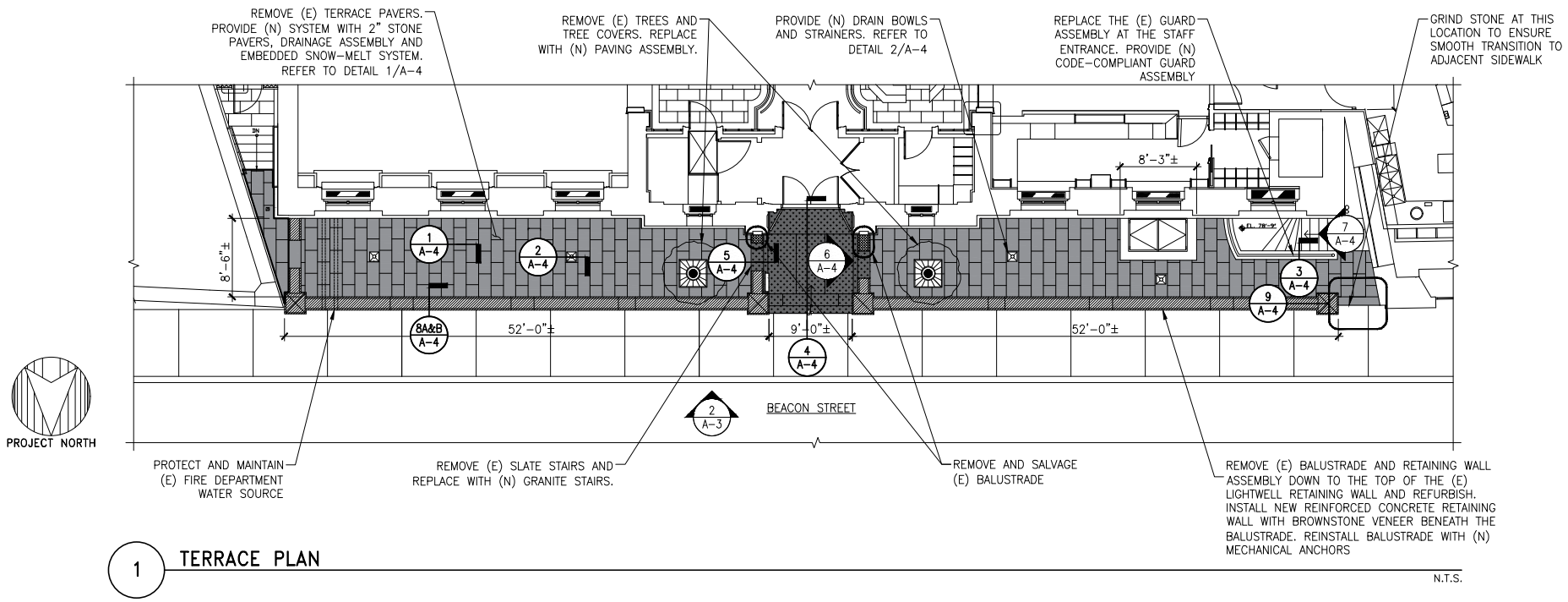
CAST STONE RESTORATION - NORTH ELEVATION

Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
Drawn	Approved	Scale
RML		AS NOTED

Seal

Drawing No. **ENV-3**



1 TERRACE PLAN

N.T.S.

SCOPE OF WORK:

TERRACE PAVERS AND STAIRS AT MAIN ENTRANCE

1. REMOVE (E) AND DISPOSE OF TERRACE PAVERS. PROVIDE (N) SYSTEM WHICH INCLUDES A DRAINAGE ASSEMBLY, 2" STONE PAVERS AND AN EMBEDDED SNOW-MELT SYSTEM AS INDICATED IN DETAIL 1/A-4.
2. REMOVE AND DISPOSE OF THE (E) 1" THICK SURFACING SLATE STAIRS AND REPLACE THEM WITH (N) GRANITE TREADS.
3. REMOVE THE (E) BALUSTRADE WHERE SHOWN ON THE DRAWINGS AND COVER WITH (N) DRAINAGE AND PAVING ASSEMBLY.
4. REMOVE (E) TREES AND TREE COVERS INCLUDING ANY AND ALL ROOTS BURIED BELOW. REPLACE WITH (N) PAVING ASSEMBLY.

BALUSTRADE AND RETAINING WALL AT TERRACE PERIMETER

5. REMOVE AND REFURBISH THE (E) BALUSTRADE ASSEMBLY AND RESTORE OFF-SITE. REINSTALL WITH NEW MECHANICAL ANCHORAGE. WHERE CRACKED OR SPALLED, REPAIR OR REPLACE WITH (N) TO MATCH EXISTING.
6. THE (E) BROWNSTONE RETAINING WALL BENEATH THE BALUSTRADE AT THE TERRACE PERIMETER IS LEANING VISIBLY TOWARDS THE SIDEWALK. PROVIDE (N) CONCRETE RETAINING WALL WITH BROWNSTONE VENEER. MATCH (E) JOINT SIZES AN SPACING.

GUARD ASSEMBLY AT BELOW-GRADE STAFF ENTRANCE

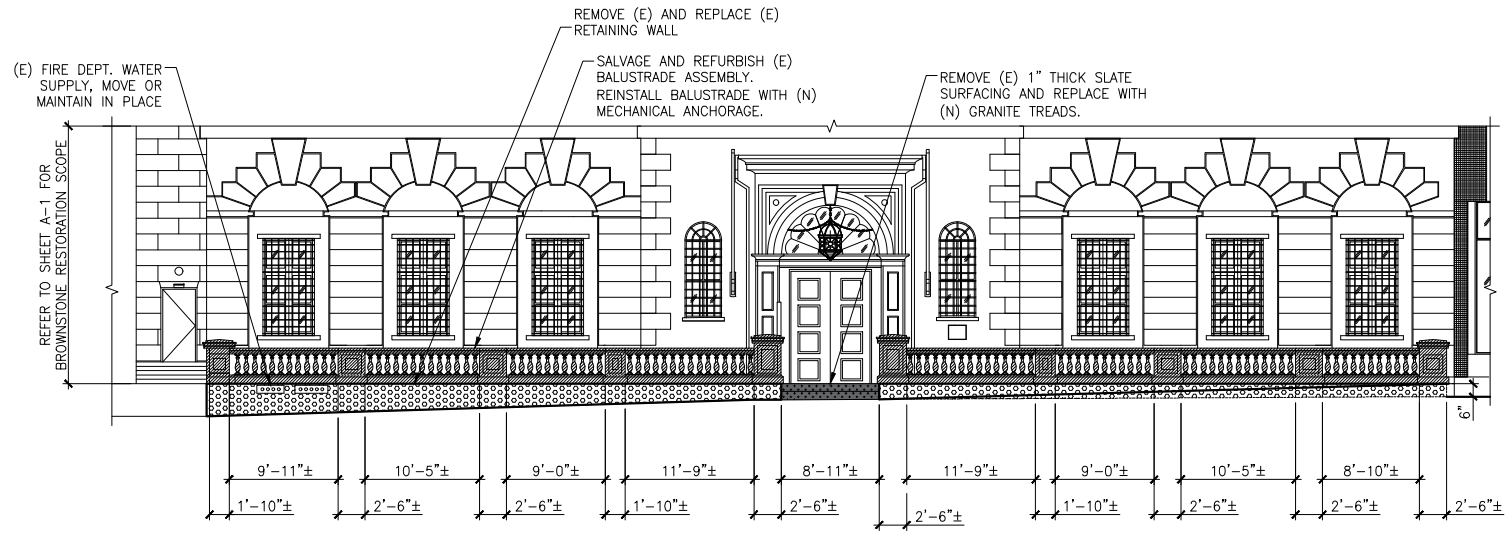
7. REPLACE THE (E) GUARD ASSEMBLY AT THE BELOW-GRADE STAFF ENTRANCE.
8. GRIND DOWN SURFACE OF (E) STONES TO REMAIN, AS INDICATED, TO PROVIDE AN EVEN WALKING SURFACE.

STONE GRINDING AT HANDICAP ENTRANCE

9. GRIND STONE FLOOR TILE AT HANDICAP ENTRANCE TO ENSURE SMOOTH TRANSITION TO ADJACENT SIDEWALK.

LEGEND:

- REPLACE STONE TERRACE AND PAVER ASSEMBLY
- RECONSTRUCT SLATE STAIRS AT ENTRANCE
- REFURBISH BALUSTRADE
- REMOVE AND SALVAGE (E) BALUSTRADE

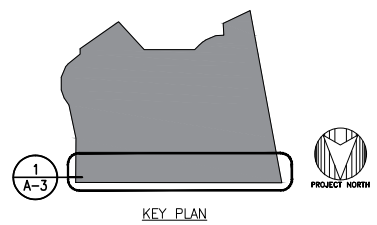


2 PARTIAL NORTH ELEVATION – TERRACE

N.T.S.

LEGEND:

- REMOVE AND REPLACE STAIRS AT ENTRANCE
- REFURBISH BALUSTRADE
- REMOVE AND REPLACE RETAINING WALL WITH REINFORCED CONCRETE WALL AND BROWNSTONE VENEER



KEY PLAN

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BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project **10 1/2 BEACON STREET BOSTON, MA**

TERRACE PLAN AND ELEVATION

Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
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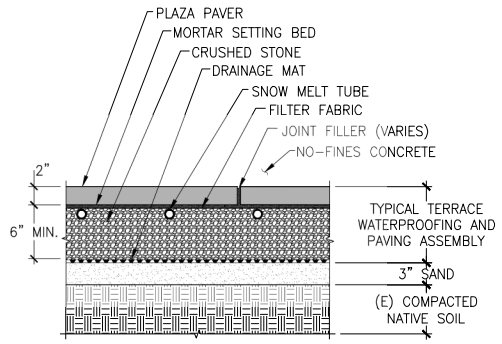
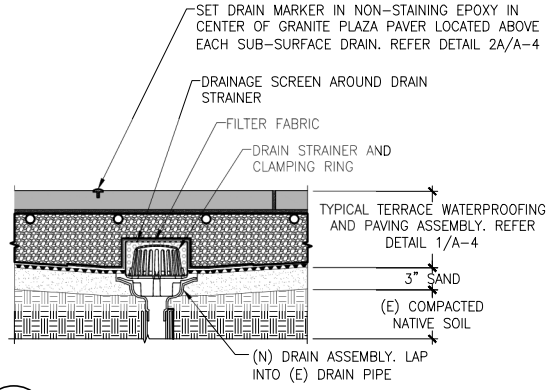
AB	MBB	AS NOTED

Seal

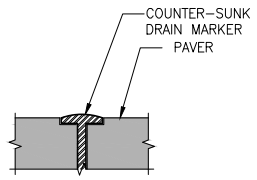
Drawing No. **ENV-4**



1 NEW TERRACE PAVER SYSTEM
N.T.S.



2 TERRACE DRAIN
N.T.S.



2A FIELD DRAIN MARKER
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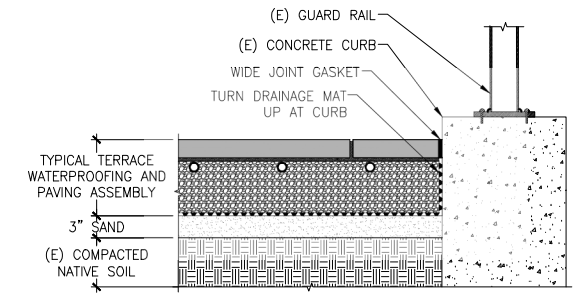
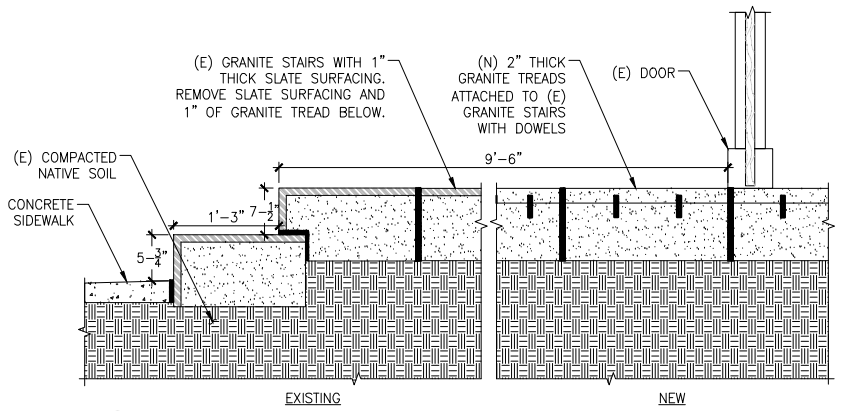


3 TERRACE PAVER SYSTEM AT CURB
N.T.S.



4 STAIRS AT MAIN ENTRANCE
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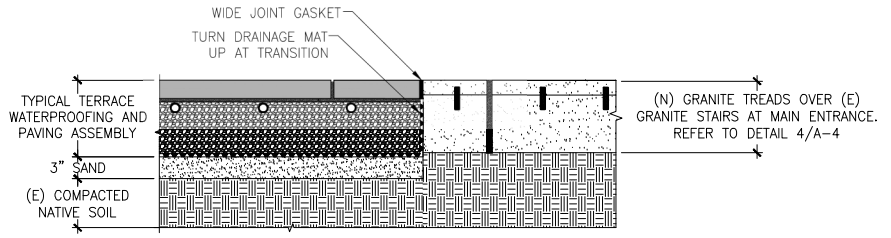
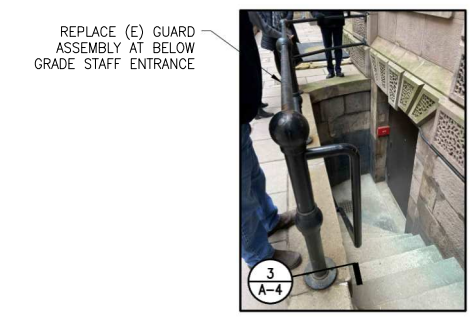
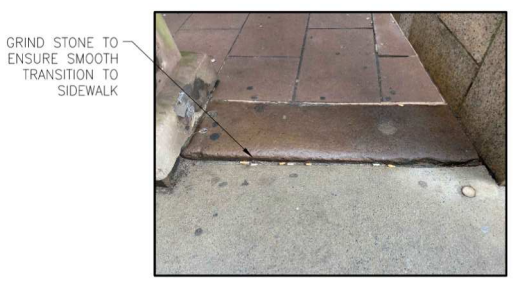


5 PAVER SYSTEM TO STAIR TRANSITION
N.T.S.

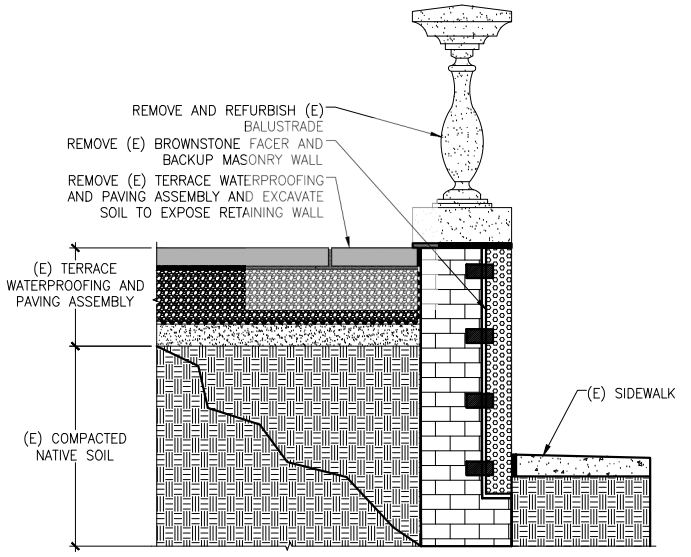
6 BALUSTRADE REMOVAL AT MAIN ENTRANCE
N.T.S.



7 GUARD RAIL AT BELOW-GRADE ENTRANCE
N.T.S.



9 STONE GRINDING AT HANDICAP ENTRANCE
N.T.S.



8A SECTION AT BALUSTRADE – REMOVAL
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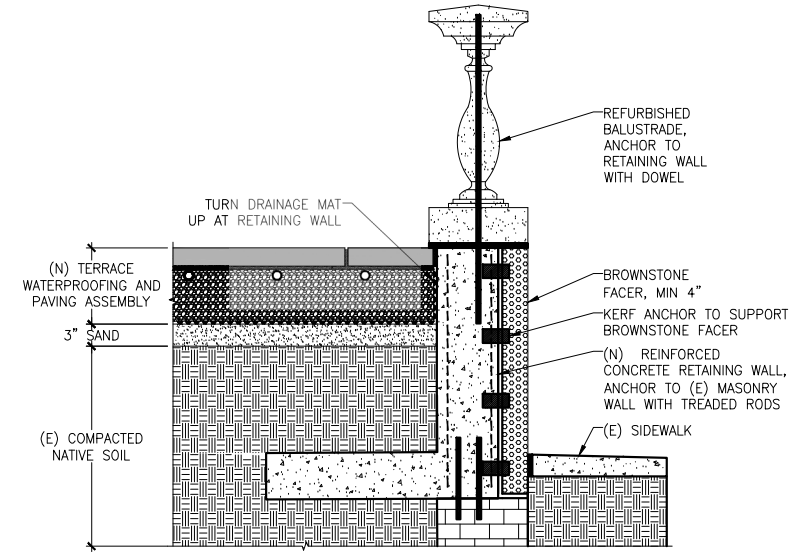

8B SECTION AT BALUSTRADE – RECONSTRUCTION
N.T.S.

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No.	Date	Description	By

BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project **10 1/2 BEACON STREET BOSTON, MA**

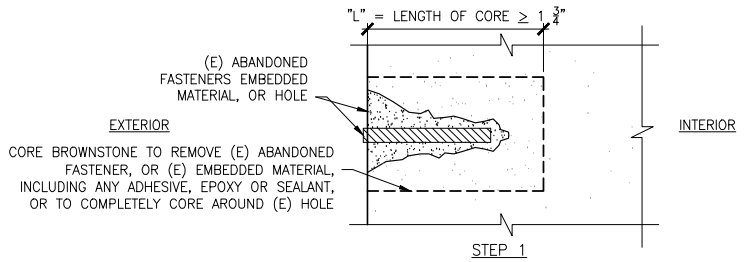
TERRACE DETAILS

Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
Drawn: AB	Approved: MBB	Scale: AS NOTED

Seal

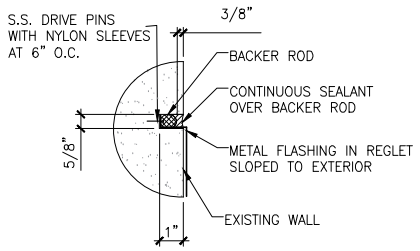
Drawing No. **ENV-5**



NOTE:
FOR (E) HOLES (NO ABANDONED EMBEDDED MATERIAL) WITH DIAMETER LESS THAN 1/4", OMIT S.S. MASONRY SCREW

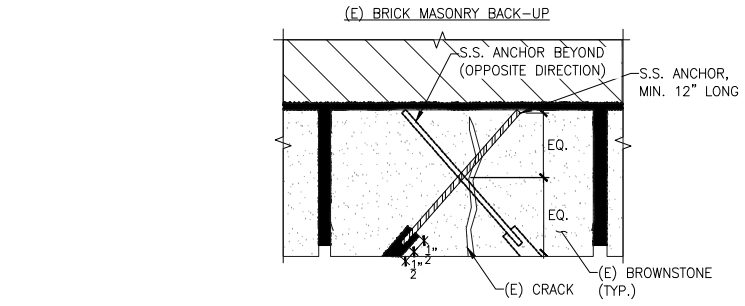
1 A-7 TYPICAL STONE REPAIR AT ABANDONED FASTENER OR HOLE – SECTIONS

SCALE: NTS



4 TYPICAL REGLET

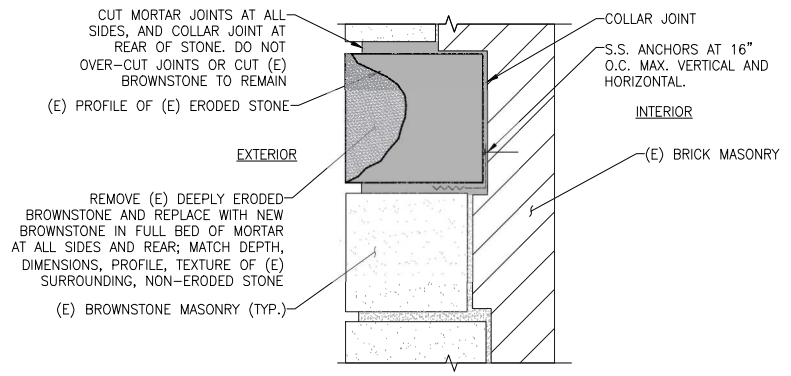
SCALE: NTS



NOTE: PROVIDE 2 ANCHORS PER EACH REPAIR, AS SHOWN

2 CROSS-STITCH REPAIR – PLAN

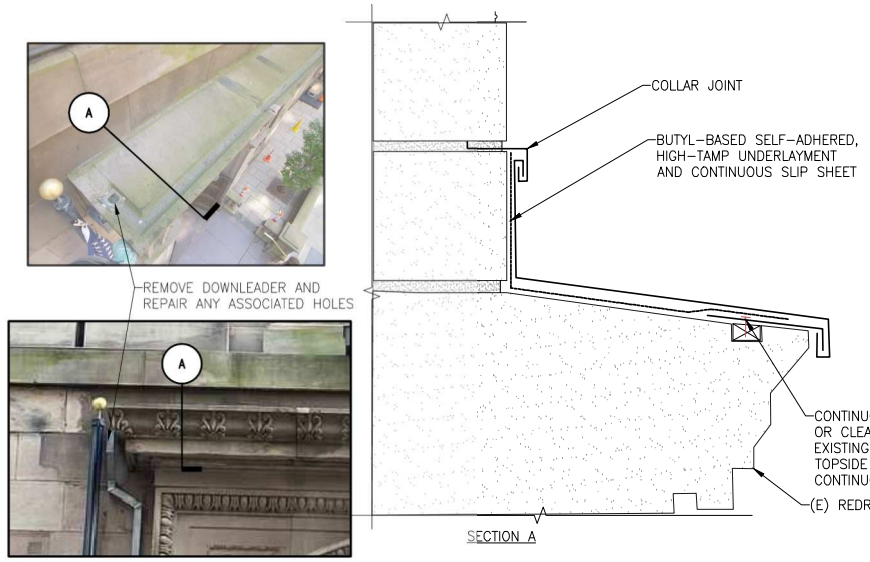
SCALE: NTS



NOTE: PROVIDE TEMPORARY SUPPORT OR SHORING OF MASONRY ABOVE BROWNSTONE TO BE REMOVED AS NECESSARY.

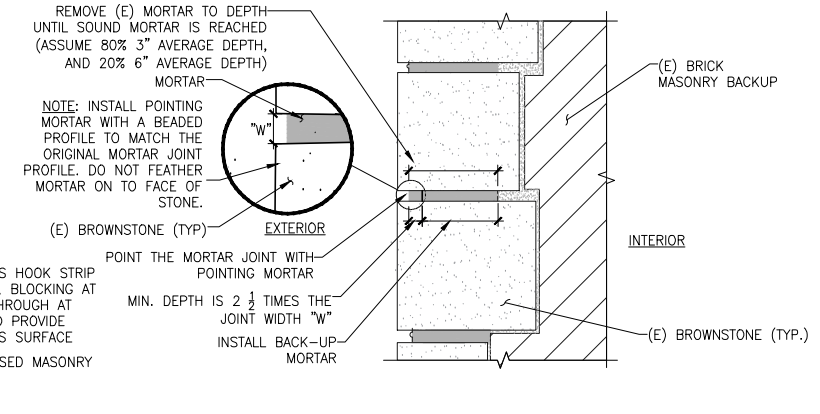
3 TYPICAL WHOLE STONE REPLACEMENT – SECTION

SCALE: NTS



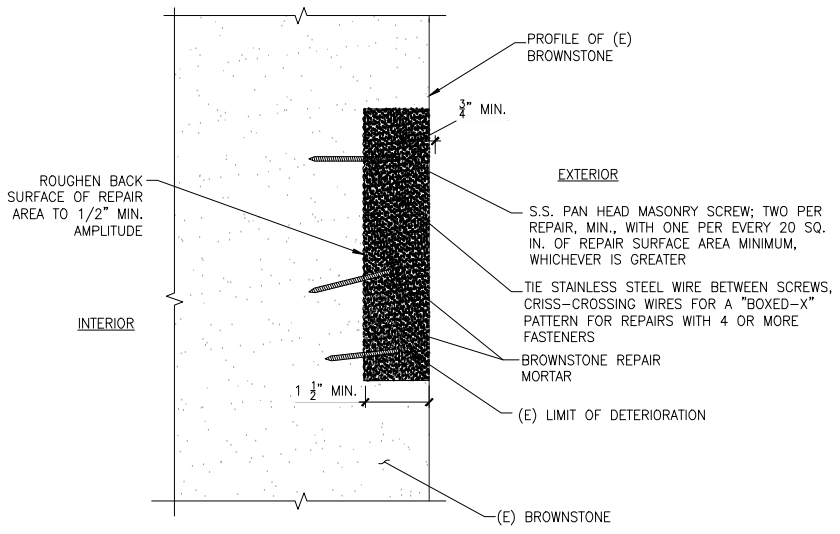
5 TYPICAL EXPANSION JOINT AT SHEET METAL FLASHING

SCALE: NTS



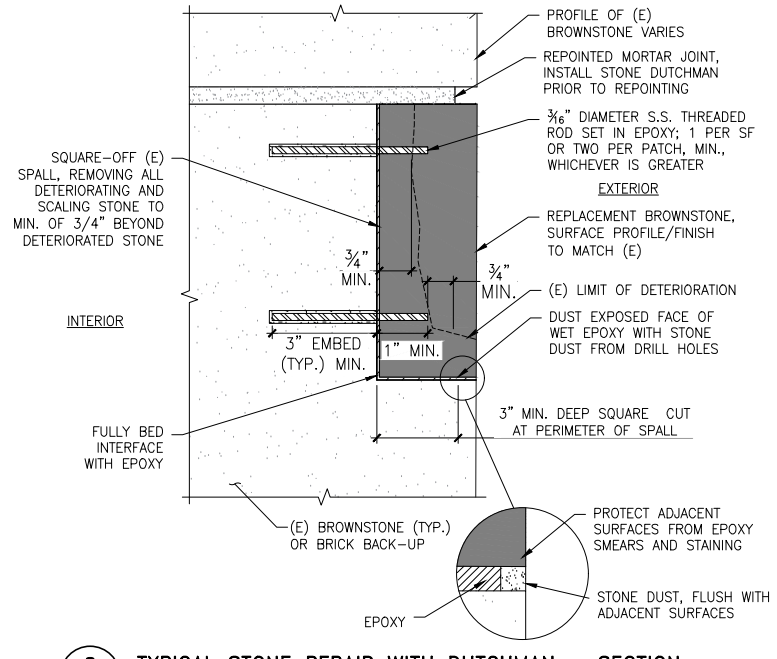
6 TYPICAL DEEP REPOINTING – SECTION

SCALE: NTS



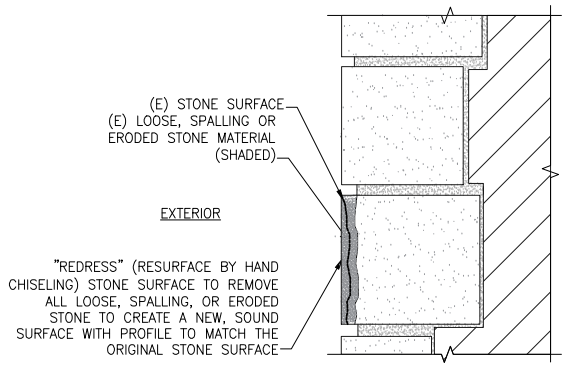
7 A-7 TYPICAL STONE REPAIR WITH REPAIR MORTAR – SECTION

SCALE: NTS



8 A-7 TYPICAL STONE REPAIR WITH DUTCHMAN – SECTION

SCALE: NTS



9 TYPICAL STONE SURFACE REDRESSING – SECTION

SCALE: NTS

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BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project **10 1/2 BEACON STREET BOSTON, MA**

BROWNSTONE MASONRY RESTORATION DETAILS

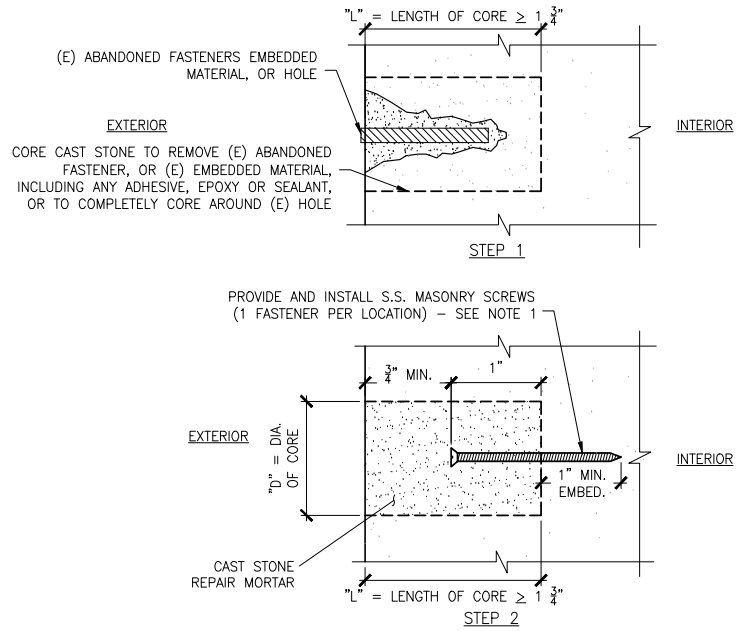
Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
Drawn	Approved	Scale
RML		AS NOTED

Seal

Drawing No.

ENV-6

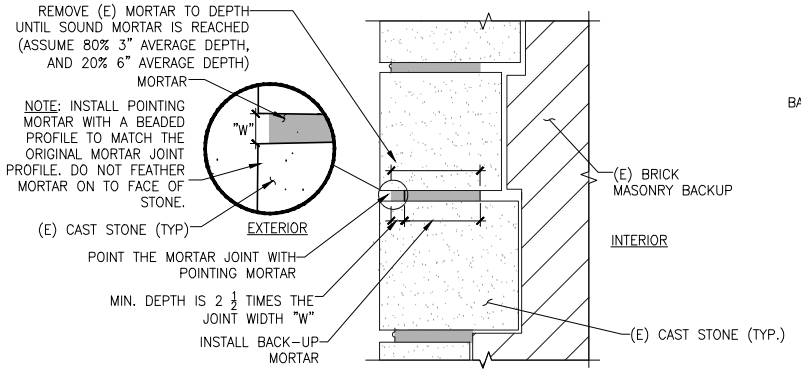


NOTE:

FOR (E) HOLES (NO ABANDONED EMBEDDED MATERIAL) WITH DIAMETER LESS THAN ½", OMIT S.S. MASONRY SCREW

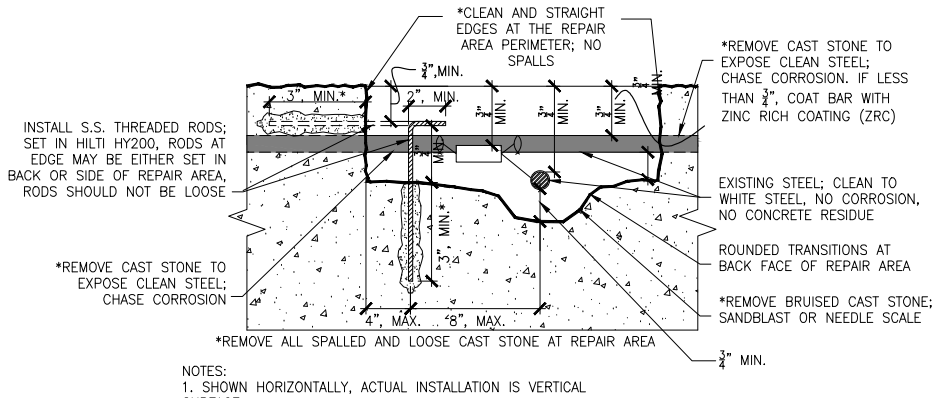
1 TYPICAL STONE REPAIR AT ABANDONED FASTENER OR HOLE – SECTIONS

SCALE: NTS



2 TYPICAL DEEP REPOINTING – SECTION

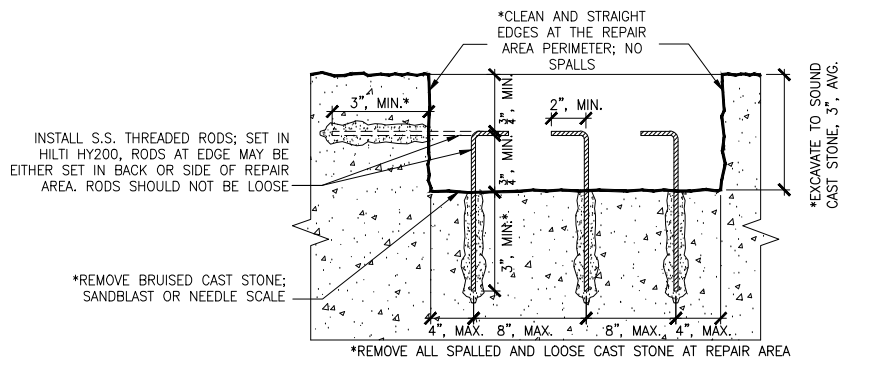
SCALE: NTS



NOTES:
1. SHOWN HORIZONTALLY, ACTUAL INSTALLATION IS VERTICAL SURFACE
2. STAINLESS STEEL THREADED RODS, ZINC RICH COATING REQUIREMENTS,
   OTHER PENETRATION DETAILS NOT SHOWN ON OTHER DETAILS FOR CLARITY.

3 CAST STONE REPAIR – IF STEEL REINFORCING EXPOSED

SCALE: NTS



4 CAST STONE REPAIR – IF NO STEEL REINFORCING EXPOSED

SCALE: NTS

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
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Consultant

No.	Date	Description	By

BOSTON ANTHENAEUM

FACADE RESTORATION AND TERRACE REHABILITATION

Project **10 1/2 BEACON STREET BOSTON, MA**

CAST STONE RESTORATION DETAILS

Drawing Title

Project No.	Checked	Date
200392.00	HMC	03/26/2020
Drawn: RML	Approved	Scale: AS NOTED

Drawing No. **ENV-7**

Seal

SECTION 045000

MASONRY RESTORATION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The General Conditions of the Contract for Construction and General Requirements are hereby made a part of this Section.

B. Maintain a copy of all applicable drawings, including shop drawings, and specifications at the site during all work covered under this Section.

C. All exterior work, including mockups, performed on this building must be reviewed and approved by the Beacon Hill Architectural District.

1.02 SCOPE OF WORK

A. The work includes all labor, materials, equipment, and services required for completion of work under this Section, and all work indicated on the Drawings. All labor, equipment, and services not shown on the Drawings or specified herein, but necessary to complete the work (e.g., all scaffolding or other access such as lifts, all temporary protection, all structural shoring, all temporary storage of materials, all site control, etc.) are included.

B. Perform and provide all submittals, surveys, shop drawings, and mockups as identified in this Section. Note that all mockups must be reviewed and approved by the Cambridge Historic Commission and may require multiple repeated efforts to achieve approval.

C. Generally, the work of this Section includes masonry and cast stone cleaning, repointing, and restoration, including a range of different repair types as indicated on the Drawings and as outlined below:

1. Masonry Cleaning: Complete masonry cleaning prior to start of masonry repair work.

    a. Clean all existing and new exterior masonry.

    b. Remove biological growth on masonry at locations indicated on the Drawings and where identified by the Engineer in the field.

2. Repointing: Cut and perform repointing at mortar joints indicated on the Drawings and where identified by the Engineer in the field.

3. Masonry Restoration:

    a. Brownstone Replacement: Remove severely eroded brownstones and replace with new stones that match the color, tone, texture, and bedding of the existing adjacent stone.

b. Masonry Repair: Perform the following masonry repairs where indicated on the Drawings or directed by the Engineer in the field:

(1) Brownstone Dutchman Repair: Repair spalls in or delaminated portions of the existing brownstone using a new or salvaged stone dutchman that matches the color, tone, texture, and bedding of the existing adjacent stone.

(2) Mortar Repair: Repair minimally eroded or shallow stones spalls with custom-color repair mortar.

(3) Surface Redress: Redress stone surfaces by removing all loose material and blending in the redressed area with the existing adjacent stone.

(4) Crack Repair:

(a) Nonstructural: Repair nonstructural cracks in fully supported stone using repair mortar.

(b) Structural: Repair crack in spanning stone using structural dowels that span across the crack prior to repairing crack with repair mortar.

(5) Repair at Abandoned Fastener or Hole: Remove all embedded materials and repair holes within the area of work with repair mortar and mechanical anchorage, depending on the geometry (depth and diameter) of the hole.

4. Cast Stone Repair: Provide localized repairs to cast stone with new integrally colored and custom-proportioned cast stone.

5. Repair or replace in-kind all materials damaged during construction, at no additional cost to the Owner, using approved materials.

1.03 COORDINATION AND SEQUENCING WITH RELATED WORK

A. Refer to other Divisions of these Specifications to determine the type and extent of work therein affecting the work of this trade, whether or not such work is specifically mentioned in this Section.

B. Work in cooperation with other trades on this project, both under this Contract and under separate Contract(s). Coordinate with other trades to maintain accessibility of building entrances.

1.04 REFERENCE STANDARDS

A. In general, follow recommendations and procedures of the following standards and publications, except where these Contract Documents (project specifications and drawings) are more stringent:

1. Massachusetts State Building Code, current edition.

2. Relevant National Park Service Historic Preservation Briefs, including but not limited to:

   a. Preservation Brief #1, Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings.

   b. Preservation Brief #2, Repointing Mortar Joints in Historic Masonry Buildings.

3. Brick Institute of America, relevant publications.

4. ACI 503 – Building Code Requirements for Masonry Structures.

5. Product manufacturer's written recommendations.

6. ASTM International (ASTM): Standards as specified or referenced herein.

1.05 SUBMITTALS

A. Submit the following items for the Engineer in time to prevent delay of the project and to allow adequate time for Engineer's review and resubmittals, if needed. Do not order materials or start work before receiving the Engineer's written approval.

1. Product Data:

   a. Manufacturer's literature for all materials specified or proposed for use on the project, properly labeled and referenced to the appropriate Specification Section.

   b. Safety Data Sheets (SDSs) for each material where appropriate. Submit to owner; do not submit to Engineer.

   c. Certifications by the producer of each material that all materials supplied comply with all the requirements of the appropriate referenced standards, that all materials are compatible with adjacent materials, and that all materials are suitable for their intended purpose.

2. Certificates for mechanics installing adhesive anchor systems showing they are certified by the manufacturer.

3. Contractor qualifications indicating at least 5 years of experience successfully completing similar masonry restoration work for historically significant buildings.

4. Existing Field Condition Survey: Prior to completing masonry repairs, survey all existing masonry within the area of work and note locations of damage, including stone deterioration, previous repairs, and cracking. Annotate elevations with areas of deterioration and provide photographic documentation of damage. Survey areas of scheduled masonry removal and

rebuilding and provide dimensions of stones, bond coursing, and photographic documentation of overall appearance. Number all pieces scheduled to be reinstalled. Submit all the aforementioned documentation and annotation as a submittal.

5. Mortar Mix Design: The Contractor shall warrant by the submission of the design mixes that such mixes are representative of the mortar that the Contractor intends to supply to meet the requirements of the Contract Documents. Submit new design mixes for review and approval when any change in materials is required or needed.

6. Masonry Shop Drawings:

   a. Masonry repair drawings indicating profile and dimensions.

   b. Provide coordinate shop drawings of reset coping and roof stones showing masonry, flashing, and structure together with anchors, dowels, and all other embedded items by related trades to ensure proper coordination of the work.

7. Samples: Submit the following samples to the Engineer for review. Samples must be approved before any repair mockups are completed.

   a. Various Mortar Samples: For each of the following, along with physical samples, submit tables showing the mix design (“recipe”) for each, listing all materials very specifically, including the particular manufacturer and product name.

      (1) Mortar Samples for Repointing: Provide samples of the cured mortar proposed to be used for repointing. Samples will be used to evaluate the color and texture of the mortar and will be compared to the original mortar in place on the building. The mortar samples may be made in “rings” cut from 3 in. diameter PVC pipe.

      (2) Submit mortar samples of the cured repair mortar proposed to be used for repair of stones with repair mortar. Samples will be used to evaluate the color and texture of the mortar and will be compared to a cleaned brownstone surface.

      (3) Submit mortar samples of the cured repair mortar proposed to be used for crack repairs. Samples will be used to evaluate the color and texture of the mortar and will be compared to a cleaned brownstone surface.

   b. Brownstone Samples: Submit 12 in. by 12 in. samples of new brownstone showing full range of colors, textures, and finish to be used for replacement stones and stone dutchman repairs. The samples will be reviewed by the Engineer for matching qualities to the existing stone. Submit as many samples as needed to obtain an adequate match.

c. Provide samples of the materials included herein at the request of the Engineer. Include Ziploc bag samples, clearly labeled, of all powder or granular materials, such as sand, cement, lime, pigment, etc.

8. Hot-Weather Masonry Work Plan: Include all provisions that will be taken to account for hot weather and specify temperature restrictions. All hot-weather work is to be in accordance with the requirements of this Specification and the standards of practice included in the references listed above.

9. Cold-Weather Masonry Work Plan: Include all provisions that will be taken to account for cold weather and specify temperature restrictions. All cold-weather work is to be in accordance with the requirements of this Specification and the standards of practice included in the references listed above.

1.06 MOCKUPS

A. The following mockups shall be prepared by the personnel who will be installing them on the project at a location on the building selected by the Engineer. Notify the Engineer at least 48 hrs before starting work on each mockup. Do not proceed with any part of the work before the Engineer approves the appropriate mockups. Approved mockups may remain in place as part of the finished work.

1. Pointing: Cut and point a sample area on the building where directed by the Engineer. Mockup to include both cut joints not filled with mortar and pointed joints with finish tooling. Mockup to consist of an area of approximately 16 sq ft total, with approximately 8 sq ft of cut joints not filled with mortar, and 8 sq ft of filled joints.

2. Crack Repair: Repair cracked brownstone using the technique and material included herein. Mockup location to be chosen by the Engineer in the field.

3. Stone Repair with Repair Mortar: Cut and remove unsound stone, and repair with brownstone repair mortar using the technique and material included herein. Mockup location to be chosen by the Engineer in the field.

4. Stone Repair with Dutchman: Cut and remove deteriorated stone, and repair brownstone with dutchman. Mockup location to be chosen by the Engineer in the field.

5. Stone Repair with Dutchman at Canopy Supports: Remove existing mortar repair around canopy supports, and repair brownstone with dutchman. Mockup location to be chosen by the Engineer in the field.

6. Stone Surface Redressing: Redress one whole stone, at a location to be chosen by the Engineer in the field.

7. Whole Stone Replacement: Remove one deteriorated stone scheduled for replacement, and install a new replacement stone.

B. Perform all cleaning mockups with the Engineer present, at inconspicuous areas, as chosen by the Engineer and the owner. Each cleaning mockup is to consist of an area of approximately 9 sq ft. Perform up to three mockups for each type of cleaning material and method specified. Adjust methods, materials, equipment, pressures, dilutions, dwell times, number of coats, etc. Allow time for mockup to completely dry to assess cleaning results and to determine whether there are any material changes that require a modification of the treatment. Do not proceed until an acceptable cleaning operation has been approved and fully documented.

1.07 PROTECTION, HANDLING, AND STORAGE

A. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

1.08 QUALITY CONTROL AND ASSURANCE

A. Contractor Qualifications: Contractor must have a minimum of ten years of experience with successfully completed projects on historic buildings (i.e., buildings listed on either the National or State Registers of Historic Places, either individually or within an historic district). Provide a list of five projects or more showing at least ten years' successful experience with similar work on historic buildings. List the building name and address, the Owner's representative, the General Contractor, and the Engineer or Architect observing the work, with phone numbers and contact personnel. Acceptance of bid will depend upon firm's experience completing similar work on historic buildings and review of provided references. The foreman for this project must individually have at least five years' successful experience on similar work on historic buildings.

1.09 WARRANTY

A. Guarantee all work under this Section in a document stating that if, within two years after the Date of Substantial Completion of the Work, any of the work of this Section is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the owner to do so. State that the obligation of these Guarantees shall run directly to the owner and may be enforced by the owner against the Contractor, shall survive the termination of the Contract, and shall not be limited by conditions other than this Contract.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer's products and specifications are generally referred to for identification; the products of other manufacturers meeting the specifications and standards of the specified systems may be submitted for review. Check all specified items upon Contract signing and initiate submittals in time to allow early ordering so that the work is not delayed. All materials are to be new, unless designated otherwise.

2.02 MATERIALS

A. Mortar (repointing): Site-mixed mortar meeting the requirements of ASTM C270 Type N, with nominal proportions 1:1:6 (cement: lime: sand). Do not use admixtures without written approval by the Engineer. All exposed mortar is to have tooling, texture, and color to match the original red mortar and as determined from the approved mortar sample and mockup. Mortar constituents as follows:

1. Sand: Naturally red-colored sand meeting the requirements of ASTM C144, fineness modulus 2.0 to 2.5. The red color and texture of sand to be match that used in the original construction (very little remains and is generally concealed) and as determined from the approved mortar sample and mockup.

2. Cement: Portland cement meeting the requirements of ASTM C150, Type 1 or Type 2 (nonstaining), low alkali (equivalent alkalis less than 0.6%). Color as determined from the approved mortar sample and approved mockup. Provide both white and gray cement in the mockup, with final selection between the two, or combination of these two colors of cement determined by the mockup.

3. Lime: Hydrated lime meeting the requirements of ASTM C207 Type S.

4. Water: Potable.

5. Mortar Pigment: Pigment meeting the requirements of ASTM C979. Do NOT use mortar-coloring material unless at the Engineer's specific request to obtain color match. If requested by the Engineer, integral coloring material shall consist of inert, nonfading, finely ground, alkali-fast mineral oxides made especially for cement/lime mortars. Limit coloring additive so as not to exceed 10% of the weight of the portland cement. Do not use carbon black as a coloring additive material.

B. Stone Repair with Mortar:

1. Mortar:

a. Option 1: Type N mortar, as specified above, utilizing naturally reddish brown sand (only), with grey cement rather than white, with the addition of inorganic pigment meeting the requirements specified above to match the color of the existing brownstone.

b. Option 2: Proprietary repair mortar custom formulated to match the existing brownstone, Jahn repair mortar by Cathedral Stone or approved equal.Screws: #10 stainless steel screws, length as necessary to provide 2 in. embedment in the existing stone and embedment in the repair material of approximately 50% of the depth of the repair.

2. Wire: Stainless steel wire.

C. Brownstone (for replacement stones and stone repair with stone dutchman): Light brown to tan sandstone ("Brownstone") matching in color, texture, and appearance to the existing New Jersey Brownstone, with approved track record of durability of 100 yrs or more in cold climates, and test data indicating similar or better material properties compared to the existing. All exposed faces to be finished to match the existing brownstone, and free of cracks, veins, or other defects.

D. Epoxy for Embedment of Anchors in Brownstone: Epoxy adhesive specifically designed for use with sandstone and limestone and shown to not stain the stone, Anchor Epoxy by Bonstone or approved equal.

E. Stainless Steel Dowels:

1. Threaded Rods: Type 304 or 316 stainless steel threaded rod, diameter as indicated below, 3 in. minimum embedment unless noted otherwise.

a. Dutchman Repair: 3/16 in. diameter, length as indicated on the Drawings.

b. Epoxy for Setting Dowels: See Para. 2.02.D above.

F. Stainless Steel Anchors:

1. Terrace Wall "Facer" Stones: Stainless steel anchor, Type 304 or 316, consisting of a 3/16 in. thick metal base plate with 1/4 in. diameter pins on both sides to engage the stone, #433 Stone Anchor by Hohmann & Barnard, Inc., or approved equal. Except, on either side of the last stone installed at each course, provide anchor with pin on one side only.

a. Masonry Screws: #10 stainless steel screws, length as necessary to provide 2 in. embedment in the existing stone.

b. Spring-Loaded Pin Anchor (for use at the last stone installed at each course): Stainless steel pin. Type 304 or 316, 3 in. long and 1/4 in. diameter, with a 5/16 in. diameter and 3-1/4 in. long stainless steel spring tack-welded to the center of the pin.

2. Cross-Stich Repair: Stainless steel, Type 304 or 316, helical threaded bars, by Helifix or approved equal.

G. Shims: Slate meeting ASTM C406 Grade S1, nominal 3/16 in. to 1/4 in. thickness, or structural plastic shims, with 4,000 psi min. compressive strength, Korolath or approved equal. Locate shims at approximate quarter points along the length of the stone.

H. Bird Netting: Knotted 1 in. netting, weather and UV resistant to be removed and replaced in kind.

I. Stainless Steel Anchors for Cross-Stitch Repairs: 8 mm min. diameter, stainless steel Type 304 or 316, length as indicated on the Drawings. Helical anchor with

double-thread for mechanically screwing into store or masonry, Helifix Dryfix or approved equal.

J. Stone Dust: Retained from holes drilled in the existing and replacement stone.

K. Cleaning products must meet the requirements listed below. Review of the proposed product(s) for conformance to the requirements will be evaluated during the submittal process. If different forms of the product exist (e.g., liquid and gel), they may be used in combination.

L. Cleaning Products for Use in Mockups for Cleaning Brownstone:

1. Water powerwashing, with low pressure (under 400 psi).

2. Water with a Mild Detergent: Simple Green or approved equal.

3. Sure Klean by Prosoco “942 Limestone and Marble Cleaner” Or approved equal.

4. Biological Growth Cleaner: D/2 Biological Solution by D/2 Biological Solutions, Inc.

M. Use natural or nylon bristle brushes for all cleaning operations. Metal bristle brushes are not permitted.

N. Cast Stone Repair Materials:

1. Reinforcing Materials: Galvanized or epoxy-coated, unless otherwise noted.

a. Reinforcing bars shall conform to ASTM A615, Grade 60.

b. Welded Wire Fabric (WWF): 6x6 – W1.4 x W1.4, WWF conforming to ASTM A185.

c. Supports: Provide manufacturer's bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to CRSI's "Manual of Standard Practice," PCI MNL 117.

d. Submit all alternative reinforcing materials to design professional for review.

2. Constituent Ingredients: Custom integrally colored and proportioned cast stone, with specific mix proportions as determined through pre-construction mockups. Intent will be to match color of exposed, weathered face of adjacent clean, uncoated cast stone as closely as possible solely by means of sand color and cement color, with minimal or no use of pigment in mix.

a. Portland Cement: ASTM C150, Type I or Type II.

b. Coarse Aggregate: Meeting ASTM C33, mineral and geological composition of course aggregate, particle shape, and particle-size distribution to match coarse aggregate in original concrete as closely as possible

c. Fine Aggregate: Meeting ASTM C33, color of sand to match color of exposed, weathered, “beige” face of uncoated original cast stone and color of sand to match color of exposed, weathered, face of uncoated exposed aggregate.

d. Water: Potable.

e. Pigment (if required): Inorganic color-fast mineral pigment.

f. Admixtures: Use of admixtures only when approved by design professional

(1) Air-entraining agent, conforming to ASTM C260.

(2) Water-reducing admixture, conforming to ASTM C494.

(3) Do not use admixtures containing calcium chloride.

3. Technical Design Parameters: Cast stone materials and replacement units shall be fabricated to meet minimum technical parameters determined through structural engineering analysis and developed in combination with reinforcement layouts/patterns to withstand anticipated loads.

a. Prepare design mixes suitable for use at each type of cast stone (lintel, sill, quoins, cornice, etc.) according to ACI 301.

b. Compressive Strength (28-day), per ASTM C39/C39M: 6000 psi minimum.

c. Maximum Water-Cementitious Materials Ratio: 0.40.

d. Air Content: 6.0% ± 1.5%.

e. Appearance of plastic shrinkage cracks due to inadequate proportioning, mixing, placement, or curing shall be cause for rejection of the work so affected. Rejected cast stone shall be removed and replaced at no cost to the owner.

f. Appearance of unconsolidated or “honeycombed” cast stone shall be cause for rejection of the work so affected. Rejected cast stone shall be removed and replaced at no cost to the owner.

4. Accessories for Localized Cast Stone Repair

a. Sacrificial Galvanic Protection Anodes: “Galvashield XP+ anodes” by Vector Corrosion Technologies.

b. Zinc-Rich Coating for Existing Steel Reinforcing or Lintels: ZRC Cold Galvanizing Compound by ZRC Worldwide.

c. Supplemental Mechanical Anchorage for Cast Stone Repair: 1/4 in. diameter, Type 316, threaded stainless steel rod, set in epoxy.

PART 3 – EXECUTION

3.01 INSPECTION

A. Verify all site conditions and dimensions by field measurement in consideration of the special conditions associated with repairs to existing construction. Notify the Engineer immediately of any inconsistency between the conditions found and those shown in the Contract Drawings. The Engineer will determine what modifications or additional repairs are necessary.

3.02 PROTECTION

A. Schedule and execute all work without exposing the building interior to the effects of inclement weather. Protect the existing building, site work, landscaping, and the building interior from all risks associated with the work. Protect persons, property, and site as required. Provide protective coverings over the windows as required to prevent damage. Repair all damaged elements of the building caused by the work of this Section at no additional cost to the Owner.

3.03 GENERAL MASONRY RESTORATION WORKMANSHIP

A. Masonry workmanship shall comply with all applicable Specifications for Masonry Structures ACI 530, except as modified below. Do not proceed with masonry restoration work until all associated flashings are installed. Report any damage to new flashing work within the work area to the Engineer and provide for repairs by appropriately skilled mechanics.

B. Conduct all masonry work in a neat and workmanlike manner to prevent staining any surface with mortar or other spills. Keep all exposed surfaces of the stone free from mortar at all times. Avoid dropping mortar on completed masonry work or other elements of the building. If mortar drops or spills, spot-clean immediately using a clean sponge and clean water before mortar can set.

C. Hot Weather:

1. Above 80°F: Protect the masonry and mortar from direct sunlight and exposure to wind to avoid rapid evaporation of water in the mortar before, during, and after masonry construction.

2. Above 90°F: Do not use mortar when masonry surface temperature is above 90°F. Protect the masonry and mortar from direct sunlight and exposure to wind to avoid rapid evaporation of water in the mortar before, during, and after masonry construction.

D. Cold Weather (below 40°F): Do not work in average daily temperatures below 40°F without providing cold weather protection as described in ACI 530 and outlined in the table below. Continue to operate heaters overnight with appropriate supervision. Do not use heaters that produce oily deposits on the masonry. If any oily deposits occur, consult with the Engineer to determine how best to remove oily deposits, and remove at the Contractor's expense.

<table>
<tr><th rowspan="2">Temp.</th><th colspan="2">WORK IN PROGRESS</th><th>COMPLETED WORK</th></tr>
<tr><th>Deep Repointing</th><th>Masonry Repairs</th><th>Curing</th></tr>
<tr><td>Above 40°F</td><td>No Requirements.</td><td>No Requirements.</td><td>No Requirements.</td></tr>
<tr><td>40°F to 25°F</td><td rowspan="3">Remove visible ice on masonry. Heat mortar during mixing to between 40°F and 120°F. Maintain above freezing while in use.</td><td>Remove visible ice on masonry. Heat mortar repair mixes during mixing to between 40°F and 120°F. Maintain above freezing while in use.</td><td>Protect masonry with a weather-resistive cover for 24 hrs after construction. Completely cover masonry when temp. is less than 32°F.</td></tr>
<tr><td>25°F to 20°F</td><td>Remove visible ice on masonry. Use heat sources on both sides of wall. Install wind breaks when wind velocity is over 15 mph.</td><td>Completely cover with insulated blanket for 24 hrs after construction.</td></tr>
<tr><td>Below 20°F</td><td>Provide an enclosure and use heat sources to maintain substrate and ambient temp. above 32°F within the enclosure.</td><td>Provide an enclosure and use heat sources to maintain substrate and ambient temp. above 32°F within the enclosure.</td></tr>
</table>

E. Measure cementitious and aggregate material for use in mortar in a dry condition by volume only. Measure materials with an approved device, not by shovel. Mix materials in a clean mechanical batch mixer. Thoroughly mix cementitious and aggregate materials together before adding any water. Add enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 1-1/2 hrs. Add remaining water in small portions until mortar of desired consistency is reached. Discard hardening mortar.

F. Do not use admixtures of any kind in mortar, unless specifically approved by the Engineer.

3.04 POINTING MORTAR MIXES

A. Mix mortar using sufficient quantity of water to ensure good workability. Mix by machine only, for at least 3 min., but not more than 5 min. Discard hardening mortar.

B. For pointing only, use prehydrated mortar prepared as follows: Mix materials in a clean mechanical batch mixer. Maintain mortar in this dampened condition for 60 min. Add remaining water in small portions until mortar of desired consistency (somewhat stiffer than bed mortar) is reached. Use within 60 min. of final mixing. Do not retemper or use partially hardened material. Mortar color must match approved mockup mortar color.

3.05 MASONRY DEEP REPOINTING

A. Remove existing mortar by hand or carefully with power tools such that masonry is not overcut or joints enlarged during mortar removal process. The Engineer will disallow use of power tools if evidence is found that mortar joints are being overcut or enlarged. If using power tools, cut down the center of the joint with power tools and then remove remaining mortar with hand tools. Do not chip or cut into adjacent masonry.

B. Remove existing mortar from joints scheduled for pointing to a depth until sound mortar is reached, to leave no cavities in the existing mortar, and to remove all deteriorated mortar.

C. Provide slate shims in joints as needed to support brownstone when mortar is removed.

D. Cut reglet in horizontal mortar joint at the back side of gables (coordinate with Section 076000 – Sheet Metal Flashing and Waterproofing).

E. Remove mortar from masonry surfaces within raked-out joints to provide reveals for contact with pointing mortar.

F. Rinse joint surfaces with water to remove dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp but free of standing water.

G. Install backup mortar in the joint to a uniform depth until the remaining depth of the joint is 2.5 times the width of the mortar joint. Point the remainder of joint using red pointing mortar, installing it in successive layers of no greater than 3/8 in. depth until flush with exterior face of stone. Fully compact each layer and allow to become thumbprint-hard before applying next layer. Where existing stones have rounded edges, recess final layer slightly from face. Take care not to spread mortar over edges and onto exposed face.

H. When mortar at exterior face is thumbprint-hard, tool to form a beaded profile to match the original mortar joints. Remove excess mortar from edge of joint by brushing.

I. Finished joints should match the original mortar joints, as approved by the mockup, in color, texture, tooling, size, and profile (raised beaded profile).

J. Cure mortar by maintaining in a damp condition for not less than 72 hrs. Do not wash the newly pointed mortar with a stream of water.

3.06 CRACK REPAIR

A. Nonstructural Crack Repair at Fully-Supported Stone:

1. Using appropriate cutting tools to trace the crack, rout out cracks to a depth 2-1/2 times the width of the crack (minimum 5/8 in.) and a 1/4 in. minimum width. Clean routed cracks of dust and debris using compressed air and a

stiff nylon bristle brush of sufficient length to reach the full depth of the routed-out crack. Do not use metal wire brushes.

2. Wet stone to a saturated surface dry condition immediately prior to installing crack repair material.

3. Pack crack with repair mortar leaving no voids. When crack is deeper than 5/8 in., fill crack in multiple layers. Compact each layer thoroughly and allow to become thumbprint-hard before applying next layer. Allow at least 24 hrs to pass between successive stages of mortar application to allow for mortar shrinkage between stages.

4. Tool the surface of the repair mortar flush and texture to match adjacent stone surface before mortar sets.

5. Clean mortar from face of stone. Remove droppings and splashed mortar immediately.

B. Structural Crack Repair at Spanning Stone:

1. Clean crack with compressed air.

2. Provide concealed stainless steel anchors embedded in the stone spanning across the crack.

3. Where directed by the Engineer, rout out cracks to a depth 2-1/2 times the width of the crack (minimum 5/8 in.) and a 1/4 in. minimum width. Clean routed cracks of dust and debris using compressed air and a stiff nylon bristle brush of sufficient length to reach the full depth of the routed-out crack. Do not use metal wire brushes.

4. Point the crack with stone repair mortar to create a dam to retain the epoxy injection.

5. Inject the crack with epoxy, working from the bottom up, and using the injection port above to ensure the crack is fully filled.

6. Patch holes at drill points with stone repair mortar.

3.07 SURFACE REDRESSING

A. Remove all loose masonry at the exterior face of the stones indicated to be redressed using hand tools to provide a surface with a similar texture and profile to the existing adjacent stones.

B. Remove additional sound material at the perimeter of the redressed area and texture the surface of the stone as needed to provide a gradual and inconspicuous transition between the redressed surface and the existing adjacent surface of the stone.

C. Notify the Engineer if redressing requires removal of unsound material to a depth greater than 1/2 in. of the stone face, as this may require more-extensive repair (i.e., stone dutchman or mortar repair).

3.08 STONE REPAIR WITH REPAIR MORTAR

A. Remove all loose or delaminated stone. Square cut the edges of the repair area to a minimum depth of 1-1/2 in. Do not overcut corners of the repair area. Do not allow any feathered edges in the repair area. Roughen the substrate to achieve the roughness required by the manufacturer for good bond, using a pointed stainless steel tool. Do not generate new cracks or damage stone beyond the repair area.

B. Provide anchors in all brownstone repair areas, providing one anchor per 20 sq in. of repair area but not less than two anchors per repair area. Install stainless steel screws as follows:

1. Drill a clear hole sufficient to accommodate the #10 screw, and clean the hole using alternate application of compressed air and nylon brush.

2. Tie stainless steel wire between screws, criss-crossing wires for a “boxed-x” pattern for repairs with four or more fasteners.

C. Clean all dust from the area of the repair using compressed air; then wash thoroughly with clean water and a soft brush. Leave the surface damp for optimum bond.

D. Mix mortar in accordance with the manufacturer’s directions. Repair mortar should be shapable without using molds and as it is being applied should hold its shape right away. Do not mix more material than can be used within 30 minutes.

E. Apply a 1/8 in. coat of mortar that is mixed with water to the consistency of wet putty (termed the “peanut butter” coat by the manufacturer). Before the “peanut butter” coat dries, apply mortar to fill the repair area, mixed to the proper consistency, per the manufacturer’s recommendations.

F. Apply material so that it is slightly proud of the adjacent stone surface. Allow the mortar to cure for approximately 60 min. (may require longer depending on the temperature and humidity) and then scrape off the excess material using a straight edge. At large repair areas, texture the surface to create false joints within the mortar repair area.

G. Finish the repair mortar to match the texture of the existing stone.

H. Cure repair material as recommended by the manufacturer, spraying the repaired areas with a water mist several times a day for a minimum of three days following the application of the material.

I. Remove excess mortar from adjacent surfaces near the perimeter of the repair area before it cures using clean water and a rubber sponge.

J. Repair mortar shall exhibit zero shrinkage after application and curing.

3.09 STAINLESS STEEL DOWEL INSTALLATION

A. Install dowels using mechanics trained and approved by the epoxy manufacturer for the epoxy installation work. Maintain proof of such certification for each epoxy mechanic at the site at all times.

B. Before drilling, measure and mark the location for dowels on both of the pieces of masonry to be joined. Use string lines and other leveling devices to ensure proper horizontal and vertical placement. Drill holes through both pieces as directed:

1. For solid masonry with no cavity, holes shall be 1/16 in. larger in diameter than the dowel to be used, i.e., 9/16 in. dia. holes for 1/2 in. dia. anchors.

C. Clean holes of all dust and debris using a vacuum cleaner, compressed air free of oil, and a stiff, cylinder nylon bristle brush of sufficient length to clean the full depth of the hole in the backup. Alternate application of compressed air and clearing the hole with brush until neither operation produces any dust. Do not use metal wire brushes to clean holes. Collect stone dust from holes drilled in brownstone for use in dutchman repairs.

D. Load two-part epoxy cartridge into double-barrel caulking gun. Remove cap on cartridge and verify that the two components of epoxy have not been contaminated at the end of the tube. Discard any hardened, partially hardened, or partially mixed epoxy. Attach static mixing head to tip of epoxy cartridge using nut supplied by manufacturer. Pump epoxy into waste contained until both components are fully mixed and epoxy is a uniform color, is not “marbled,” and does not contain any light or dark streaks of one or the other unmixed component when pumped from the end. Pump additional epoxy for two more full squeezes on the gun to ensure complete mixing at tip.

E. Insert the mixing tip into the hole or screen tube. Starting from the rear, fill hole with epoxy until one-half to two-thirds full.

F. Insert dowels of appropriate lengths into the center of the holes or screen tubes. Gently push the dowels into the epoxy to the bottom of the screen tube or holes in the masonry. As the dowel is pushed into the masonry, slowly rotate dowel counterclockwise.

G. Do not disturb dowel between the specified gel and cure time.

H. Dowels in epoxy that do not cure properly must be cut flush with the stone and abandoned and replaced with new dowels. Holes and threaded rod with failed epoxy cannot be reused and must be discarded and replaced. After epoxy manufacturer’s specified cure time for current environmental conditions check that epoxy in the masonry has cured by probing the epoxy with a #9 stainless steel wire, checking for any softness in the epoxy. If the wire makes a depression in the epoxy, replace the dowel at no cost to the Owner. Install new dowel at least 3 in. away from the abandoned dowel.

3.10 STONE REPAIR WITH DUTCHMAN

A. Provide a repair that is securely anchored to the original stone, is the shape of the original stone, and has invisible joints between the original stone and the stone replacement piece and joints that remain invisible when weathered.

B. Scribe a rectangle around the damaged area of the brownstone, and cut or chisel a rectangular area into the stone. Cut a piece of repair stone having similar color and texture, so that it will fit the repair area exactly. Test fit the repair stone to be sure it fits snugly into place.

1. The stone dutchman repair at the existing mortar repair over brick masonry is similar, except remove the existing brick masonry to a minimum depth of 3 in".

C. Clean both the parent stone/brick masonry and stone dutchman repair piece of all loose debris and grease by brushing with stiff bristle brush.

D. Provide remedial anchors using mechanics trained and approved by the epoxy manufacturer for the epoxy installation work. Measure and mark the location of remedial anchors on both pieces of stone to be joined before drilling. Drill holes through both pieces as directed. Holes shall be 1/16 in. larger in diameter than the anchor to be used, i.e., 9/16 in. dia. holes for 1/2 in. diameter anchors. Consult with the Engineer on location, size, and embedment of anchors prior to installing. Collect the stone dust resulting from drilling holes in the parent stones and stone dutchman pieces.

E. Install the threaded rods embedded in the parent stone as described in Para. 3.09.

F. Match the face of the existing parent stone/brick masonry with the inside face of the new stone piece. Spread a thin layer of epoxy on all surfaces to be attached using a minimal amount of adhesive to completely fill and bond the stones, but not create excess "squeeze out" of epoxy. Tape the surfaces of the surrounding existing stone and the stone dutchman (repair piece). Epoxy staining on the face of stone is unacceptable.

G. Press the pieces together and hold until initial set of the epoxy, approximately 15 min.

H. Apply stone dust to the exposed surface of the epoxy while the epoxy is still wet.

I. Allow the epoxy to cure fully for 24 hrs. Use the repair mortar repair techniques to cover minor irregularities or small missing pieces of stone at adhesion joint.

3.11 WHOLE STONE REPLACEMENT

A. Remove mortar from all sides of stone using hand tools in a way as to not damage the stone.

B. Clean all surfaces so that they are free of debris and mortar.

C. Set new replacement stone in mortar; rake out mortar 2.5x mortar joint width.

D. Repoint joints around new replacement stone in accordance with Paras. 3.04 and 3.05 of this Section.

3.12 MASONRY CLEANING

A. Perform cleaning, per the approved mockups, using the products and methods approved by the Engineer and owner.

B. Protection: Protect surrounding materials on the site and adjacent building surfaces and building landscaping from coming in contact with the cleaning materials and runoff.

1. Prevent cleaning chemicals from coming in contact with any painted, polished, or metallic surfaces.

2. Divert flow of runoff to drains in compliance with municipal codes. Comply with municipal codes regarding containment and disposal of cleaning materials.

C. Surface Preparation: Before proceeding with cleaning operations, remove all miscellaneous hardware, anchors, and bird excrement from the surface to prevent any discoloration.

D. Application: Avoid overcleaning stone surfaces. Aim for achieving 85% clean. Most damage occurs when attempting to clean the last 15% of dirt.

E. Do not proceed with cleaning until cleaning mockups are performed and final cleaning materials and products are approved.

F. Pre-wet stone surface using a low pressure wash (e.g., typically between 100 and 400 psi, and as per the approved mockups). Keep the stone surface moist during the entire cleaning process in order to avoid the formation of residual salts on the surface.

G. Do NOT use acid-based cleaners on calcareous sandstone. Acidic products can etch or abrade the stone. Alkaline cleaners should always be used on acid-sensitive masonry. Avoid using alkaline solutions containing sodium hydroxide (caustic soda or lye) or ammonium bifluoride. These have the potential to cause efflorescence, subflorescence, and can lead to abrasion of the surface

H. If approved through the mockup process, apply alkaline cleaner pre-wash using a soft nylon bristle brush. Allow to remain on the surface for 30 min. or as long as determined by testing.

I. Rinse the surface thoroughly with clean, clear water using light pressure (e.g., typically between 400 and 600 psi, and as per the approved mockups). Rinse the wall from top to bottom. Direct the water spray downward to avoid forcing water into joints and the stone surface.

J. Monitor interior spaces at cleaning locations and contain water from rinsing operation so as not to flood building interior.

3.13 CAST STONE REPAIR

A. Demolition and Surface Preparation:

1. Provide 3/4 in. deep saw cut edges around the perimeter of the repair area, normal to the face of the surrounding cast stone. Make saw cuts after sufficient cast stone is removed to locate and determine actual cast stone cover over reinforcement. Do not cut into reinforcement. Reduce depth of saw cut over reinforcement as required. Saw cuts shall form rectangles with 90° corners – do not overlap cuts at corners

2. Remove all loose and unsound cast stone in the areas to be repaired, extending removal to a minimum depth of 2 in. and until sound material is reached. Where reinforcement is present, extend removal to a depth to engage reinforcement. Remove cast stone at repair areas to a minimum depth of 3/4 in. beyond/inside the outermost layer of exposed reinforcement for the full length of each exposed bar.

3. Roughen all cast stone surfaces to which repair material is to be bonded to minimum amplitude of 1/8 in.

4. Conduct cast stone removal in a manner to prevent cutting, nicking, bending, or otherwise damaging the existing reinforcement and the cast stone slab. Repair or replace accidentally damaged reinforcement and cast stone at no cost to the Owner.

5. Remove all loose particles, microfractured cast stone (“bruised cast stone”) from chipping procedures, and deleterious materials from the exposed sound cast stone and from the exposed reinforcement by pressure washing with water with sand induction.

6. Clean all reinforcement to bare “white” steel by mechanical wire brushing, needle scaling, or by sand blasting. Microabrasive cleaning may also be allowed if it is demonstrated to effectively clean the reinforcement to bare white metal.

7. Remove dust from the reinforcing steel with compressed air or approved solvent – do not use water. Install zinc-rich coating by brush-applying – do not spray apply. Coat all exposed reinforcing steel, including underside of all bars, with zinc-rich coating immediately after cleaning to bare white steel and removing dust. If time passes and “flash corrosion” forms on the surface of the steel, reclean to bare white metal prior to installing zinc-rich coating.

B. Sacrificial Anode Installation:

1. Provide sacrificial anodes at all cast stone repair areas. Provide spacing of sacrificial anodes as indicated in the manufacturer’s technical literature, with a minimum of one sacrificial anode per repair area, and minimum of one

sacrificial anode per square foot or fraction there of (2.25 sq ft = three sacrificial anodes).

2. Install sacrificial anodes within the cast stone reinforcing bar frame, attaching the anode with tie wires to the exposed bar, cleaned, uncoated steel reinforcement. Set the sacrificial anode in cast stone repair material; scarify the repair material to provide a bonding surface for the cast stone patch installation.

3. Install sacrificial anodes at all structural crack repairs indicated by the Engineer. Provide spacing of sacrificial anodes so as to provide a minimum of 100 g of zinc per exposed square foot of repair surface area or fraction thereof (e.g., 0.25 sq ft surface repair area requires 100 grams zinc anode which equals one Galvashield XP+ anode, while a 2.25 sq ft surface repair area requires 300 g zinc anode which equals three Galvashield XP+ anode).

C. Supplemental Reinforcement:

1. Bring to the attention of the Engineer any reinforcing bars with metal loss greater than 10% of the original bar cross section, for strength evaluation, prior to continuing repair work.

2. Provide supplemental reinforcement as directed by the Engineer. Tie the reinforcement to existing bars with a minimum lap of 40 bar diameters. Remove additional cast stone as necessary to provide minimum lap.

D. Inspection of Prepared Areas for Cast Stone Repairs: Have the foreman or superintendent tour all areas prepared for repair with the Engineer. Do not place repair material in any repair area until the Engineer has inspected and approved the surface preparation and selected the repair mix for that repair area. Provide the Engineer with at least 24 hrs' notice of areas ready for inspection. Maintain a master log on all repair areas, based on that in the Drawings, with spaces for the Engineer's approval of each area.

E. Cast Stone Placement and Curing – General:

1. Do not apply materials until the cast stone and air temperatures are above 50°F. Temperatures must remain above 50°F during curing. Follow requirements in ACI 306R – Cold Weather Concreting if work will occur when ambient or surface temperatures are below 50°F.

2. Conform strictly to the written instructions of the approved manufacturer and to the procedures, materials, and techniques described herein.

3. In general, use a "dry-pack" method to install repair material on cast-in-place cast stone, and a form and pour method with a retarder on the formwork and post-strip wash on exposed aggregate precast cast stone.

4. Finish the surface of the repair area to be flush with the finish of adjacent cast stone surfaces per approved mockup. The repair surfaces shall be free of ridges and sharp projections.

5. Wet cure all cast stone repair areas immediately after finishing. Conform to the requirements of ACI 301 for site-mixed cast stone. Do not use curing compounds. Cure in accordance with manufacturer's most-stringent recommendations, except where ACI 301 or these specifications are more stringent.

F. Cast Stone Placement and Curing for Site-Mixed Repair Material:

1. Provide adequate labor, equipment, and materials to ensure that the cast stone for each repair is placed within 20 min. of mixing. If interruption is longer than 20 min., discard the repair material and start over.

2. Wet repair area until it is "saturated surface dry" (SSD) immediately prior to installation of scrub coat.

3. Mix a scrub coat (bond coat), using "pancake batter consistency" cement and water coat as described in the Specifications. Vigorously scrub a thin coat of the bond coat into the entire bond area. DO NOT allow scrub coat to dry prior to installation of cast stone repair material.

4. IMMEDIATELY after applying scrub coat, install cast stone repair material by pushing softball-sized balls of repair material into hole. When hole is over full (material proud of the surface), ram the material repeatedly and forcefully with a trowel to compact the material thoroughly into the hole. Repeat if necessary to make a compacted surface that is flush or slightly proud of the existing cast stone surface. Use the steel trowel to press and to the existing cast stone finish. Continue the pattern of original tie forms be pressing a similarly shaped tie or plug into the cast stone. Final tools and techniques to best match the existing cast stone surface textures to be based on the approved mockups.

5. Cover the cast stone repair with saturated surface dry (SSD) Burlene, with the SSD burlap face against the cast stone, and the polyethylene face outward. Dry the polyethylene at the perimeter, and tape all four edges of the polyethylene face of the Burlene to the surrounding (existing) cast stone continuously with duct tape to completely seal the cast stone repair from outside air. Cut the Burlene so that it is oversized and is taped to dry existing cast stone to which tape will adhere. Do not disturb or finish the cast stone for a minimum of ten days, until it has reached its initial set.

6. Allow to cure for ten days covered by Burlene (do NOT open to mist the patch). After minimum of ten days' cure, remove Burlene for review of the patch by the Engineer.

7. After the repair material has been allowed to cure, "finish" (texture by mechanical abrasion) the exposed cast stone face in a manner to match the texture of the existing surrounding cast stone, per the approved mockups.

G.

3.14 CLEANUP

A. Conduct all masonry work in a neat and competent manner, to prevent staining of any surface with mortar or other spills. Avoid dropping mortar on completed masonry work or other elements of the building. If mortar drops or spills on a nonporous material, spot clean immediately using a sponge and clean water. Brush down recently installed exposed masonry units with a soft bristle brush while mortar is hard enough not to smear, but soft enough not to bond tightly to the face of the units.

B. Do not use metal scrapers or brushes or chemicals.

C. On a daily basis, remove debris, residual repair materials, coatings, and other materials or deposits on the building or grounds resulting from the work of this Section.

END OF SECTION

Boston Athenaeum Building History

BOSTON ATHENÆUM

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

Bruner/Cott
ARCHITECTS

Lithograph of the Boston Athenaeum, looking west down Beacon Street; by Henry Bricher, 1855
source: Boston Athenaeum Archives

Architectural Significance of the Boston Athenaeum

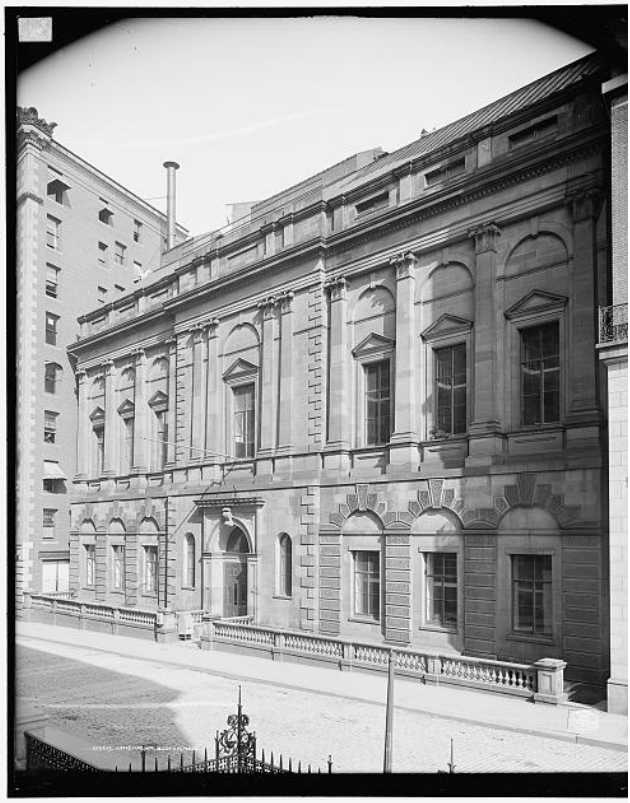
The Boston Athenaeum, one of the earliest and most handsome Boston examples of the Italian palazzo style, holds a high architectural importance. Celebrated locally and nationally, the Athenaeum is individually listed in the State and National Registers of Historic Places and is classified as a National Historic Landmark. It is also a contributing building in both Beacon Hill and Park Street Historic Districts.

The front façade is a symmetrical, seven-bay Palladian club with a wide center bay set off by alternating quoins. The center arched entrance is flanked by niches and features paneled bronze doors and a fanlight tympanum. The Athenaeum's original 1850 construction was three stories with a reading room and sculpture gallery on the first floor, main reading room on the second floor, and picture gallery on the third floor. In 1913, two floors were added at the top of the building, set back from the main façade, with careful attention paid to maintaining the buildings historic appearance.

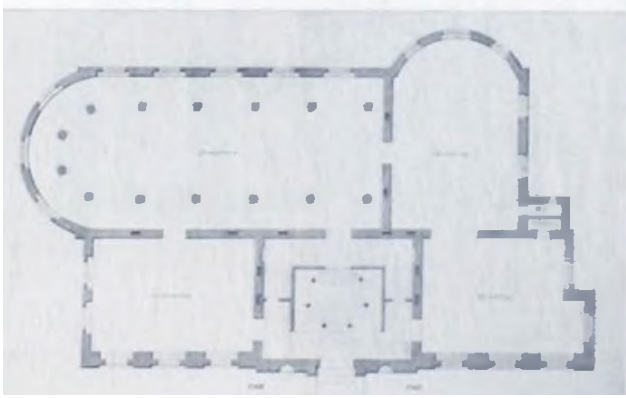
Boston Athenaeum, 10-1/2 Beacon Street, Boston, MA

History

- Architect: Edward C. Cabot, Engineer: George Minot Dexter
- Proposals for Beacon Street building are gathered through an Athenaeum sponsored design competition (1846) won by Edward C. Cabot – his first commission – for his "ingenious handling of an awkward site"
- The Building Committee invited George Minot Dexter, the winner of a prior design competition whose design proved to be too expensive and a trainer engineer, to oversee construction work as Cabot had no previous architectural experience
- Designed in the Neo-Palladian style
- Built in 1850
- Building interior was arranged on three floors to accommodate a different activity on each floor
- Athenaeum constantly outgrew that space it had for storage of volumes and programmed spaces
- One of the oldest and largest proprietary libraries in the nation
- Repository for distinguished book and art collection – was Boston's first art museum which later formed nucleus of MFA's collection



Boston Athenaeum main façade; notable changes that have been made over time include additional two stories, balustrades do not currently wrap towards the door as shown here, addition of basement stair handrail and two flagpoles, currently flank entrance doors in place of this large projecting banner pole; 1906. source: Picryl



Ground floor plan of Boston Athenaeum by Edward C. Cabot source: Change & Continuity - Pictoral History of BA

Boston Athenaeum, 10-1/2 Beacon Street, Boston, MA

Timeline

1850 — **Boston Atheneaum is built by Edward C. Cabot (architect) and George Dexter (engineer)**

1889 — **Interior grand stair, named "Sumner Staircase," is removed because the Athenaeum needed more space for their volumes**

1913 — **Addition by Bigelow and Wadsworth**

Scope includes the following:

- Expansion of building includes two recessed floors and an excavated sub-basement for heating plant, a modern ventilating system and appliances for the removal of dust
- Entire existing building was gutted and restored to its original state using all fireproof materials
- Enlarged windows for the Periodical Reading Room with elevator, stairs at either end, in the center, and an outside fire escape

1950s — **Modification to terrace and building entry**
(actual date still under investigation)

1955 — **Boston Athenaeum is contributing building to local Beacon Hill Historic District**

1966 — **Boston Atheneum receives National Historic Landmark designation and is listed on the National Register of Historic Places as an Individual Property**

1974 — **Boston Athenaeum is a contributing building to National Historic Registered District, Park Street Historic District**

1976 — **Repointing and repairing of brownstone façade. Did not clean the façade. $1.5m budget, urgent repairs and renewal to exterior masonry and brick, new roofing and flashing replacement and repairs.**

1985 — **Five windows on rear façade replaced, out of public view**

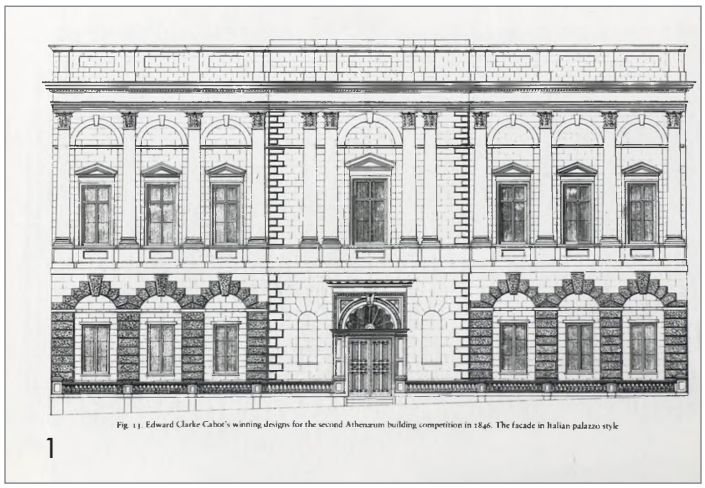
1994 — **Athenaeum was connected to its neighbor (14 Beacon Street) at the basement level**

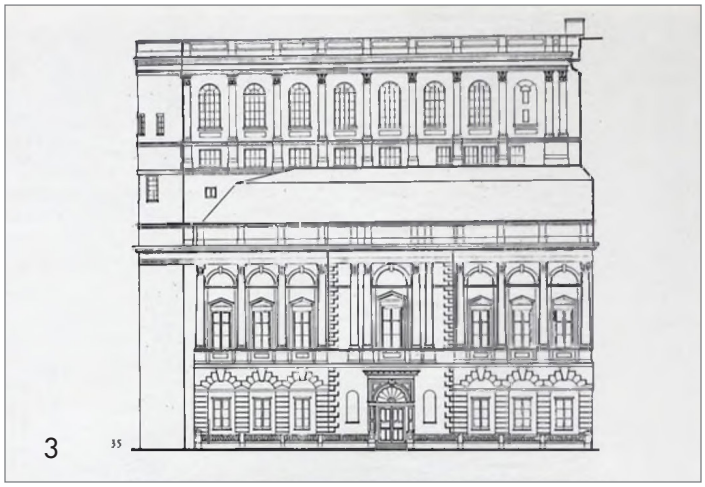
1996 — **Façade restoration**

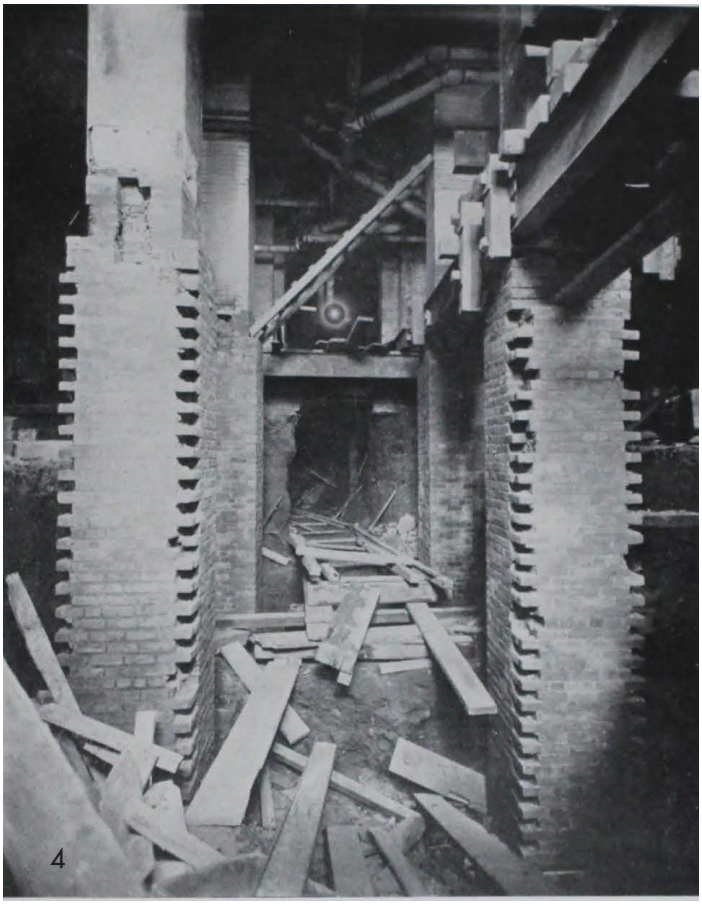
- Repointing and repairing of brownstone façade; chemically cleaned
- BA report states "...with the blessing of the Beacon Hill Architectural Commission...we began testing cleaning methods and chemicals."
- This was the first time the façade had been cleaned since initial construction.
- Judy Selwyn of Preservation Technology Associates was consultant on the façade restoration. Contractors: Bill Whall and John MacDonald of Phoenix Bay State Construction Company

1997 — **Installation of watertight membranes at main roof and fifth-floor terrace levels, lighting scheme at front façade, restoration to Beacon balustrade, refinished bronze entry doors**

1998 — **Elevator replaced**

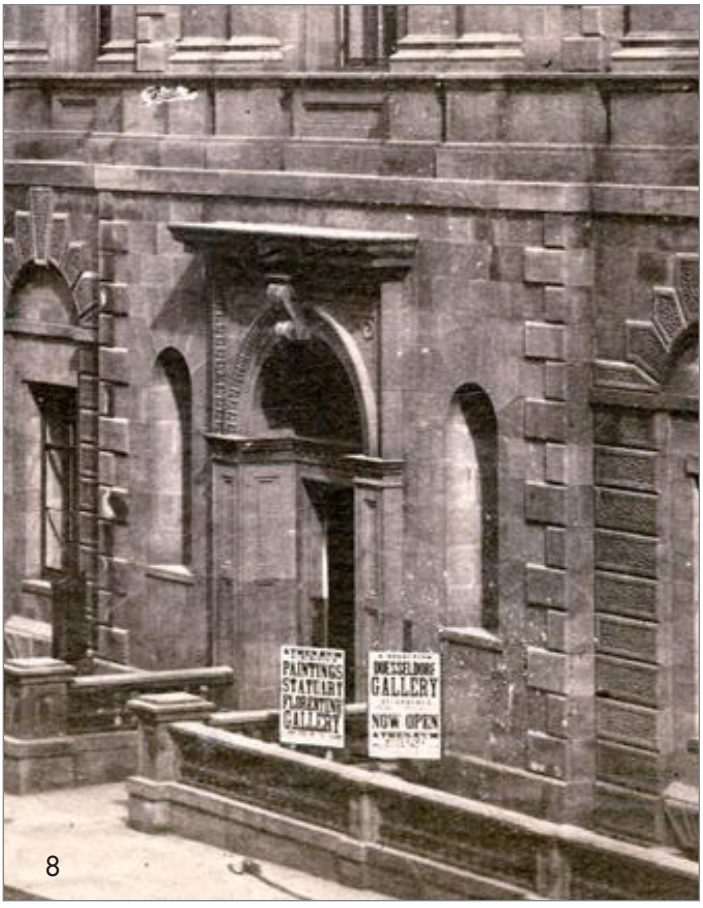






Boston Athenaeum, 10-1/2 Beacon Street, Boston, MA

Figure 1: Edward C. Cabot's winning design for the Boston Athenaeum building competition; 1846
source: Change and Continuity — Pictorial History of BA
Figure 2: "Sumner Staircase" removed in 1889. source: Change and Continuity — Pictorial History of BA
Figure 3: Sketch showing addition of two floors by Bigelow and Wadsworth; 1913
source: Change and Continuity — Pictorial History of BA
Figure 4: Excavation of sub-basement 16' below existing basement; 1913. source: Change and Continuity — Pictorial History of BA
Figure 5: Exterior photo of Boston Athenaeum across Beacon Street showing 1913 addition above
source: Bruner/Cott Architects, 2020



Figures 6 & 7: Reconstruction of the terrace; 1950-1960. source: Boston Athenaeum

Figure 8: Original entry condition,1852; stairs are not visible from this vantage point which indicates the current stair configuration and slate material are not original. source: Boston Athenaeum Archives

Figure 9: Existing entry condition; stairs are pulled out to align with the sidewalk; this modification creates access to the terrace from the east approach to the building. source: Bruner/Cott Architects, 2020

Figure 10: Photo taken following chemical cleaning of building's façade; staging coming down; 1996
source: Boston Athenaeum Annual Report, 1996

Figure 11: Photo taken from roof of Boston Athenaeum looking towards the State House during installation of new watertight roof membrane showing crane lifting materials from Beacon Street; 1997. source: Boston Athenaeum Annual Report, 1997

Boston Athenaeum, 10-1/2 Beacon Street, Boston, MA