



Town Belmont
Historic District Commission
Homer Municipal Building, 2nd Floor
19 Moore Street
Belmont, MA 02478

OFFICE USE

Case Number: HDC -

APPLICATION

In accordance with the Historic Districts Act, MGL Ch 40C, and the Town of Belmont General Bylaws, §40-315, the undersigned applies to the Belmont Historic District Commission for a Certificate of:

☒ Appropriateness

☐ Non-Applicability

☐ Hardship

1. PRELIMINARY INFORMATION:

Address of Property: TOWN HALL 455 CONCORD ROAD

Property Owner's Name: TOWN OF BELMONT

Address: BENTON LIBRARY - 75 OAKLEY ROAD

Email: Dblazon@Belmont-MA.GOV

Phone: 617 993-2646

Agent Name: DAVID BLAZON - DIR. of FACILITIES

Address: 19 MOORE STREET

Email: Dblazon@Belmont-MA.GOV

Phone: 617 993-2646

I am the: ☐ Property Owner ☒ Agent

☐ Property is Owned by a Corporation, LLC, or Trust (Submit authorization to sign as owner)

☐ Property is a Condominium or Cooperative Association (submit authorization to sign as trustee)

If applicable: Architect: LISA HAMINGTON

Contractor: BCA

2. BRIEF DESCRIPTION OF PROPOSED WORK:

RESTORE FAILED CHIMNEY (STONE) AT BENTON
LIBRARY. REPLACE WOODEN BULKED THAT WAS
CRUSHED FROM COLLAPSE OF CHIMNEY. SPOT
REPAIR ASPHALT ROOF WITH LIKE ROOF MATERIALS.
SPOT REPAIR OF INTERIOR WOODEN UNDERLAYMENT.

3. SIGNATURES:

As Owner, I make the following representations:

A. I hereby certify that I am the Owner of the Property at: _____

B. I hereby certify that if an Agent is listed on this Application, this Agent has been authorized to represent this Application before the Belmont Historic District Commission.

Owner: _____

Date: _____

As Applicant/Agent, I make the following representations:

1. The information supplied on and in this Application is accurate to the best of my knowledge;
2. I will make no changes to the approved plans without prior approval from the Belmont Historic District Commission.

Applicant/Agent: LIT/Blg - DIRECTOR OF FACILITIES

Date: 3/28/2023

* Incomplete applications and Insufficient documentation will not be accepted. *

Approved March 23, 2017

Everett C. Benton Library

75 Oakley Road
Belmont, Massachusetts

Chimney Rebuild and Associated Repairs

Bid Specifications



April 5, 2023



BUILDING CONSERVATION ASSOCIATES INC

Everett C. Benton Library

75 Oakley Road
Belmont, Massachusetts

Chimney Rebuild and Associated Repairs

Bid Specifications

Prepared For

The Town of Belmont
Belmont Town Offices
455 Concord Avenue
Belmont, Massachusetts 02478

Prepared By

Building Conservation Associates, Inc.
10 Langley Road, Suite 202
Newton Centre, Massachusetts 02459

CIRRUS Structural Engineering, LLC
19 Lower Woodland Terrace
Columbia, CT 06237

April 5, 2023



BUILDING CONSERVATION ASSOCIATES INC

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INVITATION TO BID

The Town of Belmont (OWNER) will receive electronic bid documents from qualified contractors for the **EVERETT C. BENTON LIBRARY CHIMNEY REBUILD AND ASSOCIATED REPAIRS**, located at 75 Oakley Road, Belmont, Massachusetts. All bids shall be provided on a lump sum basis for work contemplated by the Contract Documents. Sealed bids for the General Contract on forms furnished by the Awarding Authority will be received by the Awarding Authority at the offices of the Belmont Facilities Department, Ground Floor, Homer Administration Building, 19 Moore Street, Belmont, MA 02478, until **1:00 p.m.** local time on **Wednesday, April 26, 2023**. Bids received after this time will not be accepted.

All bidders will be required to provide substantial evidence for themselves and all of their subcontractors of successfully completed work of a similar character. All bidders complete the Bid Form that includes references, a proposed construction schedule, a logistics narrative and evidence of appropriate insurance coverage. Bidding procedures shall be in accordance with M.G.L. c. 149, §44A-44J, as most recently amended, and all other applicable laws.

All parties desiring to submit general bids must submit with their bids a copy of the Contractor's certificate of eligibility (DCAM Form CQ7) and an update statement (DCAM Form CQ3), both in the work category of: **[Masonry]**.

Interested contractors may obtain an **electronic copy** (PDF) of the bid package from the office of the RESTORATION CONSULTANT; please request by email: lharrington@bcausa.com. The OWNER AND RESTORATION CONSULTANT will conduct a **Non-Mandatory Pre-Bid Meeting** at Benton Library, 75 Oakley Road, Belmont, MA on **Tuesday April 18, 2023 at 11:00 a.m.** All questions pertaining to this Invitation to Bid must be submitted in writing to Building Conservation Associates, Inc. at lharrington@bcausa.com by **April 21, 2023**.

All general bids shall be accompanied by a bid deposit in the form of a certified, cashier's or treasurer's check issued by a responsible bank or trust company made payable to the Town of Belmont or a bid bond, in an amount not less than five percent (5%) of the value of the bid.

The successful bidder will be required to furnish a Performance Bond and a Labor and Material (Payment) Bond each in the amount of one hundred percent (100%) of the contract sum. Bonds shall be obtained from a surety licensed to do business in the Commonwealth of Massachusetts and the form shall be satisfactory to the Town of Belmont. No less than the minimum wage rates as set forth in the schedule contained in the Contract Documents must be paid on this project.

The OWNER reserves the right to reject any or all bids and to waive any informalities in bidding. All bid documents must be complete when submitted; incomplete bids will be disqualified. No bid shall be withdrawn for a period of ninety days subsequent to the opening of bids – or until the next workday immediately following said period if such period ends on a weekend or State holiday – without the consent of the OWNER. The contract, if awarded, will be awarded at the sole discretion of the OWNER to the lowest responsible and qualified bidder, subject to the OWNER'S right to reject any and all bids. The "lowest responsible and qualified bidder" is defined as the bidder whose bid is the lowest of those bidders possessing the skill, ability, and integrity necessary to faithfully perform the work, in the sole judgement of the OWNER. The OWNER reserves the right to consider as unqualified any bidder whose references, as submitted by the bidder with their proposal, do not confirm the proposer's qualifications to do the work.

Funding for this project is provided by the Community Preservation Act, which is funded by the MA CPA Trust Fund and administered by the Belmont Community Preservation Committee. All work must meet the Secretary of the Interior's Standards for the Treatment of Historic Properties and be approved by the Belmont Historic District Commission.

SECTION 00 20 00

INSTRUCTIONS TO BIDDERS

1. THE WORK

The Work under this phase shall include **EVERETT C. BENTON LIBRARY CHIMNEY REBUILD AND ASSOCIATED REPAIRS, 75 Oakley Road, Belmont, Massachusetts**, as described in detail in the Construction Documents. This project manual contains the invitation to bid, instructions to bidders, the bid form with required attachments, an outline of bidder qualifications and the Construction Documents.

2. SECURING DOCUMENTS

Electronic copies (PDF) of the bid package may be obtained from the Restoration Consultant, email: lharrington@bcausa.com

3. PRE-BID CONFERENCE

The Town of Belmont and the Restoration Consultant will conduct a **Non-Mandatory Pre-Bid Meeting onsite on April 18, 2023 at 11:00am.**

4. EXAMINATION OF DOCUMENTS AND THE SITE

Each bidder shall examine the proposed Contract Documents carefully and shall visit the site to examine the existing conditions prior to submitting a bid for the work. Each bidder shall fully inform themselves of all existing conditions and limitations under which the work shall be performed and shall include in his bid a sum sufficient to cover all costs necessary to complete the work as set forth in the proposed Contract Documents. No allowance shall be made to a bidder because of a lack of such examination or knowledge. Submission of a bid shall be construed as conclusive evidence that the bidder has performed such examination and obtained such knowledge.

5. INTERPRETATION OF DOCUMENTS PRIOR TO BIDDING

- a. Any person contemplating submission of a bid for the work, who is in doubt as to the true meaning of any part of the proposed Contract Documents, or who finds discrepancies in or omissions from any part thereof, shall request an interpretation from the RESTORATION CONSULTANT not later than **April 21, 2023** by contacting Building Conservation Associates, Inc, lharrington@bcausa.com.
- b. Interpretation or correction of proposed Contract Documents shall be made only by addendum, which shall be delivered by email to each general contract bidder of record. The Town of Belmont will not be responsible for any other explanations or interpretations of the proposed Contract Documents.

6. PREVAILING WAGES

The Contract shall be subject to State Prevailing Wage Rates.

7. BIDDER QUALIFICATIONS

- a. Each bidder shall furnish evidence, using the Statement of Bidder Qualifications to the OWNER, that they and all of their subcontractors have sufficient means and experience to perform the work required by the proposed Contract Documents.
- b. Each bidder and each major subcontractor shall have at least five (5) years of continuous service as the named Contractor and shall present evidence of successful completion of three (3) rehabilitation projects of this size, nature and complexity. Further, each bidder shall present at least three (3) references for projects in which conformance with the **Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68)** as required by the Contract.

9. BID FORM

- a. All bids shall be submitted on the forms provided herein. Make copies as required to complete the submission. Include all required unit prices as shown on the Bid Form.
- b. Submit all bids, properly signed, with all items filled out and all required attachments. Do not change the wording or add words to the wording on the Bid Form. Unauthorized conditions, limitations or provisions attached to the bid will be cause for rejection of the bid. Explain all erasures or interlineations with a statement, signed by the bidder.

10. RECEIVING BIDS

The Town of Belmont will receive sealed bids for the General Contract on forms furnished by the Awarding Authority will be received by the Awarding Authority at the offices of the Belmont Facilities Department, Ground Floor, Homer Administration Building, 19 Moore Street, Belmont, MA 02478, until **1:00 p.m.** local time on **Wednesday, April 26, 2023**.

Late bids will not be reviewed or considered. Submit bids clearly labeled with the words "**Bid Documents: Benton Library Chimney Rebuild and Associated Repairs**" and the firm name of the bidder.

11. WITHDRAWAL OF BIDS

A bidder may withdraw his bid, either personally or by written request, at any time prior to the scheduled bid deadline. No bidder may withdraw his bid for a period of ninety (90) days following receipt of bids.

12. EXECUTION OF AGREEMENT

- a. The successful BIDDER shall execute a contract as provided by the OWNER.
- b. The BIDDER to whom the Contract is awarded shall, within fifteen (15) calendar days of the notice of award, furnish the Town of Belmont with three original copies of the executed contract.
- c. The successful BIDDER shall post Payment and Performance Bonds for 100% of the contract price. All sureties shall be listed on the most recent IRS Circular 570.
- d. At or prior to delivery of the signed Contract, the successful BIDDER shall deliver to the Town of Belmont those Certificates of Insurance required by these documents.

- e. The Certificates of Insurance shall be approved by the Town of Belmont prior to the start of work. Failure to provide required Certificates of Insurance shall subject the successful bidder to loss of time from the construction period equal to the delay in furnishing the required materials.

13. CONSTRUCTION TIME

The agreement will contain a stipulation that work shall be completed within **seventy five (75) calendar days** following issuance of the notice to proceed from the Town of Belmont. The work shall begin as soon as possible after award of the contract and shall be completed on or prior to completion date as calculated by the OWNER.

14. INSURANCE REQUIREMENTS / MINIMUM LIMITS of INSURANCE ...

- a. The successful bidder shall carry the following insurances:
 - 1. Workers Compensation and Employers Liability Insurance in full accord with the laws of the Commonwealth of Massachusetts with coverage as follows:

Employers' bodily injury by accident with liability limits of \$500,000 each accident;

Employers' bodily injury by disease with liability limits of \$500,000 each accident;

Employers' bodily injury by disease with liability limits of \$500,000 each policy.
 - 2. Commercial General Liability Insurance with a liability limit of \$1,000,000 per occurrence for all damages arising out of bodily injury, property damage, products / completed operations and contractual liability coverage for the indemnification provide under the contract. Each annual aggregate limit shall be not less than \$2,000,000. General liability policies shall not contain a deductible and this shall be clearly evidenced on the certificate of insurance. A waiver of subrogation shall not be included in the policy. The "XCU" perils shall be included.
 - 3. Automobile Liability Insurance with respect to any owned, non-owned or hired vehicles which provides a liability limit of \$1,000,000 per occurrence for bodily injury and property damage. Coverage shall be provided for all owned, hired and non-owned vehicles and shall be evidenced on the certificate. There shall be no automobile liability deductible applicable.
 - 4. Builder's Risk Insurance as appropriate to the progress of the work under the contract.
 - 5. Umbrella Liability Insurance: Umbrella liability insurance applying in excess of primary employer's liability, general liability and automobile liability with limits of at least \$3,000,000 per occurrence, \$3,000,000 aggregate.
 - 6. Property Insurance: The Owner shall maintain property insurance on the building, including materials to be added per this contract. Such insurance shall include the interests of the Owner, Contractor and Sub-Contractors. This insurance shall cover portions of the work, stored off-site and in transit.
 - 7. Insurance Certificates: The Contractor shall furnish Certificates of Insurance that are acceptable to the Owner, within five (5) days of notification by the Purchasing Agent

or designee. Six insurance certificates, in original form shall be provided to the Owner and at least one shall contain an original signature, in blue ink.

The certificate holder shall be listed as follows:

- a) Town of Belmont, 455 Concord Avenue, Belmont, MA 02478.
 - b) The Town of Belmont shall be named as an additional insured (including its employees, agents and representatives), with respect to all coverage, with the exception of worker's compensation.
 - c) The project title shall be included on the certificate, in the section entitled "Description of Operations".
 - d) Companies providing insurance coverage shall be licensed to transact business in the Commonwealth of Massachusetts.
 - e) Certificates of Insurance acceptable to the Owner shall be addressed to and filed with the Owner prior to commencement of the work.
 - f) The insurance certificate shall require that the certificate holder be notified in writing at least 30 days (10 days for Worker's Compensation coverage) prior to cancellation or non-renewal of the policy (ies).
 - g) No restrictive amendments shall be placed on the policies.
 - h) There shall be no liability insurance deductibles, unless approved by the Owner.
 - i) All premium costs shall be included in the Contractor's bid.
- b. The "Hold Harmless" endorsement of the insurance shall include the interest of the municipality and the Commonwealth of Massachusetts. The Contractor and Subcontractors and other interests shall be so named. This policy shall insure against all risks of physical damage except as modified by the Contract Documents and subject to the normal all risk exclusions.
- c. The successful bidder shall provide evidence of the required insurances by means of an insurance certificate naming the Commonwealth of Massachusetts and the Town of Belmont as additional insureds ATIMA.
- d. The bidder's insurance carrier(s) shall be licensed to do business in the Commonwealth of Massachusetts and shall have an A. M. Best rating of A-VII or better.

15. RETAINAGE

Retainage amounting to five per cent (5%) of the Contract Sum shall be withheld by the Town of Belmont until such time as the association and its representative are satisfied that all work has been completed and all requirements of these documents have been met. All retainage shall be paid within thirty (30) days of acceptance of completed work by the OWNER. The OWNER will require partial releases of liens from all subcontractors at all scheduled payments and complete release of liens from the Contractor and all subcontractors prior to final payment.

END OF SECTION 00 20 00

SECTION 00 30 00

BID FORM

- 1.1 The undersigned, having examined the proposed Contract Documents, entitled: EVERETT C. BENTON LIBRARY CHIMNEY REBUILD AND ASSOCIATED REPAIRS for the Town of Belmont, Concord Avenue, Belmont, MA 02478 prepared by BUILDING CONSERVATION ASSOCIATES, INC. and having visited the site if desired, and examined the conditions affecting the work, hereby proposes and agrees to furnish all labor, materials and equipment, and to perform operations necessary to complete the work as required by said proposed Contract Documents for the stipulated sum of

_____ Dollars (spelled out)
(\$_____).

A. UNIT PRICES:

Provide unit prices designated below.

Item #1 – Replace deteriorated stone units

\$_____ per cubic foot

Item #2 – Stone Repointing

\$_____ per lineal foot

Item #3 – Deep backup Pointing

\$_____ per lineal foot

Item #4 – Stone Crack Repair

\$_____ per lineal foot

Item #5 – Replace roof rafters

\$_____ per lineal foot

Item #6 – Replace roof wood sheathing

\$_____ per square foot

- 1.2 The undersigned understands and agrees to comply with and be bound by the instructions to bidders issued for this work.
- 1.3 The undersigned acknowledges receipt of addenda, if any, numbered as follows:

-
-
- 1.4 The undersigned agrees to begin the work as soon as possible after award of the contract, and shall complete the work on or prior to a maximum of **seventy five (75) calendar days** from the start date.
- 1.5 The undersigned agrees to comply with all applicable provisions of Title VI of the Civil Rights Act of 1964 and Section 504 of the Rehabilitation Act of 1973, the U.S. Department of the Interior which prohibits discrimination on the basis of race, color, sex, national origin, or handicap in its federally assisted programs.
- 1.6 The undersigned agrees to perform all work in full accord with the **Secretary of the Interior's Standards for the Treatment of Historic Buildings (36 CFR Part 68)** using skilled and experienced subcontractors and specialty workers having a minimum of five (5) years' experience on historic restoration projects, and has furnished a list with at least three (3) references for themselves and their subcontractors showing experience with the Standards and the types of preservation work required by the Contract Documents.

BIDDER:

(	)
(	) _____
(	) _____
(	) _____
(	) _____
(	) Address _____
(	) _____
(	) _____
(	) License Number _____
(	) _____
(	) License Type _____

Bid date this _____ day of _____, 2023.

CERTIFICATE AS TO CORPORATE BIDDER

I, _____, certify that I am the _____ of the corporation named as Bidder in the Bid Form; that _____, who signed said Bid Form on behalf of the Bidder was then _____ of said corporation; that I know his signature and his signature thereto is genuine; and that said Bid Form was duly signed, sealed and executed for and on behalf of said corporation, by authority of its governing body.

Dated this _____ day of _____, 2023

By _____

Title _____

Section 00 30 00 BID FORM (continued)

LIST OF PROPOSED SUBCONTRACTORS

The named bidder, _____, of _____, proposes to retain the following subcontractors for the work required by the Contract. Their work will be coordinated by our staff, as required by the Project Manual.

Work Scope	Subcontractor Name
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Their qualifications for their portion of the work are represented by the list of project references attached to this Bid Form.

Section 00 30 00 BID FORM (continued)

COST BREAKDOWN BY SPEC SECTIONS

PERMITS	\$ _____
GENERAL CONDITIONS	\$ _____
TEMPORARY SHORING AND PROTECTION	\$ _____
STONE MASONRY RESTORATION	\$ _____
MASONRY CLEANING	\$ _____
RESTORATION MORTARS	\$ _____
ARCHITECTURAL WOODWORK RESTORATION	\$ _____
ASPHALT SHINGLE ROOFING	\$ _____
SHEET METAL FLASHING AND DRAINAGE	\$ _____
JOINT SEALANTS	\$ _____
TOTAL BID PRICE	\$ _____

STATEMENT OF BIDDER QUALIFICATION

All questions must be answered, and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The BIDDER may submit any additional information they desire. Failure to provide full and complete response to these criteria may be grounds for rejecting Bids. If the BIDDER hires a Subcontractor to perform project work, the BIDDER must also submit the Subcontractor's qualifications on the STATEMENT OF BIDDER'S QUALIFICATIONS.

1. Name of BIDDER: _____.
2. Permanent main office address and mailing address: _____.

_____.
3. When organized: _____.
4. How many years have you been engaged in the discipline under your present firm or trade name? _____.
5. General type of work performed by your company: _____.
_____.
6. Provide a detailed work plan narrative and schedule detailing the project approach and how the work will be phased. Acknowledge attachment of work plan and schedule: _____.
7. List at least three (3) major projects, similar to this Project in scope of work and size of project, completed by your company within the past five (5) years, stating the location, approximate cost for each, and the month and year completed. The project must demonstrate experience in restoration work, as described herein.
 - a. Project Number 1 Name: _____.

Location: _____.

Engineer/Design Professional: _____.

Contact Name for this Project: _____.

Contact Phone and email: _____.

Completion Date: _____.

Amount of Contract: _____.

Brief description of work completed (identify any subcontractor completing project work):

_____.

_____.

_____.

_____.

b. Project Number 2 Name: _____.

Location: _____.

Engineer/Design Professional: _____.

Contact Name for this Project: _____.

Contact Phone and email: _____.

Completion Date: _____.

Amount of Contract: _____.

Brief description of work completed (identify any subcontractor completing project work):

_____.

_____.

_____.

_____.

c. Project Number 3 Name: _____.

Location: _____.

Engineer/Design Professional: _____.

Contact Name for this Project: _____.

Contact Phone and email: _____.

Completion Date: _____.

Amount of Contract: _____.

Brief description of work completed (identify any subcontractor completing project work):

_____.

_____.

8. Have you ever defaulted on a Contract? If so, state details (when, where, why, etc.):

9. Credit Available: \$ _____.

10. Bank Reference for Item 8 as follows:

Bank Reference: _____.

Address: _____.

Contact Name: _____.

Telephone Number: _____.

11. The undersigned hereby authorizes and requests any person, firm or corporation to furnish any information requested by the OWNER in verification of the submittals comprising this Statement of BIDDER's Qualifications.

Dated this ____ day of _____, 2023.

(NAME of BIDDER)

By _____

Title _____

Subscribed and sworn to before me this ____ day of _____, 2023.

Signature of Notary Public

Date Commission Expires

Printed Name of Notary Public

END OF BID FORM

AFFIDAVIT OF NON-COLLUSION

Town of Belmont

The undersigned certifies under the penalties of perjury that this bid or proposal is in all respects bona fide and fair and has been made and submitted in good faith without collusion or fraud with any other person. As used in this affidavit, the word "person" shall mean any natural person, joint venture, business, partnership, corporation, union, committee, club, organization, group of individuals, or other business or legal entity.

Signature: _____

Date: _____

Name [Printed]: _____

Title: _____

Company: _____

TAX COMPLIANCE STATEMENT

Town of Belmont

ATTESTATION

Pursuant to M.G.L. c/ 62c, §49A, the undersigned acting on behalf of the Contractor, certifies under the penalties of perjury that, to the best of the undersigned's knowledge and belief, the Contractor is in compliance with all the laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.*

** Signature of Individual
Or Corporate Contractor (Mandatory)

** Contractor's Social Security #
(Voluntary) or Federal
Identification Number

By: _____
Corporate Officer
(Mandatory, if applicable)

Date: _____

*The provision in the Attestation relating to child support applies only when the Contractor is an individual.

**Approval of a contract or other agreement will not be granted unless the applicant signs this certification clause.

***Your social security number will be furnished to the Massachusetts Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed, or extended. This request is made under the authority of M.G.L. c/ 62c, §49

SECTION 00 01 00

SUMMARY OF WORK

PART 1 – DESCRIPTION

- 1.1 The work contemplated by this contract consists of rebuilding the collapsed stone chimney and associated repair of damage on the interior and exterior of the Everett C. Benton Library, 75 Oakley Road, Belmont, Massachusetts. The work shall include rebuilding the chimney using new CMU units, new clay flue liner, salvaged and new granite rubblestone to the chimney's previous dimensions with new flashings cap and chimney pot, asphalt roof repairs, repointing, gutter installation, replacement of existing bulkhead, and interior wood restoration at damage the ceiling. The building is owned by the Town of Belmont. The Contractor shall exercise care to protect the property of the Owner from damage during performance of the work. At completion of the work, the building shall be ready for occupancy and full use by the Owner.
- 1.2 This project will be financed in part by Community Preservation Act Funding, through the Commonwealth of Massachusetts Community Preservation Act Trust Fund.
- 1.3 The Everett C. Benton Library is eligible for listing on the National Register of Historic Places. All work on this project shall confirm to the Secretary of the Interior's Standards for the Treatment of Historic Buildings (36 CFR Part 68). All work is subject to review and approval by the Belmont Historic District Commission. The prime Contractor and all subcontractors shall demonstrate the qualifications and the experience with historic buildings necessary to assure competent completion of the contract including documented experience with not less than three (3) successfully completed projects in the last five (5) years. The prime Contractor and subcontractors shall utilize skilled and experienced specialty workers having a minimum of five (5) years' experience in historic restoration projects
- 1.4 The Contractor shall carry appropriate insurance coverage as required by the Town of Belmont and the Commonwealth of Massachusetts.
- 1.5 This project is subject to State Prevailing Wage Rates.

END OF SECTION 00 01 00

SECTION 01 04 00

CONTRACTOR'S RESPONSIBILITIES

PART 1 – DESCRIPTION

- 1.1 The Contractor shall supervise and direct the work. The Contractor shall provide an on-site superintendent who shall coordinate his work with that of all subcontractors. The Contractor shall insure quality workmanship in accordance with the **Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68)** and prevailing industry standards. The Contractor shall have sole responsibility for all construction means, methods and techniques.
- 1.2 The Contractor shall perform the work in a timely manner. He shall begin the work as soon as possible after award of the contract, and he shall complete the work on or prior to a maximum of **seventy five (75) calendar days** from the date of the Notice to Proceed.
- 1.3 The Contractor shall obtain all necessary state and local permits including, but not necessarily limited to, the Building Permit prior to beginning the work under this contract.
- 1.4 The Contractor shall obtain or show evidence of all of the following insurance requirements:
 - A. The Contractor shall carry the following insurances:
 1. Workers Compensation and Employers Liability Insurance in full accord with the laws of the State of Connecticut with coverage as follows:
Employers' bodily injury by accident with liability limits of \$500,000 each accident;
Employers' bodily injury by disease with liability limits of \$500,000 each accident;
Employers' bodily injury by disease with liability limits of \$500,000 each policy.
 2. Commercial General Liability Insurance with a liability limit of \$1,000,000 per occurrence for all damages arising out of bodily injury, property damage, products / completed operations and contractual liability coverage for the indemnification provide under the contract. Each annual aggregate limit shall be not less than \$1,000,000.
 3. Automobile Liability Insurance with respect to any owned, non-owned or hired vehicles which provides a liability limit of \$1,000,000 per occurrence for bodily injury and property damage.
 4. Builder's Risk Insurance as appropriate to the progress of the work under the contract.
 - B. The "Hold Harmless" endorsement of the insurance shall include the interest of the association and the Commonwealth of Massachusetts. The Contractor and Subcontractors and other interests shall be so named. This policy shall insure against all risks of physical damage except as modified by the Contract Documents and subject to the normal all risk exclusions.
 - C. The successful bidder shall provide evidence of the required insurances by means of an insurance certificate naming the Commonwealth of Massachusetts and the Town of Belmont as additional insureds ATIMA.
 - D. The bidder's insurance carrier(s) shall be licensed to do business in the Commonwealth of Massachusetts and shall have an A. M. Best rating of A-VII or better.

- 1.5 The Contractor shall exercise care to assure the safety of all workers, the Owner and the general public. He shall control access to all areas where work is performed, and he shall coordinate his activities with those of the Owner.
- 1.6 All contract employees are required to follow current [Massachusetts Department of Public Health Covid-19 Isolation and Exposure Guidance](#) when they test positive for covid-19. all employees are reminded to stay home when they are not feeling well.
- 1.7 The Contractor shall protect the ground, building and its contents from weather and other intrusions during construction. They shall protect all completed work from damage by subsequent contractors and others during construction.
- 1.8 The Contractor shall staff the project with skilled and experienced subcontractors and specialty workers having a minimum of five (5) years' experience in historic restoration projects.
- 1.9 The Contractor shall maintain either a Construction Supervisors License (CSL) or a Massachusetts Specialty CSL Masonry.
- 1.10 The first floor of the library will be in use for the duration of the project, however can close while interior work is required. The Contractor shall be required to maintain primary egress through the rear entrance and emergency egress through the front entrance.

END OF SECTION 01 04 00

SECTION 01 20 00

PROJECT MEETINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 Specification sections, apply to work specified in this section.

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for project meetings.

1.3 PRECONSTRUCTION MEETING

- A. Schedule a preconstruction meeting at the project site no later than 5 days prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The OWNER, RESTORATION CONSULTANT, ENGINEER, and the CONTRACTOR and its Superintendent, and other concerned parties shall each be represented at the meeting by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress, including such topics as:
 - Construction schedule
 - Critical work sequencing
 - Designation of responsible personnel
 - Procedures for processing field decisions, Change Orders, and Application for Payment Submittals
 - Use of the premises
 - Office, work, and storage areas
 - Site deliveries
 - Security
 - Housekeeping
 - Working hours

1.4 PROGRESS MEETINGS

- A. Conduct weekly progress meetings via online meeting platform. Coordinate with the OWNER, RESTORATION CONSULTANT and ENGINEER the scheduling of meeting dates.
- B. Attendees: In addition to representatives of the OWNER, RESTORATION CONSULTANT and ENGINEER, each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the project and authorized to conclude matters relating to progress.

PROJECT MEETINGS

- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review progress since the last meeting. Review items of significance as appropriate to the current status of the project. The contractor shall take meeting minutes.

END OF SECTION 01 20 00

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS:

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES:

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location
 - b. Name of Restoration Consultant.
 - c. Restoration Consultant's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.

PAYMENT PROCEDURES

- d. Name of manufacturer or fabricator.
- e. Name of supplier.
- f. Change Orders (numbers) that affect value.
- g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor
 - 2) Materials
 - 3) Equipment
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT:

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by the Owner and the Restoration Consultant.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: The period covered by each Application for Payment is one month, ending on the last day of the month.
 1. Submit draft copy of Application for Payment seven days prior to due date for review by the Restoration Consultant.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Restoration Consultant will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner- requested project acceleration.

- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Revise number of copies in "Transmittal" Paragraph below to suit Project.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of values.
 - 3. Contractor's construction schedule (preliminary if not final).
 - 4. Submittal schedule (preliminary if not final).
 - 5. Certificates of insurance and insurance policies.
 - 6. Performance and payment bonds.
- G. Application for Payment at Substantial Completion: After Restoration Consultant issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted.

END OF SECTION 01 29 00

SECTION 01 30 00

SUBMITTALS

PART 1 – DESCRIPTION

- 1.1 The Contractor shall provide submittals in electronic (PDF) format with the exception of material samples of all submittals required by these documents to the RESTORATION CONSULTANT for review prior to ordering, fabricating and/or installing the work.
- 1.2 The Contractor shall secure guarantees/warranties from all subcontractors/suppliers for their respective portions of the work. All work shall be guaranteed/warrantied for one year unless specified for a longer period. The start of the guarantee/warranty period shall be the date of the Certificate of Substantial Completion.
- 1.3 At completion of the project, the Contractor shall furnish the Owner electronic (PDF) copies of all maintenance and operation manuals including all guarantees/warranties, all lien waivers or releases, and all equipment operating instructions, if any, as required by these documents and/or requested by the Owner.

END OF SECTION 01 30 00

SECTION 01 40 00

QUALITY CONTROL

PART 1 – DESCRIPTION

- 1.1 The **Massachusetts State Building Code, 780** (ICC International Existing Building Code, 2015 and ICC International Building Code, 2015), is hereby made a part of these Specifications, and all work included in this contract shall conform with the applicable requirements therein.
- 1.2 Various standards and specifications are incorporated into the technical sections of these Specifications by reference. In all such instances, the reference shall mean the latest edition, including amendments or revisions, in effect as of the date of these Specifications. Nothing contained in these Specifications shall be construed to permit work which is contrary to such standards and specifications.
- 1.3 Miscellaneous items and their related components which are to be furnished under these Specifications are not necessarily individually described. The most important features and those requiring detailed description are mentioned and described. All necessary components shall be furnished in accord with the intent of the Contract Documents and as required for a complete job.

END OF SECTION 01 40 00

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 Specification sections, apply to work specified in this section.

1.2 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security, protection, and project signage.

1.3 QUALITY ASSURANCE

- A. Comply with industry standards and all Local, State, Federal and OSHA requirements.

1.4 PROJECT CONDITIONS

- A. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire-prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous, dangerous, or unsanitary conditions or public nuisances to develop or persist on the site.

1.5 SANITARY FACILITIES

- A. The contractor shall provide their own portable toilet. The contractor shall be responsible for keeping the facilities cleaned and stocked with paper products.

1.6 OFFICE SPACE

- A. The contractor will be provided with a space within the library basement to use as a site office. The contractor shall be responsible for their own equipment and supplies, and for keeping the space clean and secure.

1.7 SCAFFOLDING AND STAGING

- A. The Contractor shall provide all temporary access and safety equipment as required for the Owner and Owner's representative to access the work area for routine inspections. The Contractor will be required to maintain this equipment in good working order.
- B. Provide walk through overhead protection where work areas are above doors, walkways or sidewalks.
- C. All scaffolding and staging shall be erected in conformance with all applicable state, federal and local codes. The Contractor shall follow all applicable local, state and federal requirements regarding the construction of scaffolding and staging and the protection of public safety.

TEMPORARY FACILITIES

1.8 CRANES AND HOISTING EQUIPMENT

- A. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the work shall be furnished, installed, operated, and maintained in a safe condition by the Contractor. All costs for hoisting operating services shall be borne by the Contractor including any required Police details. No gas or fuels shall be stored onsite.

1.9 ELECTRICAL SERVICE

- A. Electrical services will be supplied by the Owner. The Owner reserves the right to charge the Contractor for excessive electrical service usage. Should charges be considered, the Owner will notify the Contractor in writing of this intent. The Contractor and Sub-Contractors will be required to provide their own generators for heat, welding equipment and grinding/vacuum equipment to perform their work.

1.10 WATER

- A. The Contractor shall supply his own source of drinking water. Water required for general construction will be provided by the Owner. The Owner reserves the right to charge the Contractor for excessive water usage.

1.11 RUBBISH

- A. The Contractor shall supply adequate covered receptacles for waste, debris and rubbish.
- B. All receptacles must be immediately removed from the site when full.
- C. The grounds in the area of the receptacle must be cleaned prior to moving the receptacle to another location on the project. Disposal shall be off-site in a legal dump intended for that use.
- D. The receptacles shall be located in areas designated by the Owner.
- E. All receptacles will be tarped over at the end of each work day.

1.12 PREPARATORY WORK BY THE CONTRACTORS

- A. The Contractor shall perform the following preparatory work to the building contents at the work areas:
 - 1. Mask the interior of all windows, louvers and vents to prevent airborne debris from infiltrating the envelope components.
 - 2. Provide temporary protection to the walkway locations from the front door, which will be used as a secondary means of egress.
 - 3. Provide temporary protection for sidewalk, doors, windows, trim and light posts along the front elevation.
 - 4. Upon completion of the work, remove all masking and protection and clean and restore the area to the satisfaction of the Owner. Wipe all surfaces down with tack cloths to removed remaining dust from the adjacent spaces. Any damages associated with the removal of the interior protection will be the responsibility of each individual trade.
 - 5. Soiled, stained or damaged floor areas will be cleaned, repaired, or replaced by the Contractor to the satisfaction of and at no additional cost to the Owner. Should interior walls require refinishing, the Contractor shall refinish the entire interior elevation as required to prevent the appearance of patch repairs – do not feather the work.

1.13 CLEAN-UP

- A. Site clean-up shall be complete and to the satisfaction of the Owner. Site clean-up shall be performed daily.
- B. All roof, building (interior and exterior), landscape and parking areas shall be cleaned of all trash, debris, and dirt caused by or associated with the work.
- C. All landscape areas damaged or littered due to the work shall be raked clean and reseeded if required.
- D. All paved areas shall be swept clean of debris daily.
- E. All areas stained, dirtied, discolored or otherwise damaged due to the work shall be cleaned, restored or replaced as required.
- F. Perform final interior air quality tests for lead and asbestos contamination at previous testing locations following substantial completion.

1.14 SIGNS

- A. The Contractor shall install adequate signage to inform facility users of any changes to existing conditions or construction areas, as well as temporary door closures and detour signs to access the building.

1.15 WORK HOURS

- A. The Contractor will be allowed to work at the project site between the hours of 7:00 a.m. and 5:00 p.m., Monday through Friday. Any work hours outside of the designated times shall be authorized by the Owner and Restoration Consultant.

END OF SECTION 01 50 00

SECTION 01 70 00
PROJECT CLOSEOUT

PART 1 – DESCRIPTION

- 1.1 At completion and before final inspection by the RESTORATION CONSULTANT and the CONTRACTOR shall conduct a thorough examination of the work to assure completion of their work and that of all subcontractors. He shall secure evidence by issuance of a Certificate of Occupancy that the work has satisfied the requirements of the Code as determined by the local Building Official.
- 1.2 At completion and before final inspection by the Restoration Consultant, the Contractor shall clean the work area, interior and exterior, of all construction related debris. They shall remove all construction facilities, debris and rubbish from the property. They shall clean all work of all trades as needed, whether or not such cleaning is included in the specifications for that trade.
- 1.3 The Contractor shall exercise care to avoid damage to all existing and/or newly completed work. They shall repair or replace all damaged materials prior to final acceptance and occupancy.

END OF SECTION 01 70 00

SECTION 02 41 19
SELECTIVE DISMANTLING AND DEMOLITION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

- A. Work shall include all labor, materials, equipment, and services necessary to complete the work designated in this section and as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

- 1. Dismantling of structural elements.

- B. Related Work Specified Elsewhere

- 1. Section 02 44 00 - Temporary Shoring and Protection

1.3 REFERENCES

- A. Comply with requirements of Massachusetts State Building Code.
- B. Comply all applicable requirements of other sections.

1.4 SUBMITTALS

- A. Submit certificates attesting to legal disposal of refuse materials if requested by the architect.

1.5 PROTECTION

- A. Provide for the uninterrupted safety of workers and occupants as well as adjacent structures during all phases of the work. Provide warning signs, and barricades as required to maintain a separated, safe, secure site.
- B. Protect all elements which are to remain. Do not dismantle anything other than what is specifically indicated on the contract documents unless specifically requested to do so in writing by the Architect.
- C. Do not remove any structural elements until finishes have been carefully stripped away and supported elements have been supported by other safe means.

PART 2 - PRODUCTS AND MATERIALS

2.1 PRODUCTS AND MATERIALS

- A. Provide products and materials which are incidental to the demolition work, disposing of these or salvaging them for re-use as best suits the project conditions.

PART 3 - EXECUTION

3.1 SITE REVIEW

- A. Perform full review of site to verify extent of dismantling and to plan for coordination with other trades.

3.2 DISMANTLING OPERATIONS

- A. Carefully study each item to be dismantled and determine the safest, least disturbing and potentially damaging method of disassembly. Number the items that are to be re-used and/or replicated, photograph them and make a sketch of assembled items. Number each component with an appropriate non-permanent method of marking and note the points of contact or intersection and their orientation. Take photographs of all elements to be worked on before and after the work.
- B. Dismantle the specific items and store in a safe place for re-assembly.
- C. Notify the Engineer immediately if any damage has occurred to any of the dismantled items and propose appropriate methods of repair.

END OF SECTION 02 41 19

SECTION 02 44 00
TEMPORARY SHORING AND PROTECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

- A. Work shall include all labor, materials, equipment, and services necessary to complete the work designated in this section and as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Design and installation of all required temporary shoring, bracing and support to enable all necessary reconstruction and repair to be completed in a safe and expedient manner.

1.3 REFERENCES

- A. Comply with the following standard material specifications that apply to the materials used.

1.4 SUBMITTALS

- A. Submit the following items to the Engineer for review:
 - 1. Drawings showing shoring, bracing, and temporary supports for the existing and re-installed structure as appropriate.

1.5 QUALITY ASSURANCE

- A. Comply with all referenced standards for the products employed.
- B. Schedule all appropriate site visits and inspections with the design Engineer for the shoring system.

PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS

- A. Provide products and materials that are appropriate to the application and permitted by the Massachusetts State Building Code.

PART 3 - EXECUTION

3.1 TEMPORARY SHORING, BRACING AND SUPPORT

- A. The contractor shall be solely responsible for all means and methods of construction employed on this project including all temporary bracing, support and protection of the existing Structure. Contractor shall retain the services of a Massachusetts registered professional structural engineer at his own expense if and as may be needed to maintain safe and stable conditions on the project. Any sequences of work or methods indicated or implied in the contract documents are present only as assumptions on which the design of

the permanent installations are based and are to be considered as a suggested option for review by the contractor.

- B. Field Survey and Analysis:
 - 1. Select shoring, bracing and support locations and measure all existing geometry and note existing conditions. Locate points of attachment and support that will best suit progress of work.
 - 2. Perform a structural analysis of the areas to be affected by the work and determine loads on temporary shoring, bracing and support system.
- C. Design Shoring, Bracing and Support:
 - 1. Shoring, bracing and support shall be designed to maintain existing lines and surfaces without deflection during work. Design shall be in accordance with gravity dead, live and wind load resistance requirements of the Massachusetts State Building Code.
 - 2. Design shall be sufficient for existing and new material loads and anticipated construction loads.
 - 3. Design shall allow for distribution of loads to supporting structure and shall limit all movement to less than 1/4" at full loading and a given span length divided by 360 and within appropriate limits to prevent damage to the supported elements or materials. Stresses on supporting structure shall not exceed safe, commonly allowable stresses for the materials in consideration of their age and conditions.
 - 4. Minimize use of side grain bearing timbers that may be susceptible to dimensional variations with changes in moisture and temperature.
- D. Construct shoring, bracing and support in accordance with approved design submittal and proper and standard construction practice. Work shall be installed so as not to permanently mar or stain the exposed.
- E. Maintenance: Maintain shoring, bracing and support in a safe condition during all phases of work. Keep wood generally dry and of constant moisture content. Protect wood from swelling or shrinking with weather and humidity fluctuations.

END OF SECTION 02 44 00

SECTION 04 01 10

MASONRY CLEANING

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of masonry cleaning as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

Note: This section pertains to areas designated for repointing and salvaged stone only:

1. Cleaning general soiling, heavy soiling and biological growth from masonry using chemical cleaners and pressurized water rinsing.
2. Remove parging from masonry as indicated on the Drawings.
3. Protecting window openings, door openings, and other openings in building exterior from water entry before beginning masonry cleaning.
4. Perform final washdown of all surfaces with pressurized water rinsing.

- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Stone Masonry Restoration - Section 04 01 40

1.3 QUALITY ASSURANCE

- A. Masonry and Cleaning Specialist: Award masonry cleaning work to a firm regularly engaged in cleaning masonry on historic buildings that can demonstrate to Owner's satisfaction that, within previous ten years, the firm has successfully completed at least three projects similar in scope and type to work required on this Project involving buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.

1. Foreman: Masonry cleaning shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Masonry Cleaning Specialist. Foreman shall be on site daily for duration of work of this Section. Same foreman shall remain on Project throughout work unless Owner deems foreman's performance unacceptable.
2. Mechanics: Masonry cleaning shall be carried out by a steady crew of skilled mechanics who are thoroughly experienced with materials and methods specified

MASONRY CLEANING

and have a minimum of three years' experience cleaning masonry on historic buildings similar to the work required by this Section. In acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.

- B. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. Referenced Standards: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. Where these standards make recommendations or suggestions, such recommendations or suggestions shall be considered mandatory for work of this Contract unless specifically indicated otherwise in Contract Documents. Provide a reference copy of each of the following standards at shop and at Project site during all periods when work of this Section is being performed in each location. In each case in which there is conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
 - 1. American Institute for Conservation of Historic & Artistic Works (AIC), *Code of Ethics and Guidelines for Practice*.
 - 2. United States Secretary of the Interior, *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*.
- D. Alternate Masonry Cleaning Methods: If Contractor proposes use of cleaning procedures and products other than those specified and Restoration Consultant gives preliminary approval following required submittals, Contractor shall perform tests and create mock-ups demonstrating ability of proposed products and procedures to produce specified cleaning results and for comparison with specified mock-ups at no additional cost. No alternate method shall be permitted until Restoration Consultant has approved it.
- E. Daily Log: Contractor shall keep onsite and available for inspection a daily log describing masonry cleaning operations. Log shall record temperature at beginning and ending of work, weather conditions, whether masonry was wet or dry prior to beginning work, personnel on site, areas cleaned and procedures used, areas inspected and accepted, and other relevant information.
- F. Access for Observation and Approvals: Provide Restoration Consultant access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move and reconfigure scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with laws and regulations regarding safety and acceptable to Restoration Consultant. Provide manpower and equipment to facilitate observation and approvals.
 - 1. Extent of Access: Provide Restoration Consultant with hands-on access to areas in which testing and mock-ups are being conducted and to each and every area of masonry surface that has been cleaned. No approval of masonry cleaning will be given before Restoration Consultant is provided hands-on access to all surfaces that have been cleaned. Provide access for reinspection of all areas where masonry cleaning work was not approved on first or subsequent inspections until Restoration Consultant approves work.

2. Relocation of Means of Access: If Contractor moves scaffolding, lift, or other means of access before providing Restoration Consultant with hands-on access to each and every surface of masonry that has been cleaned and to each and every masonry surface that has been cleaned after previous cleaning work was rejected, Contractor shall reinstall means of access to provide for close-up inspection by Restoration Consultant at no additional cost to Owner.
- G. Measurements of Existing Conditions: Measure and record conditions at Project site to allow assessment of conditions during masonry cleaning work.
1. Temperature Measurement: Measure temperature before beginning and during progress of work of this Section as required to ensure compliance with all specified conditions and manufacturer's recommendations for masonry cleaning.
 2. pH Measurement: Measure pH of masonry surfaces following chemical cleaning using non-staining litmus paper or litmus strips with appropriate range to ensure that each surface has been properly neutralized.
- H. Prohibited Materials and Methods: The following methods are strictly prohibited and shall not be used for work of this Contract: sandblasting, steam (except as specifically indicated herein and approved by Restoration Consultant), and use of nonproprietary acids, alkalis, and other products not formulated specifically as products for masonry cleaning.
- I. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.
- 1.4 SUBMITTALS
- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Restoration Consultant's approval.
- B. Qualification Data: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size, scope, and character to the work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Work Description: Prior to any masonry cleaning work on site, submit detailed description of proposed materials and procedures for each substrate and condition requiring masonry cleaning. Submit new written descriptive information. Photocopies of Contract Documents, excerpts from Contract Documents, and/or duplication of text in Contract Documents will not be accepted for Work Description. Do not begin work on site until work description has been approved in writing. Description for each condition shall include, but not be limited to:
1. Cleaning: Materials, methods, tools, and equipment for each type of masonry cleaning specified herein.

2. Protection: Description, including drawings, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this Section to persons (whether involved in the Work or not); building elements, materials, and finishes; surrounding plants, landscape, and site; and the environment (including air and water).
 3. Alternate Masonry Cleaning Methods and Materials (If Any): Contractor proposed alternate methods and materials (if any) to those specified for any phase of masonry cleaning. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- D. Product Data: Submit manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Material Safety Data Sheets (MSDS).
- E. Schedule of Masonry Cleaning: Prior to commencing masonry cleaning operations, submit a complete detailed schedule for testing and mock-ups and for completion of masonry cleaning.
1. Provide schedule in visual form and in 8-1/2 by 11 inch format or foldout therefrom.
 2. After masonry cleaning operations commence, submit updated schedule on a weekly basis.
- F. Waste Disposal Program: Prior to commencing masonry cleaning operations, submit a written description of proposed materials and methods for collection, treatment, and disposal of wastes resulting from masonry cleaning operations.
- G. Daily Log: Submit copy of daily log to Restoration Consultant each week.
- H. Testing and Mock-Ups: Prepare test panels and mock-ups as described in Articles "Testing" and "Mock-Ups," below.
- 1.5 TESTING
- A. General: Before beginning mock-ups or general masonry cleaning work, test cleaning and coating removal methods on sample areas to determine most effective product and procedure for cleaning each substrate and for removing each type of coating from each substrate. Do not proceed with mock-ups or general masonry cleaning work until Restoration Consultant has approved results of testing in writing.
1. Perform tests in locations directed by Restoration Consultant.
 2. Notify Restoration Consultant 48 hours prior to start of testing.
 3. Restoration Consultant will monitor testing. No testing done in absence of Restoration Consultant will be accepted.
 4. Use crew that will perform the work and follow requirements of this Section.
 5. All materials, dilutions, dwell times, and procedures are subject to modification by Restoration Consultant during testing process. Restoration Consultant will choose

products and procedures to be used for cleaning masonry and for removing soiling and coatings based on results of test panels. Modifications of sequence, chemical dilution, substitute reagents, and equivalent procedures shall be executed at no additional cost.

- a. Do not apply products to masonry surfaces without verifying dilution with Restoration Consultant.
6. After test panels are complete, allow seven days for thorough drying and appearance of possible adverse effects prior to final evaluation.
7. Perform additional testing as necessary to determine proper chemicals and procedures, including dilutions and dwell times, to Restoration Consultant's satisfaction.

B. Provide the Following Test Panels

1. Cleaning General Soiling from Stone Masonry Using Chemical Cleaners and Pressurized Water Rinsing: Prepare at least one 16-sq.-ft. test panel for each type of brick masonry. Prepare additional test panels using different procedures as directed.
2. Removing Metallic Stains from Masonry Using Chemical Removers and Water Rinsing: Prepare at least one test panel, 1-sq.-ft. or size of stain, whichever is smaller, on each type of masonry from which iron stains are to be removed using each chemical remover specified for testing. Provide additional test panels using different products, application methods, dwell times, and removal methods as directed.
3. Removing Sealant Residue from Masonry Using Chemical Strippers and Water Rinsing: Prepare at least one test panel at least 16 inches long by width of sealant on each type of masonry from which sealant residue is to be removed using each remover specified for testing. Provide additional test panels using different products, application methods, dwell times, and removal methods as directed.

1.6 MOCK-UPS

A. General: Following completion of testing and before beginning general masonry cleaning work, prepare mock-ups to provide standards for work of this Section. Do not proceed with masonry cleaning until Restoration Consultant has approved mock-ups.

1. Locate mock-ups as directed by Restoration Consultant.
2. Notify Restoration Consultant 48 hours prior to start of each mock-up.
3. Restoration Consultant will monitor mock-ups. Mock-ups not performed in presence of Restoration Consultant will be rejected.
4. Use crew that will perform the work and follow requirements of this Section.
5. Repeat mock-ups as necessary to obtain Restoration Consultant's approval.
6. Allow mock-ups to dry for one week to allow natural color to return and problems to appear. Notify Restoration Consultant when mock-ups are ready for inspection.
7. Protect approved mock-ups to ensure that they are without damage, deterioration, or

alteration at time of Substantial Completion.

8. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
9. Approved mock-ups will represent minimum standards for masonry cleaning. Subsequent masonry cleaning work that does not meet standards of approved mock-ups will be rejected.

B. Prepare the Following Mock-Ups

1. Cleaning General and Heavy Soiling from Masonry Walls: One location, 16 sq. ft.
2. Cleaning General and Heavy Soiling from Salvage Stone Masonry: Six Units.
3. Removing Metallic Stains from Masonry: One panel, 2 sq. ft. or size of metallic stain, whichever is less, on each type of masonry from which metallic stains are to be removed.
4. Removing Sealant and Sealant Residue from Masonry: One panel, 4 feet long x width of sealant, for each type of sealant to be removed from each type of masonry from which sealant is to be removed.
5. Sealing Window Openings To Prevent Water Entry: One entire window.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original containers with labels identifying manufacturer, product, ingredients, instructions for use, and safety precautions. Do not deliver products until MSDS sheets for products are available on site.
- B. Deliver, store, and handle products and materials to prevent damage, deterioration, degradation, and intrusion of foreign material.
- C. Discard and remove from site deteriorated materials, contaminated materials, and products that have exceeded their expiration dates. Replace with fresh materials.

1.8 PROJECT CONDITIONS

- A. Safety: Protect persons, whether involved with work of this Section or not, from harm caused by work of this Section.
 1. Erect temporary protective covers at doorways to building that must remain in operation during course of masonry cleaning work when work is ongoing around or above doorways.
 2. Provide protection to prevent persons, except properly protected masonry cleaning personnel, from coming in contact with masonry cleaning materials and waste from masonry cleaning process.
 3. Provide workers all means of protection necessary to prevent harm caused by work of this Section.
- B. Protection of Building: Protect building elements and finishes from damage and from

deterioration caused by masonry cleaning work. Repair damage to materials and damage to finishes resulting from work of this Section to Restoration Consultant's satisfaction at no additional cost to Owner.

1. Adjacent Materials: Protect adjacent materials, including but not limited to masonry, metals, glass, paint, and sealants, from masonry cleaning solutions and abrasives that might adversely affect such materials.
 2. Spread of Masonry Cleaning Solutions: Do not clean masonry during winds of sufficient force to spread masonry cleaning solutions to unprotected surfaces. Cease masonry-cleaning operations when winds may carry chemicals, rinse water, or run-off from chemical cleaning to unprotected areas.
 3. Window and Door Openings and Other Penetrations in Building Skin: Prevent masonry cleaning solutions and waste products from entering behind masonry surface at penetrations in skin. Provide reversible temporary seals that will prevent water and chemicals from entering openings and that will not damage or deteriorate substrate. Remove temporary seals following masonry cleaning. Restore substrates to condition before installation of temporary seals.
 - a. Infiltration: If Contractor notices that water or chemicals are penetrating building skin or if Contractor is told that water or chemicals are penetrating building skin, Contractor shall cease masonry cleaning operations immediately. Masonry cleaning operations shall not proceed until cause of infiltration has been eliminated.
 4. Monitoring for Water Entry: During periods when water, detergents, or chemicals are being applied to the exterior masonry, Contractor shall designate one trained person to examine interior spaces and surfaces for evidence of water infiltration. If water infiltration is detected, masonry cleaning operations shall cease immediately. Masonry cleaning operations shall not proceed until cause of infiltration has been eliminated.
- C. Protection of Surroundings: Protect adjacent buildings, site, landscape features, public rights of way, motor vehicles, and other surrounding elements from damage and from deterioration resulting from masonry cleaning work.
1. Collect and dispose of runoff and residue from masonry cleaning operations by legal means and in manner that prevents soil erosion, undermining of paving and foundations, damage to sidewalks, water penetration into building interiors, and harm to buildings, landscape elements, and natural bodies of water and water table. All means necessary shall be taken to collect runoff and dispose of it properly.
- D. Surfaces To Receive Work: The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces of building components on which work is to be performed, including surfaces concealed from view behind objects shown; surfaces of projections, reveals, returns, and other elements perpendicular to or at an oblique angle to surfaces shown; concealed surfaces of profiled members and of ornament; and surfaces of profiled members and of ornament not drawn in detail. Perform work on surfaces of projections, reveals and returns associated with surfaces indicated to receive work and on surfaces of building components concealed behind building components shown. It is the specific intent of the Contract Documents to include work on all surfaces within Project area, whether or not shown on the Drawings, except as specifically indicated otherwise.

E. Coordination

1. Sequence: Clean masonry before beginning masonry restoration as specified in Section 04 01 40 – “Stone Masonry Restoration,” except as specifically indicated otherwise.
2. Staging: Schedule and stage masonry cleaning so that no runoff from masonry cleaning operations comes in contact with previously cleaned masonry.

- F. Preconstruction Meeting: Convene a preconstruction meeting to discuss masonry cleaning and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner’s Representatives, Restoration Consultant, Construction Manager, firm(s) that will perform masonry cleaning, and other entities that might be affected by masonry cleaning work.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Use of Water: Do not perform masonry cleaning work that will wet masonry materials or cause them to be wet when ambient temperature is below 40 deg F or when temperature of air or masonry is expected to drop below 40 deg F within 72 hours as predicted for Boston, MA by AccuWeather the National Weather Service. Do not begin work when any part of wall or any materials are frozen or subject to freezing.

1.10 COLLECTION AND DISPOSAL OF WASTE PRODUCTS

- A. General: Collect, contain, test, and dispose of solid and liquid wastes in accordance with applicable federal, state, and local laws and regulations.
- B. Collection: Provide gutters and troughs to collect runoff from masonry cleaning operations for pretreatment prior to disposal. Do not allow waste materials from masonry cleaning operations to flow or drop onto adjacent roofs; setbacks; sidewalks; trees, shrubs, plants, grass, and other plantings; soil; or structures. Direct waste materials to collection vessels for treatment.
- C. Neutralizing: Neutralize masonry cleaning waste products to a pH of between 5.0 and 9.5. Propose specific methods and materials for neutralization in Waste Disposal Program submission.
- D. Disposal: Dispose of masonry cleaning run-off by legal means that prevent: erosion, undermining, damage to plant material, and water penetration into building.
1. Install protection and waste collection systems before beginning masonry cleaning work.
 2. Test drains and other water removal systems to ensure that they are functioning properly before masonry cleaning operations begin. Notify Restoration Consultant at once if drains or systems are stopped or blocked. Do not begin work of this Section until drains are in good working order.
 3. Filter masonry cleaning runoff to prevent suspended solids such as masonry residue from entering drains and drain lines. Clean out drains and drain lines that become blocked or filled with sand or other solids as a result of masonry cleaning work at no additional cost to Owner.

4. Dispose of waste products at frequent, regular intervals. Do not allow waste products to accumulate on site.

1.11 LEAD-CONTAINING PAINT (LCP)

- A. General: Perform work that disturbs lead-containing paint (LCP), handle material that involves lead-containing paint, and transport and dispose of lead-containing paint and residue in compliance with applicable federal, state, and local laws and regulations for identification, removal, labeling, handling, containerization, transportation, and disposal of lead-containing material including, but not limited to, those referenced herein.
- B. U.S. Department of Labor OSHA Regulations: Including but not limited to: Title 29, Code of Federal Regulations (CFR) Section 1926.62: "Lead Exposure in Construction" and Title 29, CFR Section 1910.1200: "Hazard Communication Standard."
- C. U.S. Environmental Protection Agency (USEPA) Regulations: Including but not limited to: Title 40 CFR Part 262: "Standards Applicable to Generators of Hazardous Waste" and Part 263: "Standards Applicable to Transporters of Hazardous Waste."
- D. U.S. Department of Transportation (USDOT) Regulations: Including but not limited to: 49 CFR Parts 172, 173, 174, 175, 177, 178, 179, and 180.

PART 2 – PRODUCTS

2.1 MANUFACTURERS AND SUPPLIERS

- A. General: Provide products by the following manufacturers or approved equals.
 1. Cathedral Stone Products, Inc., 7266 Park Circle Drive, Hanover, MD 21076 (800-684-0901).
 2. Chemique, Inc., 315 North Washington Avenue, Moorestown, NJ 08057 (800-225-4161).
 3. Hydrochemical Techniques, Inc. 253 Locust Street, Hartford, CT 06114 (800-278-7681).
 4. ProSoCo, Inc., 3741 Greenway Circle, Lawrence, KS 66046 (800-255-4255).

2.2 CLEANING MATERIALS FOR WATER, DETERGENT AND CHEMICAL CLEANING

- A. General: Provide the following products for use in testing for cleaning substrates and conditions indicated. Test using dilutions as specified by Restoration Consultant. Provide products selected during testing for use in mock-ups and for use in cleaning building and at dilutions as selected and approved by Restoration Consultant in each case at no additional cost to Owner.
- B. Cleaners for Testing for Removing General Soiling from Masonry. Test each of the following or approved equal:
 1. Enviro Klean 2010 All Surface Cleaner, manufactured by ProSoCo, Inc.
 2. Enviro Klean Restoration Cleaner, manufactured by ProSoCo, Inc.

3. Sure Klean Light Duty Restoration Cleaner, manufactured by ProSoCo, Inc.
 4. BAC-2-NU Masonry Restorer, manufactured by Chemique, Inc.
- C. Strippers for Testing for Removing Sealant from Masonry Substrates: Test each of the following, or approved equal:
1. Sure Klean Dicone NC15 Gel, as manufactured by ProSoCo., Inc.
 2. Sure Klean Dicone NC9, as manufactured by ProSoCo., Inc.
 3. HT-350-Epoxy and Urethane Paint Remover, as manufactured by Hydrochemical Techniques, Inc.
- D. Removers for Testing for Removing Iron Stains from Masonry Substrates: Test each of the following, or approved equal:
1. Artisan Light Duty Rust Remover, as manufactured by Chemique, Inc.
 2. Chemique Masonry Rust Remover, as manufactured by Chemique, Inc.
 3. Sure Klean Ferrous Stain Remover, manufactured by ProSoCo, Inc.
- E. Removers for Testing for Removing Copper Stains from Masonry Substrates: Test each of the following, or approved equal:
1. Sure Klean Copper Stain Remover, manufactured by ProSoCo, Inc.

2.3 EQUIPMENT FOR WATER RINSING

- A. General: Provide all equipment and accessories to distribute water at pressures and flow rates required for masonry cleaning.
- B. Pressure Pumps: Pressure pumps capable of producing water flow at a rate of 6 gallons per minute at a pressure of 750 psi at nozzle on end of hose. Pumps, or a combination of pumps plus pressure reducing valves, shall have capability of providing water at a steady pressure and flow rate at all pressures from 100 psi to 750 psi. Pumps shall have working pressure gauges. Pumps found to be without working pressure gauges shall be removed from site, and work shall cease until pumps have been replaced with pumps having working pressure gauges. Pumps shall have no ferrous elements in contact with liquid stream.
- C. Particulate Filter: Provide a 5-micron particulate filter in line with water supply. All water used for masonry cleaning shall be filtered.
1. Replace particulate filter as required to provide filtered water with no particles greater than 5 microns at pressure and flow rate specified.
- D. In-line Pressure Gauges: Each water line used for pressure rinsing shall have a working pressure gauge within 15 feet of nozzle used for rinsing.
- E. Spray Nozzles for Pressure Rinsing: Nozzles shall be of nonferrous metal and shall have a minimum 15-degree fan tip.

2.4 MISCELLANEOUS MATERIALS

- A. Sealant: Manufacturer's standard one part acrylic latex sealant. Use exclusively for temporary sealing of cracks and joints around penetrations during masonry cleaning work.
 - 1. Do not use sealant containing silicone or other elastomeric product.
- B. Backer Rod: Closed cell expanded polyethylene rod, sized 25 percent greater than joint to be sealed.
- C. Protection Materials: Provide materials recommended by cleaner manufacturers for products to be used that will protect from damage caused by chemicals without causing damage to materials to be protected.
 - 1. Glass and Metal Protection: "Strippable Acid Stop" manufactured by ProSoCo, Inc., or approved equal.
 - 2. Plastic Sheeting: Polyethylene sheeting, 6 mils thick minimum.
- D. Brushes: Natural fiber bristle or synthetic fiber bristle only. No metal bristle brushes are permitted.
- E. pH Indicator: Nonstaining litmus paper or strips with appropriate range approved by Restoration Consultant. Furnish pH strips on site during all work of this Section.

2.5 MIXING CHEMICAL CLEANING SOLUTIONS

- A. General: Dilute chemical cleaning materials as determined following results obtained through test panels. Manufacturer's recommended dilutions may be modified to reflect results of test panels and approved mock-ups.
 - 1. Supply all dilutions of chemical cleaners at no additional cost.
- B. Create test panels using a minimum of two dilutions for each product where dilution is recommended by manufacturer or requested by Restoration Consultant.

PART 3 – EXECUTION

3.1 GENERAL MASONRY CLEANING REQUIREMENTS

- A. General: These requirements apply to all work of this Section.
- B. Areas To Be Cleaned: 100% of designated masonry surfaces are to be cleaned to remove general soiling and heavy soiling.
 - 1. Stains, Coatings, and Other Substances to be Removed: Remove all stains, coatings, and other substances from exterior masonry surfaces. Some stains, coatings, and other substances may not be apparent until masonry has been cleaned to remove general and heavy soiling. Clean to remove all substances as specified herein and as directed by Restoration Consultant.
- C. Masonry Cleaning Progress: Clean masonry systematically in full-height, top-to-bottom sections of areas to be cleaned.

1. Masonry Cleaning with Water: Begin masonry cleaning using water at top of section to be cleaned and proceed to bottom of section before moving to adjacent section, except for remover of paint strippers where manufacturer specifically requires that removal begin at bottom of area coated with stripper.
 - D. Timing: Control timing of masonry cleaning operations (including dwell times of cleaners and misting times) to ensure that specified times are maintained. Do not allow chemicals to remain on surfaces longer than dwell times determined during testing and confirmed during mock-ups.
 - E. Water Pressure and Flow Rate: Limit water pressure and flow rates to maximum pressures specified herein and to lower pressures as required to avoid damaging masonry, metals, sealants, and other materials and finishes.
 1. Pressure: 750 psi or less as required to avoid damage to materials being cleaned.
 2. Flow Rate: 6 gallons per minute.
 3. Nozzle Position: Hold nozzle at a uniform distance from and angle to masonry surface as determined by testing and confirmed by mock-ups to provide optimum cleaning without damaging masonry surface. Nozzle shall be at least 12 inches from masonry surface.
 4. Adjustments: If any building material is damaged or deteriorated by water rinsing, immediately cease work. Do not resume pressure rinsing until water pressure and flow rate have been adjusted to avoid damage to building materials.
 - F. Uniform Cleaning: Clean masonry to achieve even, uniform surfaces so that edges, corners, crevices, profiles, and recessed areas are cleaned to the same extent as flat surfaces.
 - G. Adjustment and Alteration: Masonry cleaning procedures, including cleaning chemical, chemical dilution, dwell time, and application and removal procedures may be adjusted and/or altered by Restoration Consultant based on site conditions.
 - H. Completion of Masonry Cleaning: Cleaned masonry shall match approved mock-ups. Areas are subject to additional cleaning as directed by Restoration Consultant in order to match mock-ups. Work of masonry cleaning on each surface shall not be considered complete until Restoration Consultant has inspected surface and so notified Contractor in writing.
- 3.2 TESTING
- A. General: Perform testing under direction of Restoration Consultant following requirements of Article "Testing," above, to determine most appropriate products and procedures for cleaning each substrate before preparing mock-ups or beginning general masonry cleaning work.
- 3.3 MOCK-UPS
- A. General: Provide mock-ups under direction of Restoration Consultant following requirements of "Mock-Ups" Article, above, to confirm products and procedures selected during testing and to provide standards for evaluation of the masonry cleaning work.

3.4 CLEANING SOILING FROM MASONRY USING CHEMICAL REMOVER AND PRESSURIZED WATER RINSING

- A. General: Clean masonry free of soiling using cleaning chemical selected during testing followed by pressurized water rinsing. Cleaned masonry shall match approved mock-up to Restoration Consultant's satisfaction.
- B. Cleaner Application and Removal: Apply and remove cleaner following method of application and dwell times determined during testing and confirmed during mock-ups. Scrub surface gently with fiber bristle brushes. Rinse surface thoroughly using water at a pressure of 750 psi and flow rate of 6 gpm.
- C. Additional Cleaning: Repeat above procedure as necessary to achieve uniformly clean masonry surface matching standard of approved mock-up.

3.5 REMOVING SEALANT FROM MASONRY USING MECHANICAL METHODS, CHEMICAL REMOVERS, AND WATER RINSING

- A. General: Remove sealant from joints in masonry and joints between masonry and adjacent materials using mechanical methods, remove remaining sealant and sealant residue using chemical removers and water rinsing. Cleaned masonry shall match approved mock-ups to Restoration Consultant's satisfaction.
- B. Mechanical Removal: Cut and pull sealant from joints between masonry units and from joints between masonry and adjacent materials using sharp blades to cut along masonry units and other materials. Remove as much of the sealant as possible without damaging masonry units.
- C. Stripping Sealant and Sealant Residue: Remove sealant remaining following mechanical removal and sealant residue from joint substrates using remover and procedure selected during testing and confirmed during mock-ups. Do not spread dissolved sealant over masonry surfaces or allow sealant residue to be absorbed into masonry units. Wipe repeatedly using appropriate solvent and clean white cloths to remove sealant residue.
- D. Additional Cleaning: Repeat removal as specified above as required to achieve uniformly clean masonry without evidence of sealant matching approved mock-ups.

3.6 REMOVING ADHESIVE FROM MASONRY USING CHEMICAL REMOVERS AND WATER RINSING

- A. General: Remove adhesive and adhesive residue from masonry using chemical removers and water rinsing. Cleaned masonry shall match approved mock-ups to Restoration Consultant's satisfaction.
- B. Stripping Adhesive and Adhesive Residue: Remove adhesive and adhesive residue from masonry surfaces using remover and procedure selected during testing and confirmed during mock-ups. Do not spread dissolved adhesive over masonry surfaces or allow adhesive residue to be absorbed into masonry units. Wipe repeatedly using appropriate solvent and clean white cloths to remove adhesive residue.
- C. Additional Cleaning: Repeat removal as specified above as required to achieve uniformly clean masonry without evidence of adhesive residue matching approved mock-up.

3.7 REMOVING IRON STAINS FROM MASONRY USING CHEMICAL STAIN REMOVERS AND WATER RINSING

- A. General: Remove iron stains from masonry using chemical stain remover and form of stain remover (liquid, gel, and/or poultice) selected during testing and confirmed during mock-up to achieve masonry surface free of iron stains matching approved mock-up to Restoration Consultant's satisfaction.
- B. Remover Application and Removal: Apply remover following method of application and dwell time determined during testing and confirmed during mock-ups. Remove chemical following manufacturer's directions. Rinse surface thoroughly using water at a pressure of 750 psi and flow rate of 6 gpm, overlapping passes slightly.
- C. Additional Removal: Repeat above procedure as necessary to achieve uniformly clean masonry free of iron stains with surface matching standard of approved mock-up.

3.8 REMOVING COPPER STAINS FROM MASONRY USING CHEMICAL STAIN REMOVERS AND WATER RINSING

- A. General: Remove copper stains from masonry using chemical stain remover and form of stain remover (liquid, gel, and/or poultice) selected during testing and confirmed during mock-up to achieve masonry surface free of copper stains matching approved mock-up to Restoration Consultant's satisfaction.
- B. Remover Application and Removal: Apply remover following method of application and dwell time determined during testing and confirmed during mock-ups. Remove chemical following manufacturer's directions. Rinse surface thoroughly using water at a pressure of 600 psi and flow rate of 6 gpm, overlapping passes slightly.
- C. Additional Removal: Repeat above procedure as necessary to achieve uniformly clean masonry free of copper stains with surface matching standard of approved mock-up.

3.9 ADJUSTMENT AND PROTECTION

- A. Reclean masonry surfaces that do not have an even, uniform clean appearance matching approved mock-ups to achieve uniformly clean surfaces matching approved mock-ups.
- B. Protect cleaned surfaces from dirt and soiling from other than normal atmospheric pollution until Project completion. Reclean surfaces that become dirty or soiled to Restoration Consultant's satisfaction at no additional cost to Owner.

END OF SECTION 04 01 10

SECTION 04 01 40

STONE MASONRY RESTORATION

1.1 GENERAL REQUIREMENTS

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

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of stone masonry restoration as shown on the Drawings and/or as specified herein and as may be required by conditions and authorities having jurisdiction, including, but not necessarily limited to, the following:
1. Cleaning masonry prior to stone masonry restoration work as specified in Specification Section 04 01 10.
 2. Providing new stone masonry to match original stone masonry.
 3. Providing new stone units to replace missing stone units and damaged stone units.
 4. Salvaging, cleaning and reinstalling stone units.
 5. Removing, salvaging, cleaning and reinstalling displaced stone units.
 6. Providing and installing new clay flue liner in chimney cavity.
 7. Preparing and pointing joints in stone masonry in areas indicated.
 8. Removing anchors for scaffold tiebacks and patching holes remaining following anchor removal to match adjacent surface and to comply with requirements of this Section as scaffolding is dismantled.
 9. Field verify all existing conditions and dimensions and coordinate all dimensions. Notify the designer of any discrepancies that would affect the installation as shown.
 10. All work shall conform to the Massachusetts State Building Code.
 11. All details shall be considered typical and applicable to all similar conditions unless otherwise noted or indicated.
 12. Provide temporary weather barriers as needed to protect interior when wall is open.
- B. Related Work Specified Elsewhere
1. Masonry Cleaning – Section 04 01 10

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2. Sheet Metal Flashing & Drainage – Section 07 62 10

3. Joint Sealants – Section 07 92 10

1.3 DEFINITIONS

- A. “Cold Weather Stone Masonry Restoration” as used herein refers to work of this Section when temperature is below 40 deg F or predicted to go below 40 deg F within 48 hours of use of mortar by AccuWeather the National Weather Service.
- B. “Hot Weather Stone Masonry Restoration” as used herein refers to work of this Section when temperature is above 100 deg F or when temperature is above 90 deg F and wind is above 8 mpg or when either of these conditions is predicted within 48 hours of use of mortar.

1.4 QUALITY ASSURANCE

- A. Stone Masonry Restoration:
 - 1. Foreman: Stone masonry restoration shall be directly supervised by a full-time foreman who has successfully completed at least five years' experience with work on historic buildings similar to that required by this Section. Foreman shall be on site daily for duration of work of this Section. Same foreman shall remain on Project throughout work unless his performance is deemed unacceptable.
 - 2. Mechanics: Stone masonry restoration shall be carried out by a steady crew of skilled stone masons who are thoroughly experienced with restoration of historic stone masonry using materials and methods specified and have a minimum of three years' experience with work on historic buildings similar to that required by this Section. In acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.
- B. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. Referenced Standards: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. In each case in which there is conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
 - 1. ASTM International (ASTM)
 - a. ASTM C 144, *Standard Specification for Aggregate for Masonry Mortar.*
 - b. ASTM C 150, *Standard Specification for Portland Cement.*
 - c. ASTM C 207, *Standard Specification for Hydrated Lime for Masonry Purposes.*
 - d. ASTM C 270, *Standard Specification for Mortar for Unit Masonry.*
 - f. ASTM C 615, *Standard Specification for Granite Dimension Stone.*
 - g. ASTM C 1713, *Standard Specification for Mortars for the Repair of Historic Masonry.*

2. National Building Granite Quarries Association (NBGQA), *Specifications for Building Granite*.

- D. Preparation of Mortar under Controlled Conditions: Mortars and grouts shall be batched and packaged in factory or shop under controlled conditions that ensure consistency of ingredients, proportions, and mixing of dry ingredients as described in approved Work Description. Mortars and grouts shall be delivered packaged to Project site ready for mixing with water. No mortar or grout mixes shall be proportioned on site.
- E. Sources of Materials: Obtain each type of material for stone masonry restoration from a single source to ensure a match in quality, performance, and appearance.
- F. Access for Observation and Approvals: Provide Restoration Consultant access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide access to facilitate observation and approvals.
- G. Restoration of Damaged Masonry: Repair or replace broken, lost, and damaged masonry resulting from work of this Section to configuration and condition existing before work began to Restoration Consultant's satisfaction at no additional cost to Owner.

1.5 TEMPORARY SHORING AND BRACING

- A. Provide and install temporary shoring designed to support the temporary structural loads of the supported items.
- B. Shoring shall be of any material which is suitable for the application. Timber shoring shall be fully dried and all end grain shall be sealed to prevent absorption of water and associated swelling. Shoring shall be made stable, stiff, and snug fitting so as not to deflect under load. Pre load supported elements for snug fit only. Shoring shall deflect no more than the given span length divided by 600.
- C. Bearing surfaces of shoring shall be reviewed with architect in field and shall provide for proper transfer of loads to supporting and supported elements.

1.6 SUBMITTALS

- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Restoration Consultant's approval.
- B. Qualification Data: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to the work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Work Description: Detailed description for each type of stone masonry restoration work to be performed. Do not begin work on site until Restoration Consultant has approved Work Description in writing. Submit new written descriptive information. Description for each type of restoration on each material shall include, but not be limited to:

1. Materials and Procedures: Materials, methods, tools, and equipment to be used for each phase and task of stone masonry restoration work.
 2. Protection: Description, including drawings and diagrams, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this Section to persons (whether involved in the Work or not); building elements, materials, and finishes; surrounding landscape and site; and the environment (including air and water).
 3. Alternate Methods and Materials (If Any): Proposed alternate methods and materials (if any) to those specified for stone masonry restoration work. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- D. Documentation of Existing Conditions: Documentation as required by Paragraph "Documentation of Existing Conditions" in "Quality Assurance" Article, above.
- E. Designs for Shoring and Bracing: Drawings and calculations by Professional Engineer retained by Contractor indicating design of temporary bracing, shoring, and other provisions necessary to ensure support and stability for existing construction and support and stability for elements being removed as specified in "Quality Assurance" Article, above.
1. Drawings and calculations shall bear the Engineer's original signature and seal indicating the Engineer's Massachusetts Registration.
- F. Product Data: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Material Safety Data Sheets (MSDS).
- G. Shop Drawings: Dimensioned detailed scale drawings at appropriate scales to clearly describe stone masonry restoration; details of anchors and fasteners, 3-inches equals 1-foot scale, minimum. Submit newly prepared drawings showing site-verified conditions and materials. Photocopies of Contract Documents and/or electronic scans of Contract Documents will not be accepted for Shop Drawing submittals.
1. Providing Salvaged and New Stone Units: Each stone unit. Show location of cramps and anchors.
 2. Reinstalling Displaced and Loose Stone Units: Each unit. Show location of cramps and anchors.
- D. Product Data: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Safety Data Sheets (SDS). SDS submitted for record only.
- E. Samples
1. Salvaged Granite: Six (6) individual rubble stones, cleaned of soiling and mortar, varying in size and type.

2. Granite to Match Existing Granite: Six (6) individual rubble stones, varying in size and type to match existing.

F. Prepare mock-ups following requirements of Article "Mock-ups," below.

1.7 MOCK-UPS

A. General: Before beginning general stone masonry restoration work, prepare mock-ups to provide standards for work of this Section. Do not proceed with stone masonry restoration until Restoration Consultant has approved mock-ups.

1. Locate mock-ups as directed by Restoration Consultant.
2. Notify Restoration Consultant 48 hours prior to start of each mock-up.
3. Restoration Consultant will monitor mock-ups. Mock-ups not performed in presence of Restoration Consultant will be rejected.
4. Use crew that will execute the work and follow requirements of this Section.
5. Allow mock-ups with mortar, composite patching mortar, cementitious grout, and other products containing cements and/or limes to dry for five days to allow material to reach final color and allow potential problems to appear. Notify Restoration Consultant when mock-ups are ready for review.
6. Repeat mock-ups as necessary to obtain Restoration Consultant's approval.
7. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
8. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
9. Approved mock-ups will represent minimum standards for stone masonry restoration. Subsequent stone masonry restoration work that does not meet standards of approved mock-ups will be rejected.

B. Prepare the Following Mock-Ups

1. Preparing Joints in Granite Masonry: One panel, including at least 16 linear feet of joint.
2. Pointing Joints in Granite Masonry: One panel including at least 16 linear feet of joint.
3. Reset Granite Masonry: One section, at least 25sf, including anchorage.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products and materials to prevent damage, deterioration, degradation, and intrusion of foreign material.
- B. Discard and remove from site deteriorated materials, contaminated materials, and products that have exceeded their expiration dates. Replace with fresh materials.

- C. Handling Stone: Handle stone to prevent chipping, breakage, soiling, and other damage.

1.9 PROJECT CONDITIONS

- A. Safety: Protect all persons, whether or not involved in work of this Section, from harm caused by or resulting from work of this Section.
 - 1. Protection from Hazardous Materials: Protect workers and other persons from contact with hazardous materials resulting from work of this Section.
 - a. Silica: Use procedures necessary to protect workers and other persons from exposure to respirable crystalline silica. All work should be performed in compliance with applicable OSHA regulations, including but not limited to "Respirable Crystalline Silica Standard" (Title 29, Code of Federal Regulations (CFR) Section 1926.1153) and with other applicable state and local laws and regulations.
 - 2. Protection from Noise: Limit noise generated by work of this Section to an absolute minimum. Prevent all persons, whether or not involved with the work of this Section, from noise that might adversely affect them.
- B. Protection of Building: Protect building elements and finishes from damage and from deterioration caused by work of this Section. Repair materials and finishes damaged as a result of work of this Section to Restoration Consultant's satisfaction at no additional cost to Owner.
 - 1. Exclusion of Water: Cover open joints and areas from which sections of masonry, masonry units, and/or portions of units have been removed during periods when work is suspended to ensure materials and finishes are not damaged by water penetration.
 - 2. Prevention of Staining: Prevent grout, mortar, and adhesives from staining face of masonry to be left exposed. Protect sills, ledges, and projections from mortar droppings. Immediately remove grout, mortar, and adhesive in contact with masonry. Protect base of walls from rain splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - 3. Protection from Fire: Take precautions necessary to prevent fire and spread of fire.
 - a. Covers: Membranes, insulation blankets, and other materials used to cover masonry shall be flame retardant and fire resistant.
 - b. Warming Devices: Heating blankets, infrared heaters, and other warming devices shall be UL approved and inspected for damage before use.
 - c. Open Flame Heaters: No open flame heaters shall be used to protect finished masonry. Heaters used to warm water or sand for mortar or grout shall be well away from building and from flammable substances.
- C. Surfaces To Receive Work: The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces of building components on which work is to be performed, including surfaces concealed from view behind objects shown; surfaces of projections, reveals, returns, and other elements perpendicular to or at an oblique angle to surfaces shown; concealed surfaces of profiled members and of ornament; and surfaces of profiled members and of ornament not drawn in detail. Perform work on surfaces of projections,

reveals, returns, profiled members, and ornaments associated with surfaces indicated to receive work and on surfaces of building components concealed behind building components shown. It is the specific intent of the Contract Documents to include work on all surfaces within Project area, whether or not shown on the Drawings, except as specifically indicated otherwise.

- D. Coordination: Coordinate work of this Section with work of other sections as necessary to ensure optimum performance of work of this Contract.

1.10 ENVIRONMENTAL REQUIREMENTS

A. General

- 1. Manufacturer's Recommendations: Perform work only when temperature of products being used, temperatures of existing and new materials and surfaces, and temperature and humidity of air at Project site comply with manufacturer's requirements and recommendations.
- B. Cold Weather Stone Masonry Restoration: Cold weather stone masonry restoration shall adhere to following requirements for work, performed in ambient temperatures indicated. Work shall not be permitted when temperature of air or wall is below 40 deg F or when temperature of air or wall is predicted to be below 40 deg F in Project location within 48 hours of work by AccuWeather the National Weather Service without Restoration Consultant's prior written approval. No work shall begin when any part of wall or materials in use are frozen or subject to freezing temperatures. See Section 015000 Temporary Facilities Requirements.
- C. Hot Weather Stone Masonry Restoration: Protect fresh mortar from premature drying when temperature, humidity, and wind conditions result in rapid drying of mortar. Provide and maintain tarps against wind and direct sun. Protect masonry for 72 hours after using mortar by one of the following procedures:
 - 1. Water-Soaked Cover: Provide and maintain damp burlap or other damp cloths over masonry to protect mortars from pre-mature drying. Install, maintain, and remove coverings using materials and methods that do not damage or alter masonry.
 - 2. Fog Spray: Fog spray newly constructed masonry until damp at least three times a day using water without iron or other contaminants that might adversely affect masonry. Do not use water stream or pressure that might wash binder from surface of mortar or cause rundown on masonry.
- D. Damage from Work in Cold Weather or in Hot Weather: Remove work of this Section damaged by freezing during cold weather masonry work and/or damaged by premature or too-rapid drying during hot weather masonry work and replace with new masonry work complying with the requirements of this Section at no additional cost to Owner.

PART 2 – PRODUCTS

2.1 STONE

A. Granite

- 1. Salvaged Granite: Salvaged sound stone cleaned free of mortar, grout, dirt, and other

contaminants and matching existing cleaned granite in physical and chemical properties and in color, texture, and other surface characteristics.

2. New Granite: New sound stone complying with ASTM C 615 and matching existing cleaned granite in physical and chemical properties and in color, texture, and other surface characteristics for each type of granite to be replaced.

2.2 LOAD BEARING BLOCK UNITS(CMU)

- A. New CMU: New CMU complying with ASTM C 90

2.3 MORTAR AND PATCHING MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II. Do not use masonry cement.
- B. White Portland Cement: ASTM C 150, Type I.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Sand: Clean sharp sand, free of loam, silt, soluble salts, organic matter, and other substances that might adversely affect mortar, masonry units, or embedded elements and graded in compliance with ASTM C 144. Where mortar or patching mortar is to match existing original mortar or patching mortar, sand or other aggregate shall be selected to provide mortar matching color and texture of original mortar (with minimum addition of pigment). Sieve and mix sand and aggregates from individual sources and from more than one source to provide mortar matching original mortar.
- E. Water: Clean and free of substances that might adversely affect mortar, masonry, and embedded elements.
- F. Pigments: Stable, light-fast, alkali-resistant, water-soluble mineral oxide pigments without fillers or extenders complying with ASTM C 979. Provide one of the following, or approved equal:
 1. SGS Concentrated Mortar Colors by Solomon Color, Inc., 4050 Color Plant Road, Springfield, IL 62702 (800-624-0261).
 2. Lanxess Bayferrox Iron Oxide Pigments by Lanxess Corporation, Business Unit Inorganic Pigments, 111 RIDC Park West Drive, Pittsburgh, PA 15275 (412-809-1000).
 3. Powder Pigments by Davis Colors, 3700 East Olympic Blvd., Los Angeles, CA 90023 (323-265-8323).

2.4 MORTAR FOR NEW CONCRETE MASONRY

- A. Mortar for new concrete unit masonry: ASTM C270, Type S with a minimum compressive strength of not less than 1500 psi at 28 days.
- b. Grout shall be 2500 psi min, strength at 28 days. Grout mix shall be submitted for review. Solidly grout-fill all CMU cores.

2.5 PREFORMULATED MORTARS

- A. Composite Patching Mortar for Granite: Single-component, cementitious, mineral-based mortar specifically manufactured for the restoration of natural stone. Provide custom colors to match colors of clean stone. Provide one of the following, or approved equal:
 - 1. Jahn M160 Granite and Bluestone Repair Mortar, available from Cathedral Stone Products, Inc., 7266 Park Circle Dr., Hanover, MD 21076 (800-684-0901)
 - 2. Custom System 45, available from Edison Coatings, Inc., 3 Northwest Drive, Plainville, CT 06062 (800-341-6621).
 - 3. Matrix, available from Conproco, (800-258-3500).
- B. Surface Aggregate for Granite Patches: Sound particles of ground stone with grains matching sizes, size distribution, colors, and color distribution of surface particles in existing granite to be patched.

2.6 ANCHORS AND FASTENERS

- A. General: Provide anchors, dowels, attachments, and fasteners as shown on approved shop drawings and of size and configuration suitable for use intended to secure sound, secure anchorage.
 - 1. Material
 - a. Masonry ties and anchors: 3/16" diameter steel wire, hot dip galvanized to ASTM A153 Class B-2 after fabrication, cold drawn steel wire conforming to ASTM A82, type and layout as indicated on drawings.
 - b. Dowels shall be ASTM A276, Type 304, threaded round stock.
 - 2. Prohibited Types of Anchors and Fasteners: Expansion bolts, cinch bolts, and plugs are not acceptable.

2.7 ADHESIVES

- A. Adhesive Anchorage System for Anchors, Pins, and Dowels into multi-unit Masonry: Hilti HY270 Adhesive Injection System as manufactured by the Hilti Corporation of Tulsa, OK, or approved equal, with screen tubes.

2.8 EQUIPMENT AND TOOLS FOR CLEANING ANCHOR HOLES, CRACKS, LOSSES, AND JOINTS

- A. Brushes for Cleaning Anchor Holes: Stiff wire bristle or nylon bristle brushes of diameter to ensure full cleaning of dust and debris from masonry substrate at sides and bottom of hole. Brushes shall be sized appropriately for holes in which they are to be used so that they firmly contact entire circumference of hole at the same time. Use sizes recommended by anchor manufacturer and approved by Restoration Consultant.

- B. Brushes for Cleaning Cracks and Losses: Stiff nylon bristle brushes of shape and dimension to provide optimum removal of contaminants from stone surface and approved by Restoration Consultant.

2.9 TOOLS FOR JOINT PREPARATION

- A. Hand Tools: Chisels, hammers, and mallets.
 - 1. Thickness of Chisels: Maximum thickness of 5/8 times joint width extending from tip at least three times depth at which chisel will be inserted into joint.
- B. Power Tools: Standard tools and equipment, modified tools and equipment, and custom designed and fabricated tools and equipment as necessary to remove mortar from narrow joints without damaging masonry units. Use power tools only under conditions described in Part 3, below, and only if specifically approved by Restoration Consultant.
 - 1. Electric Grinders: Small, hand-held electric grinders with blades no greater than 1/16 inch thick and a maximum of 4-1/2-inch diameter.
 - 2. Pneumatic Grinders: Specially modified pneumatic die grinders with thin diamond abrasive blades (0.060 inch thick). Subject to compliance with requirements, provide wafer blades.
- C. Tools for Preparation of Joints Containing Sealant: Small wire bristle brushes, metal scrapers, small grinders, low-pressure, airborne, micro-abrasive blasting equipment, or other tools and equipment for removing remains of sealant and sealant residue from joint as described in approved Work Description.
- D. Brushes for Removing Dust and Dirt from Joints: Stiff, natural- or synthetic-fiber bristle brushes. No metal bristle brushes are acceptable.

2.10 MISCELLANEOUS MATERIALS AND EQUIPMENT

- A. Tape for Protecting Masonry Surfaces: Masking tape or other approved tape that will protect masonry surface from contact with repair materials being used and that can be applied to and removed completely from masonry surface without damaging, deteriorating, or altering the appearance of the masonry surface.
- B. Pointing Trowels: Long, thin pointing trowels narrower than joints being pointed. Pointing trowel shall have raised bead profile to match original joint profile.
 - 1. Custom fabricate special trowels for masonry pointing if necessary to ensure proper insertion and optimum compaction of mortar.
- C. Scrapers for Removing Mortar: Wood scrapers with rounded corners.
- D. Brushes for Removing Dirt and Debris from Joints: Stiff natural bristle or fiber bristle brushes. No metal bristle brushes are permitted.
- E. Sand for Removing Mortar: Clean, washed fine sand.
- F. Cloths for Removing Mortar: Clean, white terry cloth or similar rough-textured cloth.

2.11 MORTAR AND GROUT MIXES

A. General

1. Mortars specified hereinafter shall comply with ASTM C 1713, Standard Specification for Mortars for the Repair of Historic Masonry.
2. Mix mortars using proportions specified herein as adjusted, if necessary, by the amount of moisture in the ingredients. The proportions specified are for dry cements and limes and damp, loose (saturated, surface-dry) sand. If ingredients with different moisture contents are used (for example, lime putty is used in place of lime or dry sand is used in place of damp, loose sand), adjust quantities so that the proportions of ingredients in the mixes equal the proportions specified as approved by Restoration Consultant.

B. Mortars for Setting Stone Masonry: Mortar mixes may change and may require adjustment before and during construction in accordance with pre-construction conformance testing, field-testing, and Restoration Consultant's evaluation of testing and test results.

1. Mortar for Pointing Granite Masonry: Cement, lime, sand mortar. Proportion mortar by volume as follows to achieve a mortar with a minimum compressive strength of 1300 psi at 28 days.
 - a. 1 part by volume white Portland cement (Type I)
 - b. 1 part by volume hydrated lime (Type S)
 - c. 6 parts sand (Selected to match sand in original mortar)
 - d. Oxide pigments as needed to match color of the original mortar, but not to exceed 7 percent of the weight of the cement.
2. Mortar for Setting Granite Masonry: Cement, lime, sand mortar. Proportion mortar by volume as follows to achieve a mortar with a minimum compressive strength of 1300 psi at 28 days.
 - a. 1 part by volume white Portland cement (Type I)
 - b. 1 part by volume hydrated lime (Type S)
 - c. 6 parts sand (Selected to match sand in original mortar)
 - d. Oxide pigments as needed to match color of the original mortar in the masonry being set but not to exceed 7 percent of the weight of the cement.
3. Mortar for Setting Concrete Unit Masonry: ASTM C270, Type S with a minimum compressive strength of not less than 1500 psi at 28 days.

2.12 MIXING OF MORTARS AND GROUTS

- ### A. Measuring: Measure mortar and grout ingredients carefully using containers with fixed volumes so that proportions are controlled and maintained throughout the work of this Section.

- B. Mixing Portland Cement Mortars and Grouts: Mix mortars and grouts in an approved type of power-operated batch mixer. Mix for time necessary to produce a homogeneous plastic mortar but not be less than five minutes: approximately two minutes for mixing dry materials and not less than three minutes for mixing after water has been added.
- C. Water: Use minimum amount of water to produce a workable consistency for mortar's intended purpose.
 - 1. Mortar for Pointing: As dry a consistency as will produce a mortar sufficiently plastic to be worked into joints.
 - 2. Grout for Injection: Consistency that can be injected to fill voids and losses.
- E. After mixing, mortars for pointing or setting shall sit for 20 minutes prior to use to allow for initial shrinkage. Mortar shall be placed in final position within two hours of mixing. Retempering of partially hardened material is not permitted.
- F. Mortar for grout shall be placed in final position within two hours of mixing or within period recommended by manufacturer of custom products, whichever is less. Retempering of partially hardened material is not permitted.
- G. Custom Patching Mortars and Grouts: Mix in strict accordance with manufacturer's written instructions.

2.13 CLAY FLUE LINER

- A. CLAY FLUE LINER: ASTM C 315, Standard Specification for Clay Flue Liners and Chimney Pots.

PART 3 – EXECUTION

3.1 DOCUMENTATION OF STONE MASONRY TO BE RESTORED

- A. General: Document areas of stone masonry to be restored as specified in "Quality Assurance" Article, above.

3.2 REMOVAL OF GRANITE UNITS

- A. General: Remove units scheduled to be salvaged and reinstalled. Use extreme care to avoid damage to adjacent stone units and to units to be reset. Repair or replace elements damaged during removal and salvage work to Restoration Consultant's satisfaction at no additional cost to Owner.
- B. Freeing Stone Units
 - 1. Carefully cut out joints surrounding units to be removed. Use thin knives or blades to remove grout to the full depth of stone unit. No power tools will be permitted. Do not damage surfaces or arrises of unit.
 - 2. Gently use vibrating instrument to loosen stone from setting mortar.
 - 3. Where access to edge of stone unit is available, remove setting mortar from rear of stone to

expose an area approximately 3-inches wide under full length of exposed edge. Use a combination of grinders and hand tools as necessary. As it accumulates, remove debris from area with a vacuum.

4. Alternate between excavating setting mortar from underneath unit and vibrating unit loose with instrument until unit loosens from setting mortar.
 5. Lift out unit. Label unit on rear surface using approved identification system.
- C. Cleaning: Remove mortar from unit using care to avoid damaging unit.
- D. Storage: If reinstallation is delayed, wrap and crate unit and deliver units to area for temporary storage for reinstallation.

3.3 SETTING AND BONDING OF NEW CMU UNITS

- A. Setting and bonding of units shall comply with the following:
1. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work and fully toothed into adjacent work.
 2. Lay hollow masonry units with face shell bedding on head and bed joints.
 3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
 4. Remove excess mortar as work progresses.
 5. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
 6. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- B. Masonry elements shall be set true and plumb in accordance with the drawings.

3.4 REINSTALLING GRANITE UNITS

- A. General: Ensure sound substrates and provide stone masonry using salvaged stone units and new stone units as indicated on Drawings. Do not damage stone units. Repair and replace stone units damaged during work of this Section as directed by Restoration Consultant's satisfaction at no additional cost to Owner.
- B. Cleaning Stone: Clean stone before setting. Remove old mortar from salvaged stone and scrub stone with detergent and water using natural or synthetic fiber bristle brushes. Thoroughly rinse salvaged stone and new stone with clean water.
- C. Anchor Holes: Where indicated on Drawings, necessitated by conditions at site, and as shown on approved shop drawings, drill new holes to receive anchors, cramps, dowels, and other anchors and fasteners. Use methods that do not damage stone.
- D. Setting: Set salvaged and replacement stone units accurately with new drop pins and/or stainless steel anchors and fresh mortar to match condition of original masonry. Set true to line and level

and fill joints and anchor holes completely with mortar.

1. Joint Widths: Set stonework with joints of uniform width not exceeding width of existing joints, unless otherwise specified.
 2. Wedges: Use nylon wedges to secure proper setting of stone. Pack bed joints tightly with mortar. Clean wedges before using them and remove wedges before mortar has set hard. Fill resulting holes with mortar.
- E. Defects: Patching of defects in stone blocks shall not be permitted. Chips and stains on faces shall be redressed or cleaned. No acid-leaching agent shall be permitted.

3.5 REBUILDING STONE MASONRY

- A. General: Ensure sound substrates and provide stone masonry using salvaged stone units and new stone units as indicated on Drawings. Do not damage stone units. Repair and replace stone units damaged during work of this Section as directed by Restoration Consultant and to Restoration Consultant's satisfaction at no additional cost to Owner.
- B. Cleaning Stone: Clean stone before setting. Remove old mortar from salvaged stone and scrub stone with detergent and water using natural or synthetic fiber bristle brushes. Thoroughly rinse salvaged stone and new stone with clean water.
- C. Anchor Holes: Where indicated on Drawings, necessitated by conditions at site, and as shown on approved shop drawings, drill new holes to receive anchors, cramps, dowels, and other anchors and fasteners. Use methods that do not damage stone.
- D. Setting: Set salvaged and replacement stone units accurately with new stainless steel anchors and fresh mortar to match condition of original masonry. Set true to line and level and fill joints and anchor holes completely with mortar.
1. Joint Widths: Set stonework with joints of uniform width not exceeding width of existing joints, unless otherwise specified.
 2. Wedges: Use nylon wedges to secure proper setting of stone. Pack bed joints tightly with mortar. Clean wedges before using them and remove wedges before mortar has set hard. Fill resulting holes with mortar.
- E. Defects: Patching of defects in stone blocks shall not be permitted. Chips and stains on faces shall be redressed or cleaned. No acid-leaching agent shall be permitted.
- F. Preparation for Pointing: Upon completion of setting stonework, rake joints to prepare them for pointing in compliance with Article "Pointing Joints," below.

3.6 INSTALLATION OF ADDITIONAL REINFORCEMENT

- A. Adhesive Anchorage System for Anchors, Pins, and Dowels into multi-unit Masonry: Hilti HY270 Adhesive Injection System as manufactured by the Hilti Corporation of Tulsa, OK, or approved equal, with screen tubes.
1. Locate holes within the existing masonry so that they are at least 2" from the nearest joint intersection and within the faces of existing units rather than in the joints.

2. Monitor Conditions of stone units as the drill is advancing into them. Check for vibration or movement of brick units halfway through each by tapping with the bit. Notify the Engineer if the stonework feels "soft".
3. All holes greater than 1/2" diameter shall be drilled using a diamond tipped core drill, dry application on interior surfaces, wet or dry application on exterior surfaces. Do not use a rotary hammer or impact type hammer for holes greater than 1/2" in diameter.
4. Hole size shall be 1/8" greater in diameter than rod or as specified by the manufacturer.
5. Fill holes in base masonry with injection resin before inserting diameter rods.
6. Simultaneously pre-butter pinning rod surfaces with injection gel so that there is a uniform coating all around the rod of between 1/16" and 1/8" in thickness and insert rod immediately thereafter.
7. At voided or composite masonry construction, insert screen tubes into holes. Screen tubes shall be sized to reach the full depth of each drilled hole.
8. Injection-fill adhesive starting at the far end of the tube with a long nozzle.
9. Wipe off excess resin and bend rod to suit masonry attachment requirements. Monitor progress and quality of work, adjusting techniques as may be necessary with approval of the Restoration Consultant. Check that annular space is filled around the end of each pinning rod following insertion. If properly installed, resin (gel) should be oozing out beyond end of rod all around annular space, showing that the annular space and the hole are completely filled. If this does not happen consistently after the third installation, notify the Engineer before continuing. Supplementary injection may be necessary due to the presence of voids.

3.7 ROUTING AND FILLING CRACKS

- A. General: In locations indicated, rout out cracks at surface and fill with custom patching mortar to match color and texture of adjacent stone surface.
- B. Preparation for Patching Crack: Rout out cracks to a depth of 5/8 inch and a width of 1/8 inch. Do not damage adjacent stone surface.
- C. Cleaning: Clean stone at sides and rear of routed cracks thoroughly using fine, stiff, fiber-bristle brush to remove particles and dust.
- D. Wetting: Thoroughly rinse surfaces to ensure that substrate will not rapidly absorb water from patching mortar.
- E. Application: Brush crack with a mortar slurry coat and fill with specified composite patching mortar matching color of adjacent cleaned stone.
- F. Finishing: Strike surface of filled crack flush with face of adjacent stone. Finish surface of patching material to match texture and finish of adjacent cleaned stone.
- G. Curing: Protect installed patching mortar from too rapid drying and from contact with water that might wash binder from surface.

3.8 PREPARING AND POINTING JOINTS

A. Preparing Joints Containing Mortar

1. General: Remove mortar from joints to a depth of 3/4 inch, to 2-1/2 times width of joint, or to sound mortar, whichever is deepest. In all cases remove deteriorated, weathered, and loose material to sound mortar.
 - a. Completely remove mortar from surfaces of masonry units adjoining joint to allow new mortar to bond directly with masonry units.
 - b. Cut surface of mortar at rear of joint at a uniform depth from and parallel to wall surface.
 - c. Do not damage faces or arrises of masonry units during joint preparation. Cease joint preparation work if, in Restoration Consultant's judgment, masonry units are damaged by methods being used to prepare joints. Do not resume work until tools, workers, and methodology have been corrected to ensure that masonry units are not damaged and that work meets standard set by approved mock-up.
2. Mortar Removal Using Hand Tools: Use hand tools for removal of mortar from joints in masonry that are less than 6 inches long and from other joints in which use of power tools might damage masonry units. Use hand tools to complete mortar removal from joints where power tools have been used to partially remove mortar.
 - a. For narrow joints of 1/8-inch or less in width, rake mortar from joints manually with a sharp knife blade or cutter made for this purpose. Cutter may be used with or without aid of a hammer.
 - b. Sharpen chisels as often as necessary to provide for optimum cutting of mortar and to minimize chipping but at least hourly.
3. Mortar Removal Using Power Tools
 - a. Demonstrated Ability of Mechanics: Prior to beginning work, demonstrate that workers using power tools are proficient in use of power tools for joint preparation. Failure to demonstrate to Restoration Consultant's satisfaction that each worker is proficient in the use of each type of power tool proposed for use and that power tool joint preparation does not result in damage to masonry units shall result in prohibition of use of power tools for joint preparation. If proficiency is not demonstrated, or if work in progress results in damage to masonry to remain, power tool work shall cease, and joints shall be prepared for pointing using only hand-powered tools.
 - b. Rotary Power Tools: With Restoration Consultant's specific prior approval following successful demonstrations of skill by mechanics, power grinders and/or pneumatic grinders may be used to partially remove mortar from joints longer than 6 inches in masonry where there is no danger of cutting into adjacent stone units.
 - 1) Limitations on Use of Electric Power Grinders: Do not use electric power grinders on joints less than 3/16-inch wide or less than 6 inches long or where ornament, elaborate profile, or other surface irregularity might make damage to masonry units likely.

- 3) Extent of Mortar Removal Using Power Grinders: Use power grinder only to score one kerf cut in center of each joint to depth of mortar removal indicated. Remove remaining mortar from sides of joint using hand tools or, if approved, pneumatically powered chisels.
 - a) Stop kerf at least 4 inches from inside corners and projecting elements. Remove remaining mortar using hand tools or pneumatically powered chisels.
5. Cleaning: Remove loose mortar and foreign material from raked joints using a fine, stiff natural- or synthetic-fiber bristle brush. Remove remaining particles, dust, and dirt. Ensure that dust and dirt are not blown back into previously cleaned joints.
6. Restoration and Replacement of Damaged Units: Repair and/or replace masonry units damaged during joint preparation to provide units in at least as good a condition as before joint preparation was begun to Restoration Consultant's satisfaction at no additional cost to Owner.

C. Pointing Joints

1. Wetting: Thoroughly drench masonry with water 24 hours prior to pointing joints to saturate masonry. Thoroughly wet masonry again immediately before pointing joints and allow surfaces to dry slightly. At time of masonry pointing, surfaces shall be damp, so that they do not rapidly absorb moisture, but free of standing water (saturated, surface dry).
 - a. Failure to Properly Wet Substrate: Evidence that masonry to be pointed has not been properly dampened to prevent water in the mortar from being too rapidly absorbed by the masonry will be cause for Restoration Consultant to reject pointing work. Remove rejected pointing, properly prepare joints for pointing, and provide new mortar to meet requirements of this Section at no additional cost to Owner.
2. Installing Mortar: Install mortar in joints as follows.
 - a. Using a long, thin masonry pointing trowel, tightly pack mortar into joints in layers not exceeding 1/4-inch thick to fill joint to match original sound joints.
 - b. Begin by filling areas from which mortar is missing to a depth greater than 3/4 inch in 3/8-inch-thick layers to within 3/4 inch of finished joint surface to provide a uniform substrate for final masonry pointing. Fill final 3/4-inch depth of joint continuously and uniformly in 1/4-inch-thick layers.
 - c. Firmly iron each layer to compact mortar and ensure full bond between mortar and masonry units and a firm, solid joint.
 - d. Allow each layer to reach thumbprint hardness before applying succeeding layer. Do not let previous layer dry out before applying succeeding layer. Construct uniform joints.
 - e. Do not spread mortar over edges onto exposed surfaces of masonry units. Do not featheredge mortar.
 - f. When stopping work at end of each day or for other reasons, stagger layers of mortar

- g. Where applying new work to that of a prior day, dampen previous work to ensure good bond.
3. Tooling Joints: After final layer of mortar is “leather hard,” tool joints with a flat rule jointer, or as directed by Restoration Consultant.
 - a. Profile: Tool joints to profile as shown on Drawings or to match original joint profiles as directed by Restoration Consultant. Solidly compress mortar so that it adheres well to masonry on both sides and forms a dense surface. Premature or late tooling will result in unacceptable finishes, which will be rejected. NOTE: Raised bead joint at limestone.
4. Curing
 - a. Keep newly pointed joints damp for at least 72 hours after mortar has been inserted. Do not apply a direct stream of water to joints for at least 7 days after mortar has been placed.
 - b. Ensure masonry temperature remains as required by specifications until mortar is thoroughly cured.

1. **Repairing Pointed Joints:** As cleaning progresses, examine joints to locate cracks, holes, and other defects. Carefully point up and fill such defects with mortar. Where joints are defective in opinion of Restoration Consultant cut out joints to minimum depth of 3/4 inch or two-and-one-half times joint width, whichever is greater, properly prepare joint substrates, and provide new pointing mortar exercising extreme care to ensure that color matches that of adjacent masonry pointing work. Exposed joint surfaces shall be free from protruding mortar, holes, pits, depressions, and other defects.

A. Adjustment: Correct work of this Section that does not meet requirements of this Specification to Restoration Consultant's satisfaction at no additional cost to Owner.

- B. Cleaning Restored Stone Masonry: Clean stone masonry affected by work of this Section to remove mortar, grout, adhesive, and other contaminants using approved methods to provide clean surfaces matching the condition of the surfaces cleaned to comply with requirements of Section 04 01 10 – “Masonry Cleaning” before work of this Section was begun.
- C. Site Cleaning: At completion of stone masonry restoration work, remove debris and left over materials from site and leave site broom clean.

END OF SECTION 04 01 40

SECTION 06 01 40.91

ARCHITECTURAL WOODWORK RESTORATION

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of architectural woodwork restoration as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Providing new wood elements matching original elements to replace missing wood elements and damaged wood elements.
 - 2. Providing and installing new rough carpentry.
 - 3. Salvage, restoration, and reinstallation of wood elements.
 - 4. Restoration of wood elements in place.
 - 5. Patching holes and losses with wood filler.
 - 6. Filling open joints with wood filler.
 - 7. Removing finishes and providing new transparent finishes.
 - 8. Rubbing down finish and applying new finish coats to match historic finish.
 - 9. Sanding to remove finish and smooth wood substrate and providing new finish to match historic finish.
- B. Intent: It is the specific intent of this Section to provide for the restoration of architectural woodwork to a complete, fully intact, structurally sound, and securely anchored condition matching appearance of original woodwork, except as specifically indicated otherwise, through modification, repair, replacement, additions, finish restoration, and finish removal and replication without damaging or deteriorating remaining original elements. All work required to fulfill this intent shall be included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Architectural Woodwork Restoration Specialist: Award architectural woodwork restoration to a firm regularly engaged in restoring architectural woodwork and installing architectural woodwork in historic buildings similar to the work required by this Section that can demonstrate to Owner's

satisfaction that, within previous five years, the firm has successfully performed and completed in a timely manner at least three projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.

1. Foreman: Architectural woodwork restoration work shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Architectural Woodwork Restoration Specialist. Foreman shall read and speak English fluently. Foreman shall be on site and in shop daily when work of this Section is being performed in either location for duration of work of this Section. Same foreman shall remain on Project throughout work of this Section unless Owner deems foreman's performance unacceptable.
 2. Woodworkers: Architectural woodwork restoration work shall be carried out by a steady crew of skilled woodworkers who are thoroughly experienced in the restoration and replication of historic architectural woodwork and who have a minimum of three years' experience restoring and installing architectural woodwork on historic buildings similar to work required by this Section. In acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.
- B. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. Referenced Standards: Work of this Section shall comply with applicable requirements and recommendations of latest editions of the documents listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations of authorities having jurisdiction. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract unless specifically indicated otherwise in the Contract Documents. Provide a reference copy of each of the following standards at Project site and at shop when work of this Section is being performed. In each case in which there is a conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
1. United States Secretary of the Interior, *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*.
 2. Architectural Woodwork Institute (AWI), *Architectural Woodwork Standards*. Architectural woodwork restoration shall comply with requirements for "Premium Grade" work as defined in *Architectural Woodwork Standards*, unless specifically indicated otherwise.
 3. Hardwood Plywood and Veneer Association (HPVA), HP-1, *American National Standard for Hardwood and Decorative Plywood*.
 4. U.S. Department of Commerce (USDOC), Product Standard PS 1, *Softwood Plywood, Construction and Industrial*.
 5. Painting and Decorating Contractors of America (PDCA)
 - a. PDCA, Industry Standards.
 - b. PDCA, *Painting and Decorating Craftsman's Manual & Textbook*.

- D. Documentation of Existing Conditions: Document configurations and conditions of architectural woodwork indicated to be restored before beginning restoration with photographs showing overall areas of woodwork and with additional detail photographs showing areas of damage and deterioration to be repaired if such areas are not clearly visible and understandable in the overall photographs of the woodwork. Key detailed photographs to overall photographs and to drawings. Clearly show all existing conditions, including conditions that might be misconstrued as damage resulting from work of this Section.
1. Images: Clear, sharp, color images. Unclear images, out-of-focus images, underexposed images, and overexposed images will not be accepted.
 2. Format: One of the following:
 - a. Photographic Prints: Glossy color prints, minimum 5-inch x 7-inch.
 - b. Digital Images: High-resolution JPEG (.jpg) or TIFF (.tif) color images (minimum 6 megapixel images with color information yielding files of at least 1 megabyte each) on archival quality CD-R/DVD-Rs made with phthalocyanine dyes with a gold reflective layer. Provide two copies of each CD/DVD. Clearly label CD/DVDs using method that will not cause images to deteriorate and that will not contribute to image deterioration.
 3. Identification and Keying: Label each photograph with project name, date and time photograph was taken, and location. Key overall photographs to drawings and key detail photographs to overall photographs and to drawings so that area depicted in photograph is easily identifiable.
 - a. Photographic Prints: Clearly provide identification and keying information on reverse of each print using an approved archival marker that will not bleed through or otherwise damage or deteriorate photograph. Submit key drawings together with photographs.
 - b. Digital Images: Provide identification and keying information, including text description and images of drawings and key photographs, for all photographs on each CD/DVD in text file (Word) or in PDF file on same CD/DVD as images. In addition, submit printed black and white copies of key drawings and key photographs together with the CD/DVDs.
- E. Sources of Materials: Obtain each type of material to be used for work of this Section from a single source to ensure a match in quality, performance, and appearance.
- F. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.
- G. Access for Inspection and Approvals: Provide Restoration Consultant access on a regular basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for inspections and approvals. Provide means of access and safety precautions required to facilitate inspections and approvals.

1.4 SUBMITTALS

- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Restoration Consultant's approval.
- B. Qualification Data: Submit qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Product Data: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Material Safety Data Sheets (MSDS).
- D. Documentation: Pre- and post-restoration of configuration and condition of architectural woodwork as specified in "Quality Assurance" Article, above.
- E. Work Description: Prior to beginning architectural woodwork restoration on site or in the shop, submit detailed written description of proposed restoration materials and procedures for each phase of work required for architectural woodwork restoration. Do not begin work on site until Restoration Consultant has approved Work Description in writing. Submit new written descriptive information. Photocopies of Contract Documents, excerpts from Contract Documents, and/or duplication of text in Contract Documents will not be accepted for Work Description. Description shall include, but not be limited to:
 - 1. Materials and Procedures: Materials, methods, tools, and equipment for each type of work to be performed in restoring architectural woodwork.
 - 2. Protection: Description, including drawings and diagrams, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this Section to all persons (whether involved in the Work or not), building elements, materials, and finishes, surrounding landscape and site, and the environment (including air and water).
 - 3. Handling Elements and Materials To Be Removed and Reinstalled: Describe procedures for handling elements and materials to be removed and reinstalled, including, but not limited to, removal, crating, labeling, tracking chain of custody, handling, and transportation.
 - 4. Alternate Restoration Materials and Methods (If Any): Contractor proposed alternate materials and methods (if any) to those specified for architectural woodwork restoration. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- F. Shop Drawings: Dimensioned, scale drawings of architectural woodwork to be restored and recreated, including elements to be restored in place and new elements to replace damaged elements and deteriorated elements, as necessary to completely describe construction. Submit newly prepared drawings showing site-verified conditions and materials. Photocopies of Contract Documents and/or electronic scans of Contract Documents will not be accepted for Shop Drawing submittals.
 - 1. Elements To Be Drawn

- a. New woodwork to replace damaged woodwork and to replace deteriorated woodwork.
2. Certified Dimensions: Certify that dimensions on shop drawings have been field or shop measured.
3. Certified Profiles: Certify that profiles have been carefully duplicated from original elements.

G. Samples

1. Wood: Sets of samples of each type (specie, grain pattern, color, etc.) of new wood for repair or replacement. Each set shall contain two 6-inch by 12-inch by 1-inch samples, one without finish and one with finish. If finish will vary, provide additional samples to demonstrate full range of color to be found in final finished woodwork.
2. Wood Elements for Repair and Replacement: Each profile, 8-inch length.
3. Wood Filler: Each type of wood to be filled, 2-inch-square samples matching color of wood.
4. Color Putty: Each type of wood to be filled, 1-inch-square samples matching color of wood.
5. Finish: Provide stepped samples, defining each separate coat, including primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
6. Finish: Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
7. Fasteners: Each type to be used in work of this Section.

1.5 MOCK-UPS

- A. General: Before beginning general architectural woodwork restoration work, prepare mock-ups to provide standards for work of this Section. Do not proceed with architectural woodwork restoration work until Restoration Consultant has approved mock-ups.
 1. Locate mock-ups as directed by Restoration Consultant.
 2. Notify Restoration Consultant 48 hours prior to start of each mock-up.
 3. Use crew that will execute the work and follow requirements of this Section.
 4. Repeat mock-ups as necessary to obtain Restoration Consultant's approval.
 5. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
 6. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
 7. Approved mock-ups will represent minimum standards for the architectural woodwork restoration work. Subsequent architectural woodwork restoration work that does not meet standards of approved mock-ups will be rejected.
- B. Prepare the Following Mock-Ups

1. Providing New Wood Elements to Match Original Elements: One element of each type of new element to be provided where more than one element is to be provided.
2. Providing Dutchman Patches: One dutchman patch in each species of wood to be repaired.
3. Providing Dutchman Plugs: Two plugs in each species of wood to be repaired.
4. Patching Losses Using Wood Filler: Two patches in each species of wood to be repaired.
5. Patching Holes Using Wood Filler: Two holes in each species of wood to be repaired.
6. Filling Open Joints in Elements with Transparent Finish with Wood Filler: Three joints.
7. Filling Gouges, Scratches, and Minor Losses Using Color Putty: One location in each species and finish of wood.
8. Steaming Out Dents: One dent in each type of wood in which dents are to be removed.
9. Rubbing Down Finish in Preparation for New Finish Coats: One location in each type of wood and finish combination.
10. Sanding to Remove Finish and Smooth Wood Surfaces: One location in each type of wood and finish combination.
11. Final Finish: One location.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products and materials to prevent damage, deterioration, degradation and intrusion of foreign material.
- B. Do not deliver wood for restoration of woodwork on site until plastering and similar operations that could damage restored woodwork have been completed in areas in which woodwork is located and until HVAC system is operating and maintaining temperature and relative humidity at occupancy levels for the remainder of the construction period (if applicable). If materials must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified herein.
- C. Discard and remove from site deteriorated materials, contaminated materials, and products that have exceeded their expiration dates. Replace with fresh materials.

1.7 PROJECT CONDITIONS

- A. Safety: Take measures necessary to protect all persons, whether or not involved with work of this Section, from harm caused by work of this Section.
- B. Protection of Building: Protect building elements and finishes from damage and from deterioration caused by work of this Section. Repair damage to materials and damage to finishes to Restoration Consultant's satisfaction at no additional cost to Owner.
 1. Take precautions necessary to prevent fire and spread of fire. Do not use torches, heat guns, or other heat generating equipment to remove paint or finishes. Place paint or solvent soaked rags, waste, overalls, or other material that might constitute a fire hazard in metal containers and remove from premises daily in coordination with Project's requirements for waste removal.

- C. Surfaces To Receive Work: The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces of building components on which work is to be performed, including surfaces concealed from view behind objects shown; surfaces of projections, reveals, returns, and other elements perpendicular to or at an oblique angle to surfaces shown; concealed surfaces of profiled members and of ornament; and surfaces of profiled members not drawn in detail. Perform work on surfaces of projections, reveals, returns, and profiled members associated with surfaces indicated to receive work and on surfaces of building components concealed behind building components shown. It is the specific intent of the Contract Documents to include work on all surfaces within Project area, whether or not shown on the Drawings, except as specifically indicated otherwise.
- D. Responsibility for Dimensions: Dimensions of existing elements and conditions in Contract Documents, whether numerical, tabular, or graphic, are provided for bidding purposes and for Contractor's information and are not guaranteed. Contractor shall measure existing elements and conditions in field and in shop before preparing shop drawings, ordering materials, or starting construction and shall certify on shop drawings that dimensions have been field verified. Contractor is responsible for verifying dimensions of existing construction and for preparation of new work and replacement work fitting into and aligning with existing construction.
- E. Preconstruction Meeting for Architectural Woodwork Restoration: Convene a preconstruction meeting to discuss architectural woodwork restoration and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Restoration Consultant, Construction Manager, firm(s) that will perform architectural woodwork restoration, and other entities that might be affected by architectural woodwork restoration work.

1.8 ENVIRONMENTAL CONDITIONS

- A. Temperature and Humidity: Comply with requirements of this Section, with requirements of referenced standards, and with recommendations of material manufacturers concerning temperature and humidity requirements for materials installation and application.
- B. Acclimatization of Wood: Store wood in space in which it is to be installed for at least seven days prior to installation.

1.9 LEAD-CONTAINING PAINT (LCP)

- A. General: Perform work that disturbs lead-containing paint (LCP), handle material that involves lead-containing paint, and transport and dispose of lead-containing paint and residue in compliance with applicable federal, state, and local laws and regulations for identification, removal, labeling, handling, containerization, transportation, and disposal of lead-containing material including, but not limited to, those referenced herein.
- B. U.S. Department of Labor OSHA Regulations: Including but not limited to: Title 29, Code of Federal Regulations (CFR) Section 1926.62: "Lead Exposure in Construction" and Title 29, CFR Section 1910.1200: "Hazard Communication Standard."
- C. U.S. Environmental Protection Agency (USEPA) Regulations: Including but not limited to: Title 40 CFR Part 262: "Standards Applicable to Generators of Hazardous Waste" and Part 263: "Standards Applicable to Transporters of Hazardous Waste."
- D. U.S. Department of Transportation (USDOT) Regulations: Including but not limited to: 49 CFR Parts 172, 173, 174, 175, 177, 178, 179, and 180.
- E. Massachusetts Department of Labor Standards: Including but not limited to: Title 454 CMR 22.00 "Deleading and Lead-Safe Renovation Regulation."

PART 2 – PRODUCTS

2.1 WOOD

- A. General: Wood for work of this Section shall comply with the following requirements:
1. Quality Standard: Wood shall conform to, or exceed, requirements for wood for use in “Premium Grade” woodwork of each type required as defined by AWI Architectural Woodwork Quality Standards.
 2. Moisture Content: Provide kiln-dried (KD) lumber with an average moisture content range of 6–11 percent or to comply with requirements of Architectural Woodwork Institute standards for material for “Premium Grade” work in relation to relative humidity conditions during time of fabrication and in installation areas, whichever requirement is more restrictive.
 - a. Wood that is to be finished or painted shall be free from defects and blemishes on surfaces exposed to view that will show after top coat of finish or paint is applied. Reject materials that are in any way defective and do not comply with specifications for quality and grade or are otherwise not in proper condition.
 3. Color and Grain Pattern: In each case wood for patching, repair, and replacement shall match color and grain pattern of existing wood or of original wood as applicable to each condition.
- B. Species: Wood shall match species of wood to be repaired. Select to match grain pattern and color of existing wood to be repaired.

2.2 ROUGH CARPENTRY

- A. Provide standard attachment hardware consisting of nails, bolts, screws and standard fittings as noted on the drawings and as required. Hardware for rough carpentry shall be as follows:
1. Bolts and Nuts: AISI / ASME Standard B18.2.1
 2. Lag Screws: AISI / ASME Standard B18.6.1
 3. Steel Washer Plates: Same as above or ASTM A36 for custom sizes.
 4. Alternate Wood Reinforcement Screw: MiTiCon ASSY VG CSK Counter Sunk Head engineered screw.
 5. Dutchman Fastener: GRK RSS (Uber) Screw.
 6. Wood Structural Epoxy: ConServ Structural Epoxy Adhesive 552, ConServ Epoxy LLC, P.O. Box 454 Northford, CT 06472.
 7. Fiberglass dowels: 3/8", ConServ Epoxy LLC, P.O. Box 454 Northford, CT 06472.

2.3 ADHESIVES

- A. Adhesive for Fabrication and Repair of Solid Wood Members: provide one of the following:
1. Epoxy resin glue designed for use with wood and slightly flexible when dry. Provide West System as manufactured by West System, Inc., 102 Patterson Ave., Bay City, MI 48707

(866-937-8797), or approved equal. Follow manufacturer's written instructions for use in low ambient temperatures. Provide the following materials: 105 Resin and 206 Slow Hardener.

2. High-strength, two-part, structural adhesive of the Resorcinol/Formaldehyde family consisting of liquid resin and powdered hardener and complying with ASTM D 2559, Adhesive Service Class B. Provide Cascophen Adhesive System G-1131 as manufactured by Hexion Specialty Chemicals, Inc., 180 East Broad Street, Columbus, OH 43215. Provide liquid resin (G-1131-A) and powdered hardener (G-1131-B). *****Note*****Minimum curing temperature 70 deg F; clamping pressure 25 to 250 psi; moisture content 10-12 percent.
3. Water resistant polyvinyl acetate (PVA) glue meeting requirements of ANSI Type II water resistance. Provide Titebond II as manufactured by Franklin International. 2020 Bruck Street, Columbus, Ohio 43207.

2.4 WOOD REPAIR MATERIALS

- A. Shellac Sticks: Shellac sticks to match color of surface to be filled. Provide one of the following or approved equal.
 1. Shellac Sticks as manufactured by Mohawk Finishing Products, RPM Wood Finishes Group, Inc., P.O. Box 22000, Hickory, NC 28603 (800-545-0047).
 2. Liberon Shellac Filler Sticks, available from Tools for Working Wood, 32 33rd Street, Brooklyn, NY 11232 (800-426-4613).
 3. Brownells Shellac Sticks, manufactured by Brownells, 200 South Front Street, Montezuma, IA 50171 (800-741-0015).
- B. Retouching Crayons: Beeswax sticks impregnated with powdered dry pigments matching color of surface to be filled. Provide one of the following or approved equal.
 1. Liberon Retouch Crayons, available from Tools for Working Wood, 32 33rd Street, Brooklyn, NY 11232 (800-426-4613).
- C. Patching Material and Filler for Woodwork with Transparent Finish:
 1. Pigmented, two-component epoxy putty specifically formulated and colored for patching wood. Provide Wood Epoxy Putty Sticks as manufactured by Mohawk Finishing Products, RPM Wood Finishes Group, Inc., P.O. Box 22000, Hickory, NC 28603 (800-545-0047), or approved equal, in color to match wood being patched in each case. Mix different colors of putty sticks as required to match wood being patched.
 2. Pigmented, mineral filled putty with PVA binder specifically formulated and colored for patching wood. Provide Modostuc, available from Talas, 330 Morgan Ave., Brooklyn, NY 11211 (212-219-0770) in color to match wood being patched in each case. Tone filler with Japan colors after first coat of finish is applied.
- D. Putty Wood Filler: Wood filler made specifically for patching small damaged locations in wood in color to match adjacent wood. Provide one of the following or approved equal:
 1. Color Putty as manufactured by Color Putty Company, Inc., P.O. Box 738, Monroe, WI 53566 (608-325-6033).

2. Color Fil Putty as manufactured by Mohawk Finishing Products, RPM Wood Finishes Group, Inc., P.O. Box 22000, Hickory, NC 28603 (800-545-0047).
3. Behlen Wood-Fil Wood Putty, available from Tools for Working Wood, 32 33rd Street, Brooklyn, NY 11232 (800-426-4613).

2.5 CLEANING AND SURFACE PREPARATION MATERIALS

- A. Coating Removers: Comply with requirements of Section 09 01 10,15 – "Paint and Coating Removal."
- B. Detergent: Silicate buffered, non-ionic, rinseless-type synthetic detergent, containing no soaps, free alkali, solvents, abrasives, acids, caustics or other deleterious materials, such as Surfonic JL-80X Surfactant, manufactured by Huntsman International, and available in smaller quantities from Conservation Support Systems, P.O. Box 91746, Santa Barbara, CA 93190 (800-482-6299), or approved equal.
- C. Mineral Spirits: As manufactured by Ashland Chemical, Inc., Carteret, NJ, or approved equal.
- D. Cleaner and Wax Remover: Solution of detergent (Surfonic JL-80X, one percent) in mineral spirits.
- E. Metallic Cleaning Pads: Extra fine bronze wool, stainless steel wool, or oil-free steel wool, all free of contaminants.
 1. Steel Wool: Oil-free 0000 steel wool specifically manufactured for use on wood and wood finishes. Provide steel wool by Liberon, or approved equal, as available from Rockler Woodworking and Hardware, 3025 Lyndale Ave. S., Minneapolis, MN 55408 (800-279-4441) or Tools for Working Wood, 32 33rd Street 5th Floor, Brooklyn, NY 11232 (800-426-4613).
 - a. Also 00 recommended for stripping finishes. 0000 can be used to apply wax and rub out finishes. Steel wool should not be used with water-based finishes.
 2. Bronze Wool: Clean bronze wool pads, extra fine, free of dirt, corrosion, oils, greases, and other contaminants that might adversely affect suitability of metal surface to receive optimum finish application. Provide Rhodes American Fine Bronze Wool, as available from Homax Corp., 200 Westerly Rd., Bellingham, WA 98226 (360-733-9029), or approved equal.
- F. Non-metallic Cleaning Pads: Scotch-Brite 7447 (Maroon) Abrasive Pads, manufactured by 3M Co.
- G. Abrasive Papers
 1. Removing Existing Finishes to Bare Wood: P280, P320, P360, and P400 grit abrasive papers.
 2. Sanding Existing Finishes to Prepare for Additional Coats of Finish: P600 and P1200 grit wet dry abrasive paper.
- H. Cloths: Clean, lint-free cotton rags and cheesecloth.

2.6 FINISHING AND FINISH REPAIR MATERIALS

- A. General: Comply with requirements of Section 09 01 90 – “Painting and Finishing.”
- B. Wood Grain Filler: Wood filler to fill grain in open grain wood. Tint filler to match wood to be filled. Provide one of the following or approved equal:
 - 1. Mohawk Grain Filler (lacquer or varnish only), available from Mohawk Finishing Products, PO Box 22000, Hickory, NC 28603 (800-545-0047).
 - 2. Water Base Paste Wood Filler, available from Mohawk Finishing Products, PO Box 22000, Hickory, NC 28603 (800-545-0047).
 - 3. Benwood Wood Grain Filler 238, as manufactured by Benjamin Moore & Co., 101 Paragon Dr., Montvale, NJ 07645 (201-573-9046).
 - 4. Behlen Pore-O-Pac Grain Filler, available from Tools for Working Wood, 32 33rd Street, Brooklyn, NY 11232 (800-426-4613).
- C. Wood Finishing Products
 - 1. Wood Stain: “Concentrated Colors,” manufactured by Sutherland Welles Ltd., P.O. Box 180 North Hyde Park, VT 05665 (800-322-1245). Mix colors as required to provide stain matching adjacent wood.
 - 2. Shellac: Shellac flakes dissolved in pure 200 proof anhydrous denatured alcohol. Provide dewaxed shellac flakes as available from Kremer Pigments, 247 West 29th Street, New York, NY 10001 (800-995-5501). Provide in color, cuts (pounds of shellac flakes per gallon of alcohol), and tints specified.
 - a. Color
 - 1) Orange Shellac
 - 2) Blond Shellac
 - 3) Clear Shellac
 - 4) Bleached Shellac
 - b. Cuts
 - 1) One Pound Cut Shellac: One pound of shellac flakes in one gallon of alcohol.
 - 2) Two Pound Cut Shellac: Two pounds of shellac flakes in one gallon of alcohol.
 - 3) Three Pound Cut Shellac: Three pounds of shellac flakes in one gallon of alcohol.
 - c. Tinting: Tint shellac as required to achieve finish matching adjacent original finish where applicable.
 - 3. Oil Varnish (Wiping Varnish) for Shop Application: Solution of polymerized tung oil with urethane resin specifically formulated to be wiped on wood surfaces and to provide a semigloss finish.

- a. Sealer: "Wiping Varnish Sealer," as manufactured by Sutherland Welles, Ltd., P.O. Box 180, North Hyde Park, VT 05665 (800-322-1245), or approved equal.
 - b. Sealer: Botanical Polymerized Tung Oil Sealer, manufactured by Sutherland Welles, Ltd., P.O. Box 180, North Hyde Park, VT 05665 (800-322-1245).
 - c. Top Coats: Medium Lustre Wiping Varnish, manufactured by Sutherland Welles, Ltd., P.O. Box 180, North Hyde Park, VT 05665 (800-322-1245).
 - d. Top Coats: Botanical Polymerized Tung Oil Medium Lustre, manufactured by Sutherland Welles, Ltd., P.O. Box 180, North Hyde Park, VT 05665 (800-322-1245).
5. Waterborne Polyurethane Finish for Onsite Application
- a. Sealer: GF Sanding Sealer, manufactured by General Finishes, 2462 Corporate Circle, East Troy, WI 53120 (800-783-6050), or approved equal.
 - b. Top Coats: GF High Performance Polyurethane Top Coat, manufactured by General Finishes, 2462 Corporate Circle, East Troy, WI 53120 (800-783-6050), or approved equal.

2.7 SHOP FABRICATION

- A. General: Fabricate new woodwork to match existing forms and profiles. Restore existing millwork to exactly match existing original work in form, dimension, profile, and joinery, unless otherwise indicated.
1. Fabricate millwork to comply with requirements of AWI, *Architectural Woodwork Standards*, Section 1000, for "Premium Grade" work except where more stringent requirements are specified herein.

PART 3 – EXECUTION

3.1 ROUGH CARPENTRY

- A. Remove all dirt oil and grease for substrates to receive epoxy.
- B. Follow manufacturer's requirements for proportioning, mixing and temperature conditions.
- C. Completely fill repair areas, avoiding air entrapment to ensure proper bonding.
- D. Fiberglass dowels: 3/8", ConServ Epoxy LLC, P.O. Box 454 Northford, CT 06472.
1. Coordinate length of dowel and placement with Structural Engineer. All wood within 3" of connection must be free of decay.
 2. Align wood pieces to be connected and install dowel in hole prepared with epoxy, rotating rebar into hole to reduce displacement of epoxy material.
 3. Support or shim pieces as necessary, without damage to components until epoxy has set. Follow additional manufacturer's requirements for setting duration and temperatures.

3.2 CLEANING OF EXISTING FINISHED WOODWORK

- A. General: Clean finished wood surfaces to remove dirt and soiling to provide surface matching approved mock-ups. Do not damage existing finish.
- B. Dust Removal: Remove dust from surface with a vacuum cleaner supplied with a HEPA filter and/or clean cotton rags and soft natural bristle brushes.
- C. Application: Apply cleaning solution (one percent detergent in mineral spirits) using a soft fiber bristle brush. Allow solution to dwell on surface for 10 minutes. Agitate gently with soft fiber bristle brush during dwell period.
- D. Removal: Remove cleaning solution from surface using cotton pads or clean cotton cloths. Wipe surface dry with clean cloths.
- E. Additional Cleaning: Repeat application of cleaning solution, agitation, and removal as required to provide cleaned finished woodwork matching approved mock-up.

3.3 REMOVING FINISHES

- A. General: Remove finishes from existing woodwork to match approved mock-ups.
- B. Strippers for Testing for Removing Paint and Other Coatings from Wood: Test each of the following products on each type of coating to be removed. Perform additional tests using different dwell times and other variations as directed by Restoration Consultant to determine most effective product and procedure for removing each type of paint and coating from each substrate.
 - 1. Back-to-Nature Multi-Strip, as manufactured by Sunnyside Corporation, 225 Carpenter Ave., Wheeling, IL 60090 (800-323-8611), or approved equal.
 - 2. Peel Away 7, as manufactured by Dumond Chemicals, Inc., 1475 Phoenixville Pike - Suite 18, West Chester, PA 19380 (800) 245-1191, or approved equal.
 - 3. S-305 Paint Stripper, available from Cathedral Stone Products, Inc., 7266 Park Circle Dr., Hanover, MD 21076 (410-782-9150).
 - 4. Smart-Strip, as manufactured by Dumond Chemicals, Inc., 1475 Phoenixville Pike - Suite 18, West Chester, PA 19380 (800) 245-1191, or approved equal.
 - 5. "Enviro Klean Safety Peel 1," as manufactured by ProSoCo, Inc., 3741 Greenway Circle, Lawrence, KS 66046 (800-255-4255).

3.4 RESTORING ARCHITECTURAL WOODWORK, GENERAL

- A. Restore woodwork. Restoration work includes all repair and finishing work necessary to return architectural woodwork to a fully intact and structurally sound condition and original appearance as acceptable to Restoration Consultant.
- B. Procedure
 - 2. Remove and salvage architectural woodwork, if indicated.
 - 3. Restore architectural woodwork in place, where architectural woodwork is not indicated to be removed. Protect adjacent materials and finishes from damage and from deterioration resulting from restoration of architectural woodwork in place.

4. Remove extraneous nails, staples, bolts, hooks, and other hardware from woodwork. Fill resulting holes, gouges and indentations with approved filler and sand smooth.
5. Provide new architectural woodwork elements as indicated.
6. Replace missing woodwork elements as indicated.
7. Restore damaged woodwork elements (member replacement, dutchman repairs, patching, filling, tightening and filling joints, sanding out scratches and other damage, and filling depressions with wax crayons, color putty, and/or shellac sticks).
8. Reattach loose components. Provide new fasteners and anchors for secure attachment.
9. Reinstall restored salvaged woodwork and install new woodwork to match original woodwork.

3.5 STEAMING OUT DENTS IN WOOD

- A. General: Steam out depressions in which wood is dented but fibers are not broken to provide surface matching level of adjacent wood surface.
- B. Preparation: Treat dented wood elements following removal of finish. Where working on horizontal surfaces, apply a drop of water to depressed area and allow water to soak into wood. Repeat for larger areas to allow wood at bottom of depression to become damp.
- C. Steaming: Apply a damp cloth over area of dent to be raised. Apply heat to cloth using iron, soldering iron, or other heat source appropriate to size and position of dent being removed. Maintain heat until wood dries out. Rewet cloth and repeat application of damp cloth and heat until surface of area of dent is level with or slightly proud of adjacent wood surface. Use precautions necessary to prevent damage and deterioration to adjacent materials and finishes.
- D. Leveling: Using a fine, sharp blade, cut raised wood in location of dent even with adjacent wood surface or sand high area even with adjacent wood surface. Do not damage adjacent surface.

3.6 FILLING SPLITS, CRACKS, SMALL HOLES, INDENTATIONS, AND GOUGES

- A. General: Fill splits, cracks, small holes, indentations, and gouges in wood using shellac sticks, retouching crayons, and color putty to match color and pattern of adjacent wood surface.
- B. Preparation: Slightly roughen surface within dent or gouge with sandpaper. Do not damage surrounding finish surfaces. Clean repair area free of dust and debris.
- C. Filling Using Shellac Sticks: Melt shellac stick into depression with electric heat source until shellac penetrates completely through depth of damaged area. Leave shellac slightly proud of adjacent surface. Melt shellac from two or more sticks as required to match color of adjacent finish. Do not allow shellac to blacken or burn. Allow shellac to cool. Carefully pare shellac flush with adjacent surface using a sharp chisel. Remove any shellac remaining above surface using 400 to 600 grit silicon carbide paper with water as a lubricant. Avoid damaging adjacent finish.
- D. Filling Using Retouching Crayons: Carefully run crayon over surface to deposit fill in depression. Strike off excess deposit even with adjacent surface using sharp blade without damaging adjacent wood finish.
- E. Filling Using Color Putty: Mix color putty to match adjacent wood. Rub color putty into surface of splits, gouges, and other defects. Wipe excess putty from surface to leave surface even with

adjacent surface.

3.7 FILLING SMALL LOSSES WITH EPOXY WOOD FILLER

- A. General: Fill small losses and holes as indicated with epoxy wood filler matching color of adjacent wood and finish surface to match adjacent wood surface.
- B. Preparation: Thoroughly clean area to be filled free of dirt, debris, and other contaminants to bare wood.
- C. Mixing Epoxy Filler: Thoroughly mix epoxy filler following manufacturer's directions. Mix different colors of epoxy filler together as required to match color of wood being filled.
- D. Application: Work epoxy filler into substrate to ensure strong bond. Extend filler slightly proud of adjacent wood surfaces.
- E. Surfacing: Finish cured wood filler to match planes and profiles of adjacent wood surfaces. Sand to provide finish matching adjacent surface.

3.8 DUTCHMAN REPAIRS

- A. General: Provide dutchman repairs in locations indicated on Drawings and as specified herein. Dutchman repairs shall provide continuous smooth surfaces matching planes and profiles of wood members being repaired with grain pattern matching pattern of grain in wood into which dutchman is inserted.
- B. Preparation: Neatly cut out defective material and enough sound wood to allow dutchman to bond to sound substrate. Form a prismatic void with square corners and edges.
 - 1. At anchors and fasteners, drill out anchor using core drill 1/8-inch diameter larger than existing hole.
- C. Dutchman: Cut dutchman to exactly fit void, with exposed portion matching original profile of woodwork and just slightly proud of original surface. Orient grain of dutchman parallel to original wood grain.
 - 1. Where deterioration or loss at end of component requires dutchman repair, use a diagonal scarf joint for end-to-end joint between dutchman and remaining portion of component.
- D. Installation: Insert dutchman using specified adhesive and clamp in place until glue is set. Where clamping is not feasible, use small brads; remove brads and fill holes after adhesive has set.
- E. Surfacing: Plane or scrape dutchman to provide smooth continuous surface coplanar with adjacent wood. Do not damage or alter profile or finish of adjacent wood.

3.9 TIGHTENING AND FILLING JOINTS IN WOODWORK WITH TRANSPARENT FINISH

- A. Draw joints tight and fill remaining openings to provide surface flush with adjacent surface and matching color and profile of adjacent wood.

3.10 INSTALLING SALVAGED AND NEW ARCHITECTURAL WOODWORK

- A. General: Install wood elements to match original configuration as shown on approved shop drawings. Install work plumb, level, true, and straight with no distortions and to meet lines and planes of adjacent work. Shim as required using concealed shims. Install to a tolerance of 1/8

inch in 8 feet for plumb and level work; and with 1/32-inch maximum offset in flush adjoining surfaces and 1/16-inch maximum offset in revealed adjoining surfaces.

- B. Unacceptable Material: Discard material that does not meet requirements of this Section, of referenced standards, and of best museum-quality architectural woodwork restoration. Furnish new material complying with requirements of this Section.
- C. Attachment: Fasten architectural woodwork to anchorage devices or blocking built-in or directly attached to substrates. Secure units of work to substrate in same manner as original woodwork and as shown on approved shop drawings. Use fine finishing nails where nails are exposed, countersink heads, and fill holes flush with finished surface with colored wax or putty matching color of finish.

3.11 PREPARING AND FINISHING WOOD TO RECEIVE CLEAR FINISHES

- A. General: Clean wood surfaces free of dirt, oil, and other substances that might adversely affect adhesion and/or durability of new paint film to provide clean, sound substrate complying with coating manufacturer's recommendations.
 - 1. Dense and Oily Woods: Specially prepare surfaces of dense and oily woods as recommended by coating manufacturer and approved by Restoration Consultant to ensure optimum adhesion of coating.
- C. New Wood for Transparent Finish: Set raised nails and fill holes. Sand with 220 grit and finer grit abrasive paper as required for smooth finish without visible plane marks and without visible scratches. Clean surface by vacuuming followed by wiping with clean tack cloths using appropriate solvent to ensure clean wood surfaces free of oil, grease, and other contaminants.
 - 1. Sealing Concealed Surfaces: Apply a coat of spar varnish to wood surfaces to be concealed following installation immediately on delivery.
 - 2. Filling: Fill recess, cracks, joints, crevices, and nail holes in finish surfaces with putty or plastic wood filler. Sand lightly with fine sandpaper.
 - 3. Staining: Properly stain surfaces to approved color. Sand lightly after staining and remove sanding dust using clean tack cloths until tack cloths come away clean.
- D. Stripped Existing Wood for Transparent Finish: Set raised nails and fill holes. Sand with 220 grit and finer grit abrasive paper as required for smooth finish without visible scratches. Adjust stain to provide even color. Clean surface by vacuuming followed by wiping with clean tack cloths using appropriate solvent to ensure clean wood surfaces free of oil, grease, and other contaminants.
- E. Coated Existing Wood for Transparent Finish: Following cleaning of existing transparent finish, wipe surface with appropriate solvent to ensure that it is free of oil, grease, and other contaminants.
- C. Removing Existing Finish by Sanding and Applying New Finish: Sand off existing finish and sand wood level. Provide new finish system to match historic finish.
 - 1. Remove existing finish and sand wood smooth using abrasive papers (P280, P320, P360, and P400). Ensure that finish is removed and substrate is sanded uniformly. Do not alter profiles at edges, corners, or other locations.
 - 2. Remove sanding dust using vacuum and clean tack cloths.

3.12 PROTECTION, ADJUSTMENT, AND CLEANING

- A. Protection: Protect restored woodwork to prevent damage and deterioration until Project completion.
- B. Adjustment: Prior to inspection for Substantial Completion, examine all work of this Section. Repair work that has been damaged or deteriorated. Where work cannot be repaired to comply with requirements of this Section, remove work and provide new work complying with requirements of this Section to the satisfaction of the Restoration Consultant at no additional cost to Owner.
- C. Cleaning: Clean architectural woodwork to remove dirt and dust. Leave woodwork in clean condition.

END OF SECTION 06 01 40.91

SECTION 07 31 13 –

ASPHALT SHINGLE ROOFING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of asphalt shingle roofing as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Providing new asphalt shingle roofing together with sheathing (where damaged or deteriorated), underlayments and accessories.
- B. Intent: The intent of this Section is to provide for a complete, watertight installation with manufacturer's warranty as specified herein. All work required to achieve such installation and to receive such warranty shall be included as work of this Section. No additional payments will be made or change orders processed for work required by asphalt roofing shingle manufacturer as a condition for issuing warranties as specified.
- C. Related Work Specified Elsewhere
 - 1. Stone Masonry Restoration – Section 04 01 40.91
 - 2. Slate Shingle Roofing – Section 07 31 26
 - 3. Sheet Metal Flashing and Drainage – Section 07 62 10
 - 5. Joint Sealants – Section 07 92 10

1.3 QUALITY ASSURANCE

- A. Work shall be undertaken by a firm that demonstrates successful completion of work at a minimum of three historic properties similar in scale and construction to this Project, and with a similar scope of work.
- B. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. Referenced Standards: Comply with applicable requirements and recommendations of latest editions of standards listed below, which shall have the same force and effect as if written out in full herein. In each case in which there is a conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.

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1. ASTM International (ASTM)
 - a. ASTM D 226, *Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.*
 - b. ASTM D 1970, *Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.*
 - c. ASTM D 3018, *Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.*
 - d. ASTM D 3161, *Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).*
 - e. ASTM D 3462, *Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules.*
 - f. ASTM D 7158, *Standard Test Method for Wind-Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method).*
 - g. ASTM D 4586, *Standard Specification for Asphalt Roof Cement, Asbestos-Free.*
 - h. ASTM F 1667, *Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.*
 2. National Roofing Contractors Association (NRCA), *NRCA Roofing Manual: Steep-slope Roof Systems.*
- D. Sources of Materials: Obtain each type of material required for asphalt shingle roofing from a single source to ensure a match in quality, performance, and appearance. Obtain auxiliary materials and accessories from manufacturer of asphalt shingles or products approved by manufacturer of asphalt shingles.
- E. Access for Observation and Approvals: Provide Restoration Consultant access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with all laws, codes, and regulations regarding safety and acceptable to Restoration Consultant. Provide manpower and equipment to facilitate observation and approvals.
- F. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with all conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.

1.4 SUBMITTALS

- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Restoration Consultant's approval.
- B. Qualification Data: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to the work required on this Project. For each project list project name, address, architect, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Product Literature: Manufacturer's published technical data for each product to be used in work of this Section including recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Material Safety Data Sheets (MSDS).
- D. Shop Drawings: Detailed, dimensioned scale drawings showing coursing and treatment of shingle installation coordinated with adjacent construction, including ridges, hips, valleys, walls, vertical penetrations, and flashing. Show conditions at scales that clearly explain configuration. Details shall be at 3 inches equals 1 foot, minimum. Indicate fasteners.
- E. Samples: Submit, for verification purposes, samples of the following:
 - 1. Asphalt Shingles: Individual units.
 - 2. Underlayments: 12-inch-square sample of each underlayment material.
 - 3. Anchors and Fasteners: Each type proposed for use in work of this Section.

1.5 MOCK-UPS

- A. General: Before beginning general asphalt shingle roofing, prepare mock-ups to provide standards for work of this Section. Do not proceed with asphalt shingle roofing until Restoration Consultant has approved mock-ups.
 - 1. Locate mock-ups as directed by Restoration Consultant.
 - 2. Notify Restoration Consultant 48 hours prior to start of each mock-up.
 - 3. Use crew that will execute the work and follow requirements of this Section.
 - 4. Repeat mock-ups as necessary to obtain Restoration Consultant's approval.
 - 5. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
 - 6. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.

7. Approved mock-ups will represent minimum acceptable standards for asphalt shingle roofing. Subsequent asphalt shingle roofing work that does not meet standards of approved mock-ups will be rejected.

B. Prepare the Following Mock-ups (Mock-ups Can Be Combined):

1. Asphalt Shingle Roofing at Roof Edge and Rake: One location of at least 25 sq. ft.
2. Asphalt Shingle Roofing at Chimney: One location of at least 25 sq. ft.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver, store, and handle materials to protect them from damage, moisture, dirt, and introduction of foreign matter. Store materials on raised platforms and under ventilated, waterproof covers. Store packaged materials in manufacturer's unopened containers, marked with manufacturer's name and product brand name. Immediately reseal containers after partial use. Remove and discard damaged materials and materials that have exceeded their expiration dates and replace with fresh materials.
- B. Storage: Store bundles on a flat surface. Do not exceed manufacturer's recommendations for stacking bundles.

1.7 PROJECT CONDITIONS

- A. Safety: Take all measures necessary to protect all persons, whether or not they are involved with work of this Section, from harm caused by work of this Section.
- B. Protection of Building: Protect building elements and finishes from damage and from deterioration caused by work of this Section using all means necessary. Repair damage to materials and damage to finishes to Restoration Consultant's satisfaction at no additional cost to Owner.
 1. Provide all protection necessary to prevent water from entering building during roofing work. Repair or replace all elements damaged or deteriorated by failure to properly protect building during work of this Section to Restoration Consultant's satisfaction at no additional cost to Owner.
 2. Take precautions necessary to prevent fire and spread of fire.
- C. Protection of Site and Surroundings: Protect site, landscape features, and other surrounding elements from damage and deterioration resulting from work of this Section.
- D. Dimensions and Site Conditions: Dimensions of existing elements indicated on Drawings are for bidding purposes only. Field measure all dimensions before preparing shop drawings or beginning work. Contractor is responsible for all dimensions and for ensuring that new work meets up with existing construction.
- E. Limits to Exposure of Underlayments: Do not leave underlayments exposed to weather more than 30 days after beginning installation.
- F. Coordination: Coordinate work of this Section with work of other sections to ensure proper completion of Work.

1. Carefully coordinate asphalt shingle roofing work with sheet metal flashing to ensure watertight flashings at edges, chimney, walls, valleys, and penetrations.
2. Minimize foot traffic over completed roof areas. Remove dirt and debris that does occur on roof areas to leave clean areas to the Restoration Consultant's satisfaction at no additional cost to the Owner.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with shingle manufacturer's recommendations and in such a manner that water will not penetrate building interior.
- B. Surface Conditions: Install asphalt shingle roofing only when surfaces are free of ice, water, or snow. Surfaces to receive underlayments and shingles shall be dry.

1.9 EXTRA STOCK

- A. Furnish attic stock of asphalt shingles equal to 5 percent of the shingles installed. Deliver packaged and labeled attic stock to location requested by Owner for storage.

1.10 WARRANTY

- A. Provide manufacturer's standard system warranty agreeing to replace shingles that fail in materials or workmanship within warranty period.
 1. Warranty Period for Manufacturing Defects: 40 years with the first 20 years nonprorated.
 2. Warranty Period for Workmanship Errors: 100 percent coverage for 20 years.

PART 2 - PRODUCTS

2.1 ASPHALT SHINGLES

- A. Shingles: New asphalt three tab shingles, complying with ASTM standard for type of shingle, in size, configuration, color, and surface as approved by Restoration Consultant. Provide GAF Slateline Roofing Shingles, Lifetime Series, manufactured by GAF Corp., 1361 Alps Road, Wayne, NJ 07470 (800-766-3411).
 1. Starter Shingles: Self-sealing starter shingles designed for premium roof shingles.

2.2 MISCELLANEOUS MATERIALS

- A. Nails: Hot-dip-galvanized roofing nails with flat heads 3/8-inch to 7/16-inch in diameter and barbed or ringed shanks, 12 gauge. Provide nails of sufficient length to penetrate solid wood sheathing at least 3/4-inch or to extend through plywood by at least 1/8 inch.
 1. Unacceptable Fasteners: Power (electric or air) installed nails are not acceptable. Staples are not acceptable.
- B. Self-adhered Waterproof Membrane Underlayment for Eaves, Ridge, Hips, Rakes, Walls, Valleys, and around Penetrations: Polyethylene-sheet-backed rubberized asphalt membrane, complying with ASTM D 1970, 40 mils thick. Provide primer when

recommended by underlayment manufacturer. Provide "Ice and Water Shield," by W.R. Grace & Co., or waterproof membrane as required by shingle manufacturer for warranties as specified.

- C. Roofing Underlayment for General Coverage (Roofing Felt): Asphalt impregnated unperforated building paper, ASTM D 226, with minimum weight of 30 pounds per 100 square feet or other underlayment as required by shingle manufacturer for warranties as specified.
- D. Roofing Cement: ASTM D 4586, Type I or II.
- E. Sheet Metal Flashing: Comply with requirements of Section 07 61 00 – "Sheet Metal Flashing."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Removal of Previous Roofing, Underlayments, and Flashing: Remove shingles, underlayments, and flashings. Remove projecting nails and other obstructions to smooth, even surface.
- B. Repair of Existing Sheathing: Replace damaged sheathing with new sheathing to match existing.
- C. Provision of New Sheathing: Provide new plywood sheathing to match existing sheathing thickness.
- D. Surface Preparation: Ensure that substrate is sound, smooth, and free of projecting nails, splinters, uneven joints and other conditions that might adversely affect application of underlayments and shingles. Fill knot holes and other holes and losses. Correct all adverse conditions.
- E. Flashings and Adjacent Work: Coordinate installation with sheet metal flashings and other adjoining work to ensure proper sequencing.

3.2 INSTALLATION OF SHINGLES

- A. Underlayments
 - 1. Self-adhered Waterproof Membrane Underlayment: Install self-adhered waterproof membrane underlayment in all locations within 3 feet of edge of eaves and walls, at hips, at ridges, in valleys, and around penetrations.
 - 2. Roof Underlayment: Install roofing felt on roof surface in other locations. Comply with shingle manufacturer's directions, specified requirements, and requirements of codes having jurisdiction. All underlayments shall lap 6 inches, minimum, in direction of flow. Lap ends of underlayments 6 inches. Entire area to receive shingles shall be covered by underlayment.
- B. Sheet Metal Flashing: Install sheet metal flashing in conjunction with underlayment and asphalt shingle installation as shown on Drawings and following requirements of Section 07 62 10 – "Sheet Metal Flashing and Drainage."

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- C. Shingles, General: Comply with requirements and recommendations of *NRCA Roofing Manual: Steep-slope Roof Systems* and with asphalt shingle manufacturer's written instructions.
 - 1. Install shingles from lower edge of roofing upwards.
 - 2. Strike chalk lines to ensure courses are even. Install to match existing coursing.
 - 3. Nail shingles to comply with referenced standard and with building code requirements. Do not use staples to secure shingles.
 - D. Starter Shingles: Install starter shingles containing sealant or cement shingles to underlayment and each other in a 4-inch width of asphalt plastic roof cement. Extend shingles as indicated to provide drip edge; coordinate with flashing installation. Nail to comply with manufacturer's recommendations.
 - E. Field Shingles: Install with nails as recommended by manufacturer and local codes. Drive nails flush with shingle surface. Do not over drive or under drive nails.
- 3.3 ADJUSTMENT AND CLEANING
- A. Correction of Work: Remove all work that does not comply with specified requirements and all damaged and deteriorated asphalt shingles and replace with new work to match requirements of this Section at no additional cost.
 - B. Clean-up: Remove all equipment, materials, and debris from site. Leave site in an undamaged condition and broom clean.

END OF SECTION 07 31 13

SECTION 07 62 10

SHEET METAL FLASHING AND DRAINAGE

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of sheet metal flashing and drainage as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Providing new sheet metal flashings in conjunction with chimney rebuild and asphalt shingle roof repair.
 - 2. Providing new copper gutter and leaders in conjunction with asphalt shingle roof repair as indicated on Drawings.
 - 4. Coordinating work of this Section with work of other sections to ensure complete, sound, weatherproof flashing and drainage work.
- B. Intent: It is the specific intent of this Section to provide for provision of new sheet metal flashing and drainage with accessories necessary to provide secure, weatherproof flashing and drainage work. All work required to fulfill this intent shall be included.
 - 1. Existing Conditions: Contractor is responsible for conditions that can be seen and for conditions that can reasonably be assumed from those that can be seen on the day of prebid walkthrough. No additional amounts will be paid or change orders processed relating to conditions that can be observed on the roof or conditions that can reasonably be assumed to exist from evidence visible on the day of the pre-bid walkthrough.
- C. Related Work Specified Elsewhere
 - 1. Stone Masonry Restoration – Section 04 01 20
 - 2. Asphalt Shingle Roofing – Section 07 31 13
 - 3. Joint Sealants – Section 07 92 10

1.3 QUALITY ASSURANCE

- A. Sheet Metal Specialist: Award sheet metal flashing and drainage work to a firm that is regularly engaged in sheet metal flashing and drainage work with a minimum of ten years' experience in sheet metal flashing and drainage work including sheet copper flashing and drainage on historic buildings and that can demonstrate to Owner's satisfaction that it has successfully completed at least three sheet metal flashing and drainage projects similar in scope, craftsmanship, and scale requirements to work required on this Project involving buildings listed in a State Register of Historic Places under the direction of preservation authorities.
 - 1. Foreman: Sheet metal flashing and drainage shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Sheet Metal Specialist. Foreman shall be on site daily for duration of work of this Section and shall read and speak English fluently. Same foreman shall remain on Project throughout work unless Owner deems foreman's performance unacceptable.
 - 2. Mechanics: Sheet metal flashing and drainage shall be carried out by a steady crew of skilled sheet metal workers who are thoroughly experienced with materials and methods specified and have a minimum of three years' experience in sheet metal flashing and drainage on historic buildings. In acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.
- B. Testing of Sheet Metal Workers: Mechanics proposed for soldering joints in sheet metal roofing and flashing of this Project shall be required to successfully complete two feet of joint soldered horizontally and one foot of joint soldered at a vertical angle in presence of Restoration Consultant prior to working on Project. Seams shall show at least one full inch width of smooth, evenly flowed solder, indicating that sheet metal was hot enough to melt solder and fully sweat the joint at time of application. Unsuccessful performance in this test area will be grounds for rejection of this mechanic for sheet metal soldering work on this Project.
- C. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- D. Referenced Standards: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. Where these standards make recommendations or suggestions, such recommendations or suggestions shall be considered mandatory for work of this Contract unless specifically indicated otherwise in Contract Documents. Provide a reference copy of each of the following documents in shop and at Project site when work of this Section is being performed in each location. In each case in which there is a conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
 - 1. ASTM International (ASTM)
 - a. ASTM A 666, *Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar*.
 - b. ASTM B 32, *Standard Specification for Solder Metal*.

- c. ASTM B 101, *Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction.*
- d. ASTM B 127, *Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip.*
- e. ASTM B 370, *Standard Specification for Copper Sheet and Strip for Building.*
- f. ASTM B 749, *Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.*
- g. ASTM D 226, *Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.*
- i. ASTM D 4637, *Standard Specification for EPDM Sheet Used in Single-Ply*
- 2. U.S. General Services Administration Federal Specifications (FS)
 - a. FS QQ-C-40, *Caulking: Lead Wool and Lead Pig.*
 - b. FS UU-B-790, *Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant).*
- 3. Copper Development Association (CDA), *Copper in Architecture – Handbook.*
- 4. National Roofing Contractors Association (NRCA): *NRCA Roofing and Waterproofing Manual.*
- 5. Revere Copper Products, Inc., *Copper & Common Sense.*
- 6. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA), *Architectural Sheet Metal Manual.*
- E. Provisions for Expansion and Contraction: Provide sheet metal flashing and drainage that will accommodate without damage or deterioration expansion and contraction caused by air temperature changes over a range of 140 deg F and metal temperature changes of 180 deg F.
- F. Sources of Materials: Obtain each type of material required for sheet metal flashing and drainage work from a single source to ensure a match in quality, performance, and appearance.
- G. Access for Observation and Approvals: Provide Restoration Consultant access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move and reconfigure scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with laws and regulations regarding safety and acceptable to Restoration Consultant. Provide manpower and equipment to facilitate observation and approvals.
- 1. Extent of Access: Provide Restoration Consultant with hands-on access to each and every area of sheet metal flashing and drainage work. No approval of sheet metal

flashing and drainage will be given before Restoration Consultant is provided hands-on access to all new sheet metal flashing and drainage work. Provide access for reinspection of areas where sheet metal flashing and drainage work was not approved on first or subsequent inspections until Restoration Consultant approves work.

2. Relocation of Means of Access: If Contractor moves scaffolding, lift, or other means of access before providing Restoration Consultant with hands-on access to each and every location in which sheet metal flashing and drainage work has been provided and to each and every location in which sheet metal flashing and drainage work has been provided after previous sheet metal flashing and drainage work was rejected, Contractor shall reinstall means of access to provide for close-up inspection by Restoration Consultant at no additional cost to Owner.

- H. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.

1.4 SUBMITTALS

- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Restoration Consultant's approval.
- B. Qualification Data: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Product Data: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Material Safety Data Sheets (MSDS).
- D. Work Description: Detailed written description for each phase of sheet metal flashing and drainage work required by this Section. Submit new written descriptive information. Photocopies of Contract Documents, excerpts from Contract Documents, and/or duplication of text in Contract Documents will not be accepted for Work Description. Description for each condition shall include, but not be limited to:
 1. Materials and Procedure: Materials, methods and procedures, tools, and equipment to be used.
 2. Protection: Description, including drawings, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this

Section to persons (whether involved in the Work or not), building elements, materials, and finishes, surrounding landscape and site, and the environment (including air and water).

3. Alternate Methods and Materials (If Any): Proposed alternate methods and materials (if any) to those specified for sheet metal flashing and drainage work. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- E. Shop Drawings: Dimensioned, detailed, scale drawings for work of this Section. Submit newly prepared drawings showing site-verified conditions and materials. Photocopies of Contract Documents and/or electronic scans of Contract Documents will not be accepted for Shop Drawing submittals. Submit plans and details showing locations, layouts, materials, thicknesses, finishes, construction, joints, connections, and other details required to fully illustrate work of this Section.
1. Provide details at appropriate scales. Curb sections and similar details shall be at least half-size. Joint details shall be full-size.
 2. Specifically indicate type and configuration of joint at each connection.
- F. Samples: Submit, for verification purposes, the following:
1. Sheet Copper: 12-inch x 12-inch pieces of each weight.
 2. Cleats: Each metal, gauge, type, and configuration.
 3. Waterproof Membrane: 12-inch x 12-inch pieces.
 4. Separation Membrane: 12-inch x 12-inch pieces.
 5. Rosin-Sized Paper: 12-inch x 12-inch pieces.
 5. Anchors, Fasteners, and Accessories: Each type and size in each material to be used in work.
 6. Seams in Sheet Metal: 12-inch length of each type of seam in each type of and gauge of sheet metal.
 7. Soldered Seams in Sheet Metal: 12-inch length of each configuration in each type and gauge of sheet metal.
 8. Intersections of Seams: Section of each condition of intersecting seams including 8-inch length of each seam meeting at intersection.
 9. Copper Leader: 12-inch length.
 10. Gutter: 12-inch-length to match designated profile and dimensions.
- G. Warranties: As specified in Article "Special Project Warranty," below.
- H. Mock-Ups: Perform mock-ups as specified in Article "Mock-Ups," below.

1.5 MOCK-UPS

- A. General: Before beginning general sheet metal flashing and drainage work, prepare mock-ups to provide standards for work of this Section. Do not proceed with sheet metal flashing and drainage until Restoration Consultant has approved mock-ups.
 - 1. Locate mock-ups as directed by Restoration Consultant.
 - 2. Notify Restoration Consultant 48 hours prior to start of each mock-up.
 - 3. Restoration Consultant will monitor mock-ups.
 - 4. Use crew that will execute the work and follow requirements of this Section.
 - 5. Repeat mock-ups as necessary to obtain Restoration Consultant's approval.
 - 6. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
 - 7. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
 - 8. Approved mock-ups will represent minimum standards for sheet metal flashing and drainage. Subsequent sheet metal flashing and drainage work that does not meet standards of approved mock-ups will be rejected.
- B. Prepare the Following Mock-Ups
 - 1. Gutter: minimum 12 feet long, including expansion provisions.
 - 2. Leaders: One leader.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver, store, and handle materials to protect them from damage, moisture, dirt, and introduction of foreign matter. Store materials on raised platforms and under ventilated, waterproof cover. Store packaged materials in manufacturer's unopened containers, marked with manufacturer's name and product brand name. Immediately reseal containers after partial use. Remove damaged and deteriorated materials and replace with fresh materials.

1.7 PROJECT CONDITIONS

- A. Safety: Use measures necessary to protect persons, whether or not engaged in work of this Section, from harm resulting from work of this Section.
 - 1. Lead-Containing Material: Perform work with materials containing lead in compliance with applicable OSHA regulations, including but not limited to, Lead in Construction and Hazard Communication Standard (Title 29, Sections 1926.62 and 1910.1200, respectively, Code of Federal Regulations, OSHA, US Department of Labor) and with other applicable federal, state, and local laws and regulations.

- B. Protection of Building: Protect building elements and finishes from damage and from deterioration caused by work of this Section.
 - 1. Cover areas into which water might penetrate when work is suspended to ensure materials and finishes are not damaged by water penetration. Extend covers sufficiently far onto sound roofing to prevent water entry and secure using methods that do not damage roofing.
 - 2. Take precautions necessary to prevent fire and spread of fire.
 - a. Whenever operations involving open flame or heat-generating equipment are underway and for four (4) hours following completion of such operation, station one worker who is knowledgeable in the use of fire extinguishers with an approved fire extinguisher within 15 feet of operation dedicated solely to preventing fire and spread of fire.
 - 3. Contractor's Responsibility: Contractor is solely responsible for the safety and security of the building during work of this Section. Contractor shall repair damage to materials and damage to finishes resulting from work of this Section to Restoration Consultant's satisfaction at no additional cost to Owner.
 - C. Contract Drawings
 - 1. The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces. Perform work on surfaces of projections, reveals, parapets, and other elements associated with areas on which work is indicated.
 - 2. Where elements interface with existing work or work that is in place, field measure dimensions of existing and in-place elements before preparing shop drawings or beginning work.
 - 3. Install surface-applied flashing reglets, separation membranes, and flashing collars to existing elements and materials only after they have been stripped, cleaned, prepared, and painted.
 - D. Protection of Self-Sealing Membrane: Do not solder sheet metal installed over self-sealing membrane without inserting separation membrane under rosin paper below joints to be soldered to protect self-sealing membrane from heat as specified herein.
 - E. Coordination: Coordinate work of this Section with work of other sections as required to ensure proper completion of the Work.
 - F. Preconstruction Meeting: Convene a preconstruction meeting to discuss sheet metal flashing and drainage and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Architect, Construction Manager, firm(s) that will perform sheet metal flashing and drainage, and other entities that might be affected by sheet metal flashing and drainage work.
- 1.8 ENVIRONMENTAL REQUIREMENTS
- A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in such a manner that water will not penetrate building interior.

1.9 SPECIAL PROJECT WARRANTY

- A. Flashing and Drainage Warranty: Contractor shall supply Owner with a minimum two-year workmanship warranty covering work of sheet metal roofing and flashing. In the event work related to sheet metal roofing and flashing is found to be defective or otherwise not in accordance with Contract Documents within two years of the date of Substantial Completion, the Contractor shall repair such work or shall remove such defective work and provide new work complying with requirements of this Section at no additional cost to Owner.
- B. Execution of Warranty: Provide written warranty, signed by a principal of firm performing work of this Section who has authorization to execute such a document, dated, and notarized.

PART 2 – PRODUCTS

2.1 SHEET METAL

- A. General: Provide materials that have been selected for surface flatness, smoothness, and freedom from surface blemishes where exposed to view in finished Work. Exposed to view surfaces that exhibit pitting, seam marks, roller marks, rolled trade names or symbols, oil canning, stains, discoloration, or other imperfections will not be accepted.

2.2 SHEET COPPER, LEAD-COATED SHEET COPPER AND ACCESSORIES

- A. Sheet Copper: ASTM B 370, cold rolled except where soft temper is required for forming. Provide weight indicated on Drawings but not less than 20 oz. per square foot.
- B. Cleats: Fabricate of sheet copper, ASTM B 370, cold rolled, weighing no less than 20 oz. per sq. ft., unless otherwise noted. Cleats shall be at least 2-inches wide and of proper length for intended purpose (3-inches long minimum).
 - 1. Expansion Cleats: Provide expansion cleats of same overall dimensions as fixed cleats formed as recommended by referenced standards and as on approved shop drawings.
- C. Nails: Copper or hardware bronze of Stronghold type, or equal, minimum No. 12 Stubs gauge (0.109 inch diameter), with large flat head. Provide nails of sufficient length to penetrate roof substrate not less than 3/4 inch. Provide longer nails as indicated on Drawings. Ensure that nails are not long enough to penetrate underside of wood elements exposed on the interior.
- D. Rivets: 1/8-inch-diameter of hard copper with copper burrs.
- E. Screws, Bolts, and Other Fasteners: Copper, brass, or bronze compatible with substrate, of type and form to provide secure, sound anchorage.
- F. Anchors for Masonry Substrates: Anchors of size and configuration to provide sound, secure, anchorage.
 - 1. Anchors 1/8-Inch or Less in Diameter: Copper or brass screws in lead or plastic shields, appropriate for use intended, and as approved by Restoration Consultant.

2. Anchors Over 1/8-Inch Diameter: Adhesive fastening systems specifically designed to anchor elements to masonry and of size indicated on Drawings. Provide fasteners using copper, brass, or bronze bolts and washers or threaded rods and nuts and washers together with screen tubes and structural adhesive specifically designed for anchoring to masonry. Provide adhesive systems by Hilti, P.O. Box 21148, Tulsa, OK (800-879-8000); ITW Ramset/Red Head, 1300 N. Michael Dr., Wood Dale, IL, 60191 (630-350-0370); Powers Fasteners, Inc., 2 Powers Lane, Brewster, NY 10509 (914-235-6300); or approved equal.
 3. Prohibited Anchors: Expansion anchors and sleeves, other than those specified in this Paragraph, and plugs are prohibited.
- G. Solder: ASTM B 32, Alloy Sn50 (50 percent block tin and 50 percent pig lead). Or Sn95 (95 percent tin/5 percent silver) or Sb5 (95 percent tin/5 percent antimony).
- H. Solder for Lead-Coated Copper: ASTM B 32, Alloy Sn60 (60 percent block tin and 40 percent pig lead).
- I. Flux: Muriatic acid neutralized with zinc or flux recommended by solder manufacturer.

2.3 UNDERLAYMENTS

- A. Roofing Felt: Asphalt impregnated unperforated building paper, ASTM D 226, with minimum weight of 30 pounds per 100 square feet.
- B. Self-Sealing Waterproof Membrane: High-density, cross-laminated, polyethylene-sheet-backed butyl-based adhesive membrane, ASTM D 1970, specifically designed for use in high temperature locations, 30 mils (0.030 inch) thick. Provide primer when recommended by underlayment manufacturer. Provide "Ultra," by Grace Construction Products, 62 Whittemore Avenue, Cambridge, MA 02140 (866-333-3726). Provide membrane with the following properties:

PROPERTY	VALUE	TEST METHOD
Thickness, membrane	30 mil	ASTM D 3767, method A
Tensile strength, membrane	250 psi	ASTM D 412 (Die C, modified)
Elongation, membrane	250 percent	ASTM D 412 (Die C, modified)
Low temperature flexibility	Unaffected at -20 deg F	ASTM D 1970
Permeance (max)	0.05 Perms	ASTM E 96

- C. Separation Membrane: EPDM sheet membrane, ASTM D 4637, 60 mils (0.060 inch) thick. Provide Sure-Seal sheet membrane by Carlisle SynTec Inc., P.O. Box 7000, Carlisle, PA 17013 (800-479-6832), or approved equal.
- D. Rosin-Sized Building Paper Slip Sheet: Smooth, water-vapor permeable, water-repellent, fire-resistant, rosin-sized building paper weighing not less than 6 pounds per 100 sq. ft.

complying with requirements of Fed. Spec. UU-B-790A, Type 1, Grade D, Style 1b.

2.4 SEALANTS AND ACCESSORIES

- A. Sealant for Sheet Metal Joints: Silicone sealant complying with requirements for sealant for joints in sheet metal work of Section 07 92 10 – “Joint Sealants.”
- B. Sealant for Sheet Metal Joints: Single-component, high-modulus silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O. Provide “795” as manufactured by Dow Corning Corporation.
 - 1. Primer: Use primer as recommended by sealant manufacturer to ensure adhesion to substrates, unless manufacturer certifies that no primer is required.
- C. Sealant for Flashing Reglets: Silicone sealant complying with requirements for sealant for general use of Section 07 92 10 – “Joint Sealants.”
- D. Primers: Primer for each substrate as recommended by sealant manufacturer for optimum sealant adhesion and performance.
- E. Sealant Accessories: Bond breaker tapes and backer rods compatible with sealant, recommended by sealant manufacture for use intended, and complying with requirements of Section 07 92 10 – “Joint Sealants.”

2.5 MISCELLANEOUS MATERIALS AND EQUIPMENT

- A. Drains for Sheet-Metal-Lined Gutters
 - 1. 4-Inch-Diameter Drains: 4-inch-diameter gutter drain with coated cast-iron body, high bronze dome, and bronze clamping ring for 3-inch-diameter threaded pipe. Provide drains with extended length body as required for optimum installation and performance. Provide Z180-HD Roof Drain with dura-coated cast-iron body and bronze dome and clamping ring by Zurn Specification Drainage Products, 1801 Pittsburgh Avenue, Erie, PA 16514 (814-455-0921), or approved equal.
 - 2. 6-Inch-Diameter Drains: 6-inch-diameter gutter drain with bronze body, high bronze dome, and bronze clamping ring for 4-inch-diameter threaded pipe. Provide drain with deep body as required for optimum installation and performance. Provide 1630T Gutter Drain with bronze body and bronze dome and clamping ring by J. R. Smith Mfg. Co., P.O. Box 3237, Montgomery, AL 36109 (334-277-8520), or approved equal.
- B. Soldering Coppers: Heavy soldering coppers of blunt design, weighing not less than 10 lbs. per pair, properly tinned before using.
- C. Metallic Cleaning Pads: Bronze wool, stainless steel wool, extra fine, clean and free of contaminants and corrosion.
- D. Non-Metallic Cleaning Pads: Non-metallic pads designed for cleaning and polishing. Provide Scotch-Brite General Purpose (Maroon) Pads and Ultra-Fine (Gray) Hand Pads as manufactured by 3M Company, 3M Center, St. Paul, MN 55144, or approved equal.

- E. Metal Cleaner: Mineral spirits with a minimum flash point of 100 deg F when ambient temperature is below 80 deg F, minimum flash point of 120 deg F when ambient temperature is between 80 and 95 deg F, and minimum flash point of 140 deg F when ambient temperature is above 95 deg F.
- F. Cleaning Solution to Remove Flux Residue: Solution of detergent ("Simple Green," as manufactured by Sunshine Makers, Inc., 15922 Pacific Coast Highway, Huntington Harbour, CA 92649 (800-228-0709), or approved equal) and washing soda (10 percent) in water.
- G. Cloths: Clean, lint-free cotton rags and cheesecloth.
- H. Lead Wool: Caulking lead formed from fine strands of lead twisted together to make a loose, rope-like yarn, complying with Federal Specification QQ-C-40, Grade C. Provide lead wool by Mayco Industries, Inc. 18 West Oxmoor Road, Birmingham, AL 35209 (800-749-6061), or approved equal.
- I. Leader Attachments: Straps leader clamps matching original elements with fasteners of same metal as leader attachments with lead or plastic sleeves.
- J. Basket Strainers: Copper or brass wire baskets designed and fabricated to protect leader outlets in gutters from entry of debris.

2.6 FABRICATION AND WORKMANSHIP, GENERAL

- A. General: Materials shall be fabricated by an experienced fabricator with experienced craftsmen. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, and erection shall be according to Contract Documents, approved shop drawings, referenced standards, and best industry practices, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected. Work shall be accurately and neatly fabricated and assembled.
- B. Cutting: Cut metal by sawing, shearing, or blanking. Make cuts accurate, clean, sharp, and free of burrs, without deforming adjacent surfaces or profiles.
- C. Holes: Drill or cleanly punch holes; do not burn.
- D. Forming: Form metal to required shapes and sizes, with true curves, lines, and angles. Do not distort metal planes and surfaces. Provide necessary rabbets, lugs, and brackets for assembly of units.
- E. Joints: Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
 - 1. At joints to be soldered or riveted and soldered, metal shall overlap at least 1/2 inch. Provide an extra layer of metal across joint below both pieces to be joined where metal does not overlap.
- F. Connections: Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to weather. Locate joints where least conspicuous. Provide expansion and contraction joints

to allow for thermal movement of metal at location and by methods approved by Restoration Consultant.

1. Riveted and Soldered Joints: Joints not indicated to be loose locked, loose double-locked, or locked and soldered, shall be riveted and soldered with rivets spaced 3 inches on center, minimum. Peen rivet heads before soldering.
- G. Surface Preparation and Soldering: Comply with Article "Surface Preparation and Soldering," below.
- H. Exposed Edges: Fold back exposed edges to form hems. No unhemmed exposed edges will be acceptable.
- I. Supplementary Parts: Provide additional parts necessary to complete each item of work to provide optimum, weather-tight sheet metal fabrication, even though such supplementary parts are not shown or specified.
- J. Coordination: Accurately cut and fit work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of work.
- K. Exposed Work: In addition to requirements specified herein or shown on Drawings, surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs, and other defects that mar finished work's appearance. Metal work exposed to view shall be straight and true to line or curve, with smooth arrises and angles as sharp as practical, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line.

2.7 SURFACE PREPARATION AND SOLDERING

- A. Protection: Protect areas of metal not to be soldered from damage and from deterioration caused by soldering, including but not limited to contact with flux, spattered solder, and spray caused by cleaning soldering coppers.
- B. Heat for Soldering: Use specified soldering coppers for tinning and soldering sheet metal. Heat soldering coppers evenly. Use coppers only when they are hot enough to heat metal to ensure free-flowing solder. Do not use torches or flames of any kind when soldering metal. Torches or other types of open flames may be used to heat soldering irons away from sheet metal work being soldered.
- C. Cleaning Metal Surfaces: Clean surfaces to be soldered (including but not limited to seams and areas to receive cleats and other attachments) free of dirt, grease, oils, coatings, foreign matter, and other elements that might inhibit formation of optimum adhesion of solder and sound solder joint.
 1. Copper: Clean surfaces of copper to be soldered using general metal cleaner. Mechanically clean copper to bright metal using copper or brass wire brushes, bronze wool, and non-metallic cleaning pads. Do not damage copper surface or scratch surface of copper to be exposed after installation.
- D. Flux: Apply flux to surfaces of metal to receive solder before tinning and to surfaces of tinned metal to be soldered before soldering. Do not allow flux to touch surfaces not to

receive solder.

- E. Tinning Metal Surfaces: Tin sheet metal in areas to receive solder. Heat metal sufficiently so that solder will flow freely and apply solder. Tinned metal shall have a smooth, thin, evenly-flowed, and soundly adhering coating of solder. Reheat metal and carefully remove drips, runs, and other imperfections to leave a smooth, even coating.
 - 1. Joints with Solder Not To Be Exposed in Finished Work: Tin metal at joints to a width of 1-1/2 inches.
 - 2. Joints with Solder To Be Exposed in Finished Work: Tin metal so that areas to be covered with metal are tinned and that no more than 1 inch of solder will be exposed on visible areas in finished work.
 - 3. Cleats and Other Attachments: Tin areas of metal on which cleats and other fabrications are to be soldered where surfaces will not be exposed in finished work for a width not less than width of element to be applied plus 1/2 inch either side of element.
- F. Soldering: Solder slowly with well-heated coppers to heat sheet thoroughly and to sweat solder completely through full width and all layers of seam. Use ample solder. Seam shall show at least one full inch of evenly flowed solder. Wherever possible, solder metal in flat position. Solder seams on slopes steeper than 45 degrees and on vertical surfaces a second time. Joints shall show smooth, evenly flowed solder in direction of seam, indicating that sheet metal was hot enough to melt solder and draw solder into seam at time of application. Heat back of seam so that solder flows into seam. Do not build up solder on surfaces of metal. Do not "stitch" solder across joints. Joints that do not show smooth, evenly flowed solder in the direction of the seam, joints that have excess solder, and joints that are soldered across the seam ("stitched") will be rejected. Prepare and resolder rejected joints in sheet metal to provide joints complying with requirements of this Section.
- G. Cleaning following Soldering: Clean surfaces of metal following soldering using specified cleaning solution to remove flux and flux residue.

2.8 SHOP-FABRICATED COMPONENTS

- A. General: Fabricate ridge rolls, hip rolls, hung gutters, leaders, and similar elements in shapes and sizes indicated, with mitered and soldered corners. Include attachment devices, expansion joints, end plates, and other accessories indicated or required for complete installation.
- B. Hung Gutters: Fabricate from 24-oz. sheet copper.
- C. Leaders: Fabricate from 24-oz. sheet copper.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine substrates on which sheet metal flashing and drainage are to be installed. Notify Restoration Consultant of conditions detrimental to proper and timely completion of Work.

Do not proceed until unsatisfactory conditions have been corrected in manner acceptable to Restoration Consultant.

3.2 INSTALLATION, GENERAL

- A. General: Install sheet metal flashing and drainage as shown on Drawings and approved shop drawings to meet standards of approved mock-ups using experienced sheet metal workers. Set work accurately in location, alignment, elevation, plumb, level, true, measured from established lines and levels and to meet adjoining existing construction. Comply with requirements of this Section including requirements of referenced standards.
- B. Fabrication and Workmanship: Comply with requirements of Article "Fabrication and Workmanship, General" in Part 2, above.
- C. Waterproof Membrane: Install waterproof membrane continuously on substrates to receive sheet metal flashing and gutter linings. Provide flashing membrane as recommended by waterproof membrane manufacturer to provide complete watertight membrane over substrates to receive sheet metal flashing and drainage.
 - 1. Install termination bars as indicated on Drawings and approved shop drawings, securely anchored to masonry substrates.
 - 2. Install accessories necessary to provide optimum, watertight membrane.
- D. Separation Membrane
 - 1. Separating Metals: Provide strips of separation membrane between sheet metal and metals of different composition to comply with industry standards and as shown on approved shop drawings.
 - 2. Protecting Underlayments: Provide strips of separation membrane 12 inches wide below joints in sheet metal work to be soldered over self-sealing membrane underlayment. Center strips on joints.
- E. Rosin-sized Paper: Provide slip-sheet of rosin-sized paper below sheet metal flashing and drainage work.
- F. Fitting: Perform cutting, drilling, and fitting required for optimum installation.
- G. Provision for Expansion and Contraction: Provide joints and attachments that will allow sheet metal to expand and contract without causing buckling, excessive opening of joints, and overstressing of joints, welds, and fasteners. Comply with the requirements of Quality Assurance Paragraph "Provisions for Expansion and Contraction," above.
- H. Attachment: Provide continuous cleats where indicated on Drawings and approved shop drawings. In other locations provide cleats spaced as required to ensure sound, secure, stable attachment, but no more than 12 inches on center, maximum, unless specifically indicated otherwise.
 - 1. Indirect Attachment: Do not attach sheet metal fabrications exposed in final work,

including but not limited to pans, flashings, and fabricated elements, directly to substrate. Provide attachment by means of cleats to allow for thermal movement.

2. Fastening Cleats: Use nails for wood substrates, screws in expansion shields for masonry substrates, and/or other approved fasteners suitable for use intended.
 - a. Continuous Cleats: Fasten continuous cleats with fasteners spaced 8 inches o.c.
 - b. Individual Cleats: Fasten each cleat using two fasteners. Fold end of cleat back over fastener heads.

- I. Seams: Form seams that are completely watertight and properly sealed. Seams shall be lock seams, unless specifically indicated otherwise.

1. Form joints to allow for thermal movement where applicable.
2. Use solder for filling and sealing joints only. Do not use solder to provide mechanical strength to joint.
3. Rivet joints where mechanical strength is necessary. Space rivets not more than 3 inches apart. Peen heads.

- J. Separation of Dissimilar Metals: Separate dissimilar metals using separation membrane or another method that complies with industry standards as shown on accepted shop drawings.

3.3 FLASHING

- A. General: Provide sheet metal flashing as shown on Drawings and on approved shop drawings. Coordinate sheet metal flashing installation with installation of underlayments and shingles.
- B. Base Flashings: Provide base flashings at locations indicated on Drawings. Form flashings from copper of weight indicated, but not less than 20 oz. per sq. ft., in lengths not exceeding 16 feet. Overlap flashings at least 12 inches.
- C. Other Conditions: Provide flashing as shown on Drawings, as shown on approved shop drawings, and as necessary to provide sound, weathertight flashing and drainage installation.

3.4 ADJUSTMENT AND CLEANING

- A. Correction of Work: Remove work that does not comply with specified requirements and damaged and deteriorated components of sheet metal flashing and drainage and replace with new work to match requirements of this Section at no additional cost to Owner.
- B. Clean-up: Remove equipment, materials, and debris from site. Leave site in an undamaged condition and broom clean.

END OF SECTION 07 62 10

SECTION 07 92 10

JOINT SEALANTS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

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

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of joint sealants as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:

1. Preparing and sealing joints between masonry openings and other dissimilar materials.
2. Providing sealant for installation of new flashings.

- B. Related Work Specified Elsewhere:

1. Stone Masonry Restoration - Section 04 01 40
2. Asphalt Shingle Roofing – Section 07 31 33
3. Sheet Metal Flashing and Drainage – 07 62 10

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Joint Sealant Performance: Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.4 QUALITY ASSURANCE

- A. Sealant Installer: Award joint sealants work to an experienced Installer with a minimum of ten years' experience preparing joints and installing sealant who has completed joint sealant applications similar in material, design, and scope to the joint sealant work required on this Project that have resulted in sealant joints with a record of successful in-service performance.

1. Foreman: Joint sealant work shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Sealant Installer. Foreman shall be on site daily for duration of work of this Section. Same foreman shall remain on Project throughout work unless Owner deems foreman's performance unacceptable.
2. Technicians: Joint sealant work shall be performed by workers skilled in techniques

JOINT SEALANTS

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of joint preparation and sealant installation with a minimum of three years' experience installing sealants similar to the work required on this Project and completely familiar with current published recommendations of manufacturers of sealants being used.

3. Indication of Lack of Skill: Indication of lack of skill on part of sealant installers shall be sufficient grounds for Restoration Consultant to reject all installed sealant and to require Contractor to remove all installed sealants, provide proper joint preparation acceptable to sealant manufacturer, and furnish and install new sealants meeting the requirements of this Section at no additional cost to Owner. Restoration Consultant's decision shall be final.
- B. Laws, Codes, and Regulations: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. Referenced Standards: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. Where these standards make recommendations or suggestions, such recommendations or suggestions shall be considered mandatory for work of this Contract unless specifically indicated otherwise in Contract Documents. Provide a reference copy of each of the following standards at Project site during periods when work of this Section is being performed. In each case in which there is a conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
1. ASTM International (ASTM)
 - a. ASTM C 509, *Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material*.
 - b. ASTM C 920, *Standard Specification for Elastomeric Joint Sealants*.
 - c. ASTM C 717, *Standard Terminology of Building Seals and Sealants*.
 - d. ASTM C 719, *Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)*.
 - e. ASTM C 1021, *Standard Practice for Laboratories Engaged in Testing of Building Sealants*.
 - f. ASTM C 1193, *Standard Guide for Use of Joint Sealants*.
 - g. ASTM C 1521, *Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints*.
 - D. Testing Laboratory Qualifications: An independent testing laboratory qualified in compliance with ASTM C 1021.
 - E. Sources of Materials: Obtain each type of material required for joint sealant work from a single source to ensure a match in quality, performance, and appearance.
 - F. Product Testing: Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product

formulations within a 24-month period preceding date of Contractor's submittal of test results to Restoration Consultant.

1. Compliance with Requirements: Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
 - a. Include test results performed on joint sealants after they have cured for one (1) year.
2. Preconstruction Field-Adhesion Testing: Before installing sealants, field test adhesion of each type of sealant to each joint substrate condition (material and surface) as follows:
 - a. Locate test joints as directed by Restoration Consultant for each joint substrate condition.
 - b. Notify Restoration Consultant seven days in advance of dates and times when test joints will be erected.
 - c. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
 - 1) Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - d. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, modify substrate conditions and retest until satisfactory adhesion is obtained.
 - e. Evaluation of Preconstruction Field-Adhesion Test Results: Sealants not evidencing adhesion failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory.
- G. Joint Substrate Preparation: Prepare joint substrates as required to obtain optimum sealant adhesion and performance. Substrate preparation and priming to ensure sealant adhesion and performance shall be included as work of this Section.
 1. Cleaning: Clean joint substrates as necessary for optimum sealant adhesion and performance. Remove contaminants, including, but not limited to, dust, dirt, oil, grease, cleaning residues, previous coatings, and previous sealants and sealant residues.
 2. Priming: Prime all surfaces of joint substrates as necessary for optimum sealant

adhesion and performance. Prime all substrate surfaces using primer furnished by or approved by sealant manufacturer unless sealant manufacturer certifies in writing that installing sealant into joints whose surfaces have not been primed will result in adhesion and performance of sealant superior to those that would be achieved on primed surfaces.

- H. Access for Observation and Approvals: Provide Restoration Consultant access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move and reconfigure scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with laws and regulations regarding safety and acceptable to Restoration Consultant. Provide manpower and equipment to facilitate observation and approvals.
1. Extent of Access: Provide Restoration Consultant with hands-on access to each and every joint into which sealants have been installed. No approval of joint sealants work will be given before Restoration Consultant is provided hands-on access to all joints into which sealant has been installed. Provide access for reinspection of areas where joint sealants work was not approved on first or subsequent inspections until Restoration Consultant approves work.
 2. Relocation of Means of Access: If Contractor moves scaffolding, lift, or other means of access before providing Restoration Consultant with hands-on access to each and every location in which joint sealants have been installed and to each and every location in which joint sealants have been installed after previous joint sealant installation was rejected, Contractor shall reinstall means of access to provide for close-up inspection by Restoration Consultant at no additional cost to Owner.
- I. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.

1.5 SUBMITTALS

- A. General: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Restoration Consultant's approval.
- B. Qualification Data: Qualification data for Installer and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to the work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Product Literature: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Material Safety Data Sheets (MSDS).

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- D. Compatibility and Adhesion Test Reports: Reports from each elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants proposed for use. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain optimum adhesion.
 - E. Certifications from Sealant Manufacturer: Certifications for each of the following from manufacture of each sealant to be used, signed by an authorized representative of the manufacturer and notarized.
 - 1. Certification that Sealant is Non-staining: Certification that sealant will not stain masonry adjacent to joint surfaces, that it will not stain sheet metal adjacent to joint surfaces, and that it will not stain other materials adjacent to joint surfaces.
 - 2. Certification of Recommended Primers: Certification that primers furnished by or recommended by sealant manufacturer will provide optimum surface for sealant installation.
 - F. Samples for Initial Selection: Manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
 - G. Samples for Verification
 - 1. Sealants: Each type and color of joint sealant. Install joint sealant samples in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching appearance of exposed surfaces adjacent to joint sealants.
 - 2. Backer Rods, Bond Breakers, and Other Accessories: Each type, minimum 6 inches long.
 - H. Warranties: Signed and notarized warranties complying with requirements of Article "Special Project Warranties," below.
 - 1. Preliminary Submittal: Submit with the bid, a copy of the proposed warranties/guarantees, along with a signed and notarized statement that same will be provided on completion of the Work.
 - 2. Final Submittal: Submit executed and notarized warranties on completion of the Work.
 - I. Mock-Ups: Perform mock-ups as specified in Article "Mock-Ups," below.
- 1.6 MOCK-UPS
- A. General: Before beginning general joint sealant work, prepare mock-ups to provide standards for work of this Section. Do not proceed with joint sealants until Restoration Consultant has approved mock-ups.
 - 1. Locate mock-ups as directed by Restoration Consultant.
 - 2. Notify Restoration Consultant 48 hours prior to start of each mock-up.
 - 3. Restoration Consultant will monitor mock-ups. Mock-ups not performed in presence

of Restoration Consultant will be rejected.

4. Use crew that will execute the work and follow requirements of this Section.
5. Repeat mock-ups as necessary to obtain Restoration Consultant's approval.
6. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
7. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
8. Approved mock-ups will represent minimum standards for joint sealants. Subsequent joint sealants work that does not meet standards of approved mock-ups will be rejected.

B. Prepare the Following Mock-Ups

1. Joints between Masonry Openings and Window Frames: Two windows.
2. Joints between Masonry Other Dissimilar Materials: Two locations.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, and curing time. Include mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent deterioration and/or damage due to moisture, high or low temperatures, contamination, and other causes.
 1. Temperature Range: Do not expose sealant materials to temperatures outside range permitted by sealant manufacturer or range of 40 deg F to 90 deg F, whichever is more restrictive.

1.8 PROJECT CONDITIONS

- A. Safety: Use all means necessary to protect persons, whether or not involved in the work of this Section, from harm caused by or resulting from work of this Section.
- B. Protection of Building and Property: Use means necessary to protect adjacent building components and materials from damage and from deterioration resulting from work of this Section.
 1. Protect building components and materials from damage by water infiltration through open joints.
 2. Repair damage to components and materials resulting from work of this Section to Restoration Consultant's satisfaction at no additional cost to Owner.
- C. Conditions for Sealant Installation
 1. Temperature: Install joint sealants only when ambient temperature, temperature of

substrate, and temperature of sealant are within the middle two-thirds of the range recommended for installation by sealant manufacturer or between 45 deg F and 85 deg F, whichever range is more restrictive.

2. Joint Widths: Install joint sealants only when joint widths are between minimum and maximum dimensions recommended by sealant manufacturer for application indicated.
3. Joint Substrates: Install joint sealants only under the following conditions:
 - a. Joint substrates are free of contaminants that might adversely affect adhesion or performance of sealant.
 - b. Joint substrates are completely dry.
 - c. Joint substrates are primed as recommended by sealant manufacturer for best sealant adhesion.
- D. Contract Drawings: The Drawings are two-dimensional representations of three-dimensional objects and do not show all surfaces. Perform work on surfaces of projections, reveals, returns, and other elements and surfaces associated with areas on which work is indicated.
- E. Coordination: Coordinate work of this Section with work of Division 4 sections, with work of Division 7 sections, and with work of other sections as required to ensure proper completion of the Work.
- F. Preconstruction Meeting: Convene a preconstruction meeting to discuss joint sealant work and its effects on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Restoration Consultant, Construction Manager, firm(s) that will perform joint sealant work, and other entities that might be affected by joint sealant work.

1.9 SPECIAL PROJECT WARRANTIES

- A. General: Provide warranties as specified below and complying with the requirements of Division I Section "Submittals" in a form acceptable to the Owner, executed by a principal of the firm having authority to execute such documents, and notarized. Submit warranties to Restoration Consultant. Warranties as specified herein shall be in addition to and not a limit on rights the Owner may have under the Uniform Commercial Code and other applicable federal, state, and local laws, codes, and regulations.
- B. Contractor's Warranty and Guarantee: The Contractor shall provide a full guarantee for joint sealant and fully warrant joint sealant installation for a period of five (5) years from the date of Substantial Completion. Contractor shall warrant joint sealants and joint sealant installations against faulty materials, poor workmanship, improper installation, adhesive and/or cohesive failure, reversion, and leakage of water. Contractor shall make repairs and replacements, including both labor and materials, promptly within the warranty period.
- C. Sealant Manufacturer's Warranty and Guarantee: Sealant manufacturer's project-specific full warranty for a period of twenty (20) years from the date of Substantial Completion warranting sealant used in this Project and guaranteeing full replacement for sealant material used in this Project that fails because of faulty materials, poor workmanship, improper installation, adhesive and/or cohesive failure, reversion, and leakage of water.

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- D. Submission: Comply with requirements under "Submittals" Article, above.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2.2 JOINT SEALANTS

- A. Elastomeric Sealant for General Use: Medium modulus, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Uses Related to Exposure NT, Uses Related to Joint Substrates M and O, complying with ASTM C 719 requirements for ± 50 percent movement capability, designed to reduce residue rundown and substrate staining. Provide Dow Corning 756 SMS Silicone Building Sealant-H.P. as manufactured by Dow Corning Corporation, Corporate Center, P.O. Box 994, Midland, MI 48686 (989-496-4400), or approved equal.

1. Color: Provide color selected by Restoration Consultant from full line of manufacturer's standard colors. Colors will not necessarily be limited to manufacturer's standard colors.

- B. Elastomeric Sealant for Joints in Sheet Metal Work: Medium modulus, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Uses Related to Exposure NT, Uses Related to Joint Substrates M and O and complying with ASTM C 719 requirements for ± 50 percent movement capability. Provide Dow Corning 795 Silicone Building Sealant as manufactured by Dow Corning Corporation, Corporate Center, P.O. Box 994, Midland, MI 48686 (989-496-4400), or approved equal.

1. Color: Provide color selected by Restoration Consultant from full line of manufacturer's standard colors. Colors will not necessarily be limited to manufacturer's standard colors.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer in each case based on field experience and laboratory testing.
- B. Cylindrical Plastic Foam Joint Fillers (Backer Rod): Preformed, compressible, resilient, nonstaining, nonwaxing, nonoutgassing strips of flexible plastic foam complying with ASTM C 1330, Type B, of material recommended by sealant manufacturer and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance. Provide Sof Rod as manufactured by Nomaco Inc., 501 NMC Drive, Zebulon, NC 27597 (800-345-7279), or approved equal. Provide plastic foam joint filler with the following properties:

PROPERTY	VALUE	TEST METHOD
Water absorption (g/cc)	<.03	ASTM C 1016 Procedure B

PROPERTY	VALUE	TEST METHOD
Density lb/ft ³	1.8-2.5	ASTM D 1622
Outgassing (No. of bubbles)	<1	ASTM C 1253
Compression recovery, %, min	> 90	ASTM D 5249
25% Compression deflection force, psi, max	5	ASTM D 5249
Tensile Strength psi, min	38	ASTM D 1623

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primers: Material recommended by joint sealant manufacturer for optimum adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
1. All Substrates: Provide primers for all substrates unless sealant manufacturer certifies that unprimed substrate will provide for superior sealant adhesion.
 2. Non-Staining: Provide primers that will not stain substrates and will not stain adjacent materials.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Cork Joint Filler for Horizontal Joints: Resilient, non-extruding type pre-molded cork units complying with ASTM D 1752, Type II or Type III.
- D. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

2.5 TOOLS AND EQUIPMENT

- A. Tools for Removing Sealant Residue and Preparing Masonry Substrates: Nonferrous wire bristle brushes, nonferrous metal scrapers, small grinders with abrasive blades, and low-pressure, airborne-abrasive blasting equipment consisting of a complete system of air compressor, oil and water filters, valves, pressure regulators, nozzles, hoses, and other components for optimum removal of sealant and sealant residue to prepare masonry for installation of new sealant.
1. Use only nonferrous brushes and scrapers. Ferrous metal tools shall not be used in contact with stone.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions

JOINT SEALANTS

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affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION FOR SEALANT INSTALLATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and with the following requirements:
1. General: Remove from joint substrates foreign material that could interfere with adhesion of joint sealant, including, but not limited to, dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, surface dirt, water, and frost.
 2. Masonry and Similar Porous Joint Surfaces: Following proper protection of exposed surfaces adjacent to joints to prevent damage by cleaning, clean masonry and similar porous joint substrate surfaces by brushing using nonferrous wire bristle brushes and metal scrapers; grinding using small grinders with abrasive blades; low-pressure, airborne-abrasive cleaning; or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - a. Removal of Sealant and Sealant Residue: Remove sealant and sealant residue to provide clean, sound substrate capable of developing optimum bond with joint sealants and primers for joint sealants. Following mechanical removal of major portions of sealant and protection of exposed surfaces of masonry units, clean masonry and similar porous joint substrate surfaces using solvent removers and poultices containing solvent removers to remove sealant and sealant residue. Remove remaining contaminants at joint substrates using abrasive methods as indicated above.
 - 1) Do not spread sealant or sealant residue over surface or allow dissolved sealant residue to penetrate into pores of stone.
 - b. Exposed Surfaces and Joint Dimensions: Do not damage masonry surfaces to be exposed in finished work during preparation of masonry at sides of joints. Do not widen joints.
 - c. Removal of Loose Dirt, Dust, and Debris: Remove loose particles remaining from above cleaning operations by brushing with natural fiber bristle brushes followed by blowing out joints with clean, oil-free compressed air at a minimum pressure of 100 psi. Do not blow debris into joints that have previously been cleaned.
 3. Metals and Similar Non-Porous Joint Surfaces: Clean metal and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates to provide optimum conditions for sealant adhesion as recommended by sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces. Prime all surfaces to receive sealant unless sealant manufacturer specifically recommends in writing that a specific surface not

be primed for optimum adhesion of sealant.

1. Apply primers prior to installation of backer rod or bond breaker tape.
2. Apply primers using brush or other approved method as required to reach all joint substrates.
3. Apply primers to achieve a continuous, uniform, smooth, even coating as recommended by manufacturer. Avoid applying primer too thickly or too thinly. Allow primer to cure as recommended by sealant manufacturer before applying sealant.

- C. Protection of Adjacent Surfaces To Be Exposed: Use masking tape where necessary to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements are specified herein or in referenced standards.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with following requirements:
1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that facilitate maximum sealant movement capability.
 - a. Install backer rod to a uniform depth to create optimum sealant profile with a tolerance of plus or minus 1/8 inch.
 - b. Do not leave gaps between ends of joint fillers.
 - c. Do not stretch, twist, puncture, or tear joint fillers.
 - d. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
 2. Install bond breaker tape between sealants and joint fillers or back of joints where backer rods are not used and take other measures necessary to prevent three-point adhesion of sealant.
- D. Installation of Sealants
1. General: Install sealants as recommended by sealant manufacturer using proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration without air pockets, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow maximum sealant movement. Install sealants at same time sealant backings are installed.

2. Depths and Geometry: Install sealants with profiles as shown on Drawings and as recommended by sealant manufacturer and approved by Restoration Consultant.
 - a. Widths Not Exceeding 1/4 Inch: Sealant depth shall equal sealant width.
 - b. Widths Over 1/4 Inch: Sealant depth shall be 1/2 width of joint up to 1/2 inch maximum depth at center of joint with sealant thickness at center of joint equal to approximately 1/2 of depth at adhesion surface.
 - E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 1. Provide flush joint configuration as shown in Figure 5B in ASTM C 1193, unless otherwise indicated.
- 3.4 CLEANING
- A. Clean off excess sealant and sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products adjacent to joints in which sealant is installed.
- 3.5 PROTECTION AND ADJUSTMENT
- A. Protection: Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so that they are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged joint sealants and deteriorated joint sealants immediately, properly prepare joints, and provide new sealants so that installations with repaired areas are indistinguishable from original work.
 - B. Adjustment: Remove joint sealant work that does not comply with requirements of this Section as determined by Restoration Consultant and replace to meet requirements of this Section at no additional cost to Owner.

END OF SECTION 07 92 10

JOINT SEALANTS
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EVERETT C. BENTON LIBRARY
Chimney Rebuild & Associated Repairs

75 OAKLEY ROAD
BELMONT, MA 02478

DRAWING LIST

- A-0 TITLE SHEET
- A-1 ELEVATIONS, ROOF PLAN, PHOTOS
- A-2 DETAILS
- S-1 STRUCTURAL DETAILS

GENERAL NOTES

1. CONTRACTOR SHALL REVIEW EXISTING CONDITIONS BY FIELD VISIT PRIOR TO SUBMITTING BID.
2. GRAPHIC INDICATIONS OF WORK SPECIFIED ON DRAWINGS ARE INTENDED TO GIVE LOCATION OF REPAIR AND APPROXIMATE SIZE OF REPAIR ONLY. ALL WORK SHOULD BE FIELD VERIFIED.
3. CONTRACTOR SHALL CERTIFY THAT ALL WORK IS IN ACCORD WITH THE 8TH EDITION OF THE MASSACHUSETTS STATE BUILDING CODE, ALL OTHER LOCAL OR NATIONAL CODES AND REQUIREMENTS AND GOOD CONSTRUCTION PRACTICES.
4. CONTRACTOR SHALL APPLY FOR AND MAINTAIN IN GOOD ORDER ALL REQUIRED PERMITS AND SHALL COORDINATE WITH OFFICIALS FOR ALL REQUIRED INSPECTIONS AND CERTIFICATIONS.
5. ALL EXTERIOR WORK IS SUBJECT TO REVIEW BY THE APPROPRIATE AGENCIES AND CONSULTANTS FOR THE OWNER. CONTRACT DOCUMENTS REFER TO DRAWINGS AND SPECIFICATIONS FOR THE PROJECT TITLED "EVERETT C. BENTON LIBRARY CHIMNEY REBUILD AND ASSOCIATED REPAIRS."
7. PROVIDE PROTECTION AS REQUIRED TO PROTECT ELEMENTS AND MATERIALS TO REMAIN FROM DAMAGE AND DETERIORATION.
8. CONTRACTOR TO PROVIDE ALL SCAFFOLDING AND MEANS OF ACCESS TO PERFORM WORK.
9. DISPOSE OF OFFSITE IN A LEGAL MANNER, ELEMENTS AND MATERIALS NOT TO BE REINSTALLED OR RETURNED TO OWNER.
10. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD (VIF) BY CONTRACTOR. REPORT ALL DISCREPANCIES PRIOR TO BEGINNING WORK.
11. DO NOT SCALE DRAWINGS.
12. CONTRACTOR WILL SECURE THE SITE TO PREVENT UNAUTHORIZED ACCESS, INCLUDING BUT NOT LIMITED TO CONSTRUCTION BARRIERS, LOCKED ENTRY AND OTHER SECURITY MEASURES AS NECESSARY.

GENERAL MASONRY NOTES
REFER TO SPECIFICATION SECTION 040140

1. COORDINATE ALL MASONRY WORK, INCLUDING BUT NOT LIMITED TO: INSTALLATION OF FLASHINGS AND ASPHALT SHINGLE REPLACEMENT.
2. REBUILD STONE CHIMNEY 100% USING ORIGINAL SALVAGABLE STONES. ASSUME 25% REPLACEMENT STONES CHOSEN TO MATCH IN STONE TYPE AND VARYING DIMENSIONS SIMILAR TO ORIGINAL STONES.
3. CLEAN 100% OF SALVAGED STONE TO BE REUSED, REMOVING ALL SOILING AND MORTAR RESIDUE USING CHEMICAL CLEANERS AS DETERMINED BY TESTING.
4. INSTALL NEW CLAY FLUE LINER IN CHIMNEY CAVITY.
5. INSTALL SALVAGED OR NEW STONE CAPSTONE AND NEW METAL CHIMNEY CAP.
6. REPOINT OPEN AND CRACKED EXTERIOR MASONRY JOINTS IN AREAS SHOWN ON THE DRAWINGS. MATCH NEW MORTAR COLOR AND PROFILE TO ORIGINAL MORTAR COLOR AND JOINT PROFILE. ASSUME 100LF OF REPOINTING.
7. REMOVE PARGING AND DEEP REPOINT JOINTS ON INTERIOR BASEMENT WALL AREAS AS SHOWN ON THE DRAWINGS. FOLLOWING REMOVAL OF PARGING, REVIEW CONDITION OF MASONRY WITH RESTORATION CONSULTANT AND IDENTIFY AND REPAIR ANY MASONRY CRACKS THAT HAVE BEEN EXPOSED. ASSUME 10LF.
8. PERFORM A FINAL MASONRY WASHDOWN AFTER ALL MASONRY RESTORATION WORK IS COMPLETE.
9. INSTALL NEW FLASHINGS ASSOCIATED WITH CHIMNEY REBUILD AND ASPHALT SHINGLE ROOFING AS SHOWN ON THE DRAWINGS.
10. NEW METAL FLUE VENT LINER TO BE INSTALLED BY OTHERS.

GENERAL STRUCTURAL NOTES

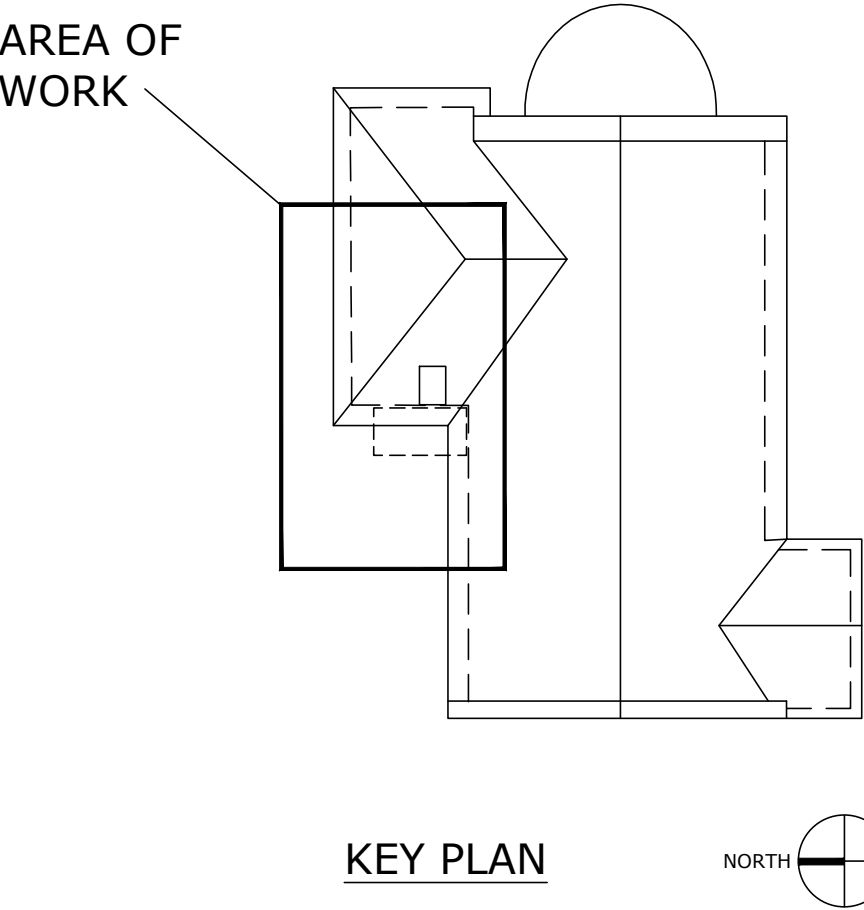
1. FOLLOWING EXPOSURE OF THE MASONRY CHIMNEY SURFACE AT THE ROOFLINE, SCHEDULE REVIEW OF CONDITIONS AND GEOMETRY BY RESTORATION CONSULTANT.
2. ADDITIONAL DISMANTLING (ASSUME 12 CF) OF THE MASONRY BELOW THE ROOF IS ANTICIPATED TO REACH SOUND MORTAR; THIS CONDITION SHOULD ALSO BE REVIEWED BY THE RESTORATION CONSULTANT. REVIEW HOW ROOF FRAMING AND DECKING AROUND THE CHIMNEY IS ATTACHED AND ITS CONDITION. REVIEW WITH RESTORATION CONSULTANT.
3. BASED ON EXISTING CONDITIONS, PROVIDE SHOP SKETCH OF ACTUAL EXTERIOR AND INTERIOR CHIMNEY DIMENSIONS, TOGETHER WITH THICKNESS AND SIZE OF CHIMNEY LINER. NOTE HOW THE CLEAR OPENING OF THE NEW PART COMPARES TO THAT OF THE EXISTING.
4. BASED ON THE SHOP SKETCH, RESTORATION CONSULTANT/STRUCTURAL ENGINEER WILL DETERMINE IF STAINLESS STEEL DOWELS AND FURTHER VERTICAL REINFORCEMENT WILL BE REQUIRED. ASSUME (8)³/₄" DIAMETER THREADED ROD DOWELS, DRILLED AND EPOXY SET 12" INTO MASONRY BASE, AND LAPPING 36" INTO STRUCTURE ABOVE. ASSUME THAT FURTHER VERTICAL REINFORCEMENT WILL NOT BE REQUIRED. ASSUME THAT MASONRY CONCEALED BEHIND FLASHING CAN BE A MODULAR UNIT SUCH AS CONCRETE BRICK. IF HOLLOW UNITS ARE SELECTED, THEY MUST BE GROUTED SOLID.

GENERAL ROOFING, FLASHING AND WATER MANAGEMENT NOTES
REFER TO SPECIFICATION SECTIONS 073113,076210 AND 079210

1. COORDINATE ALL ROOFING WORK, INCLUDING BUT NOT LIMITED TO: REMOVALS, SUBSTRATE REPAIR AND REPLACEMENT, WATERPROOFING MEMBRANE INSTALLATION, SHEET METAL FLASHING INSTALLATION, AND ASPHALT SHINGLE INSTALLATION TO ENSURE OPTIMUM INSTALLATION AND WEATHER TIGHT ROOF.
2. AS SHOWN ON THE DRAWINGS, REMOVE EXISTING ASPHALT SHINGLE ROOFING DOWN TO DECK. REPAIR DAMAGED DECKING AS REQUIRED TO PROVIDE SOUND, SECURE, CONTINUOUS, EVEN SUBSTRATE AND INSTALL NEW ASPHALT SHINGLE ROOFING TO MATCH EXISTING IN COLOR AND DIMENSION.
3. INSTALL NEW COPPER GUTTER AND LEADERS AS SHOWN ON THE DRAWINGS.

GENERAL INTERIOR FINISHED WOOD REPAIRS NOTES
REFER TO SPECIFICATION SECTION 060140.91

1. REPAIR OR REPLACE EXISTING DAMAGED WOOD ELEMENTS AS SHOWN ON THE DRAWINGS. REPLACE WOOD TO MATCH EXISTING WOOD IN SPECIES, PROFILE, DIMENSION AND FINISH.



BCA

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NAME: Everett C. Benton Library
Chimney Rebuild & Associated Repairs

ADDRESS: 75 Oakley Road
Belmont, MA 02478

REVISIONS		
#	DATE	DESCRIPTION

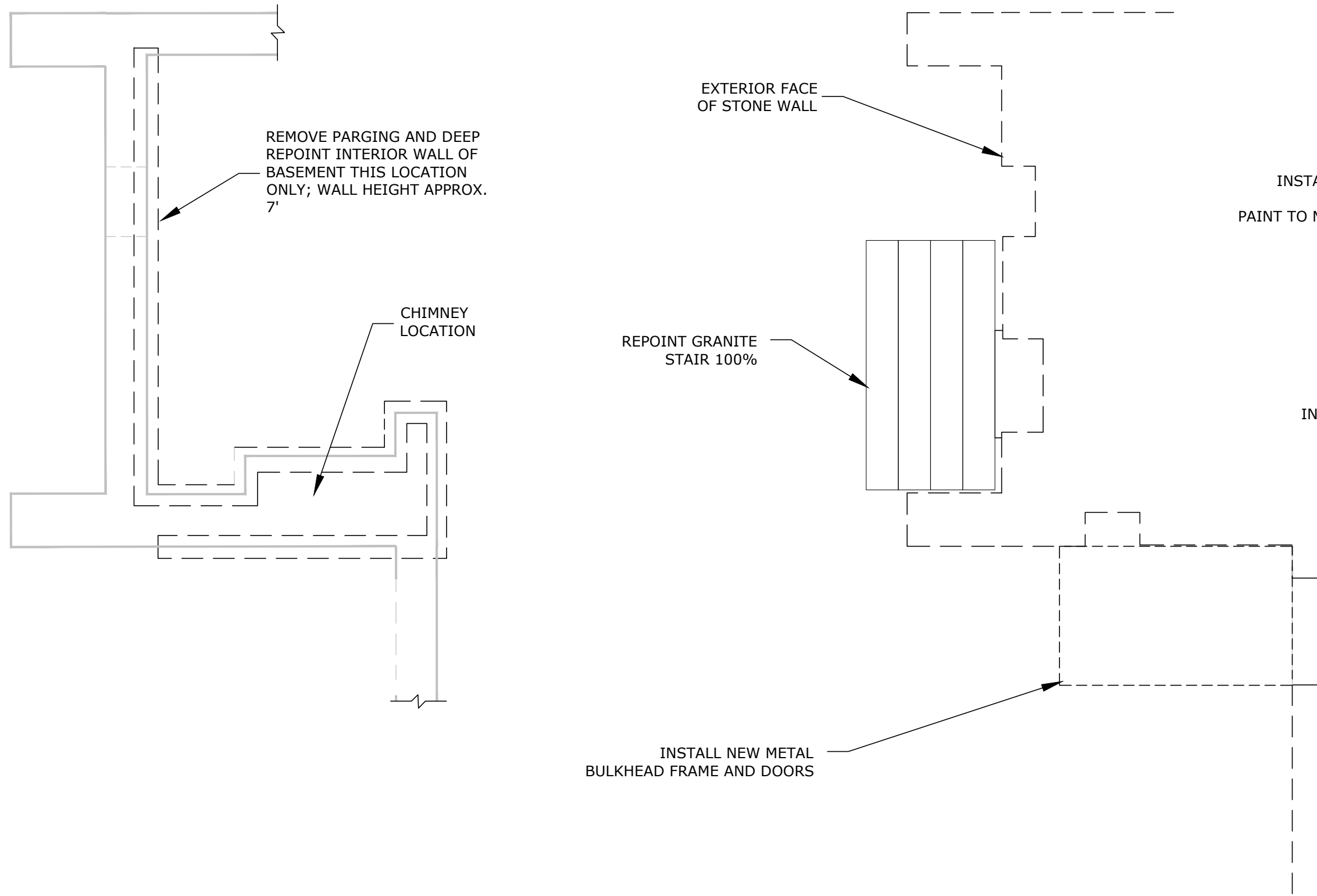
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Date of Issue:
April 5, 2023

Drawing Title:
TITLE SHEET
GENERAL NOTES

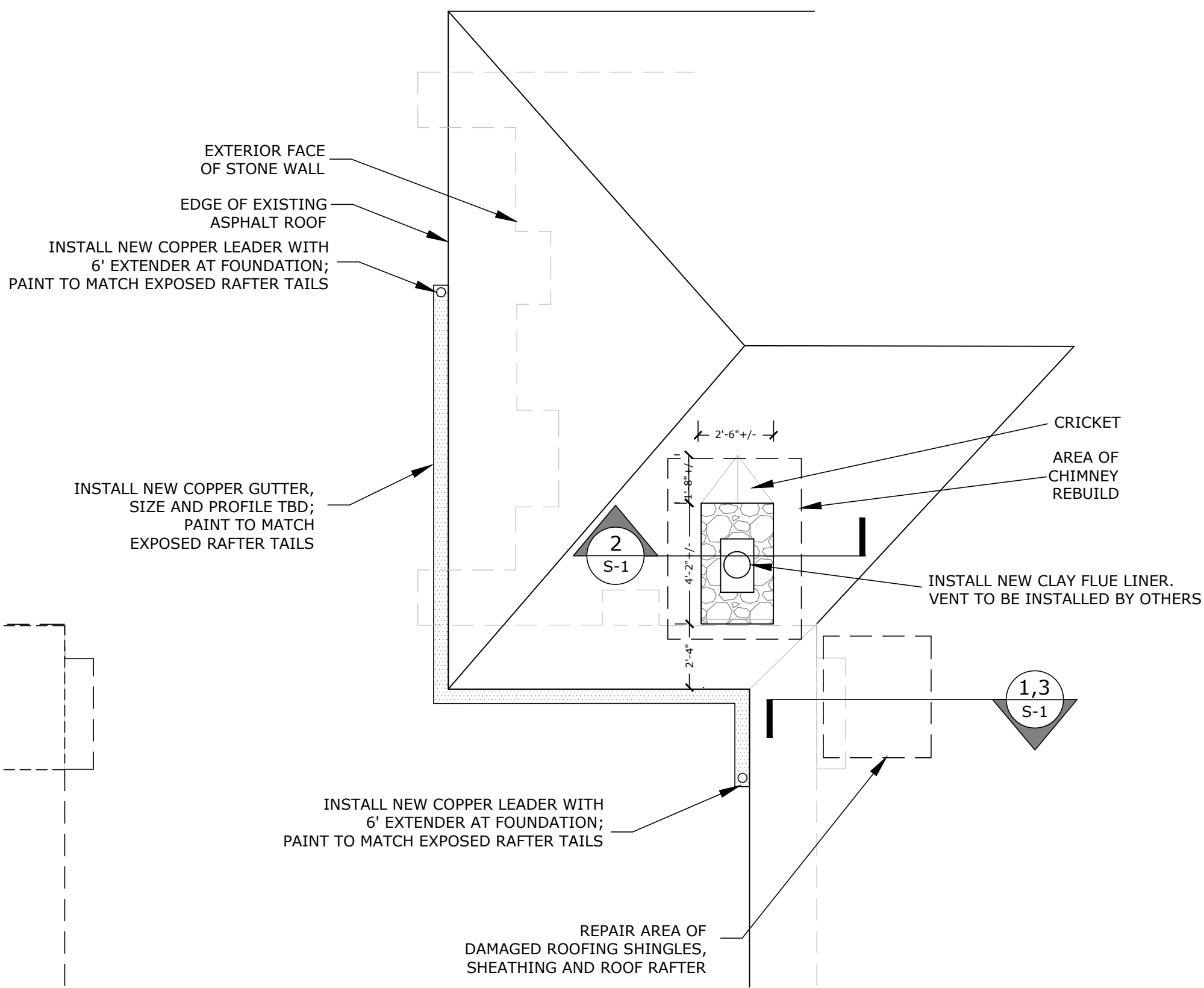
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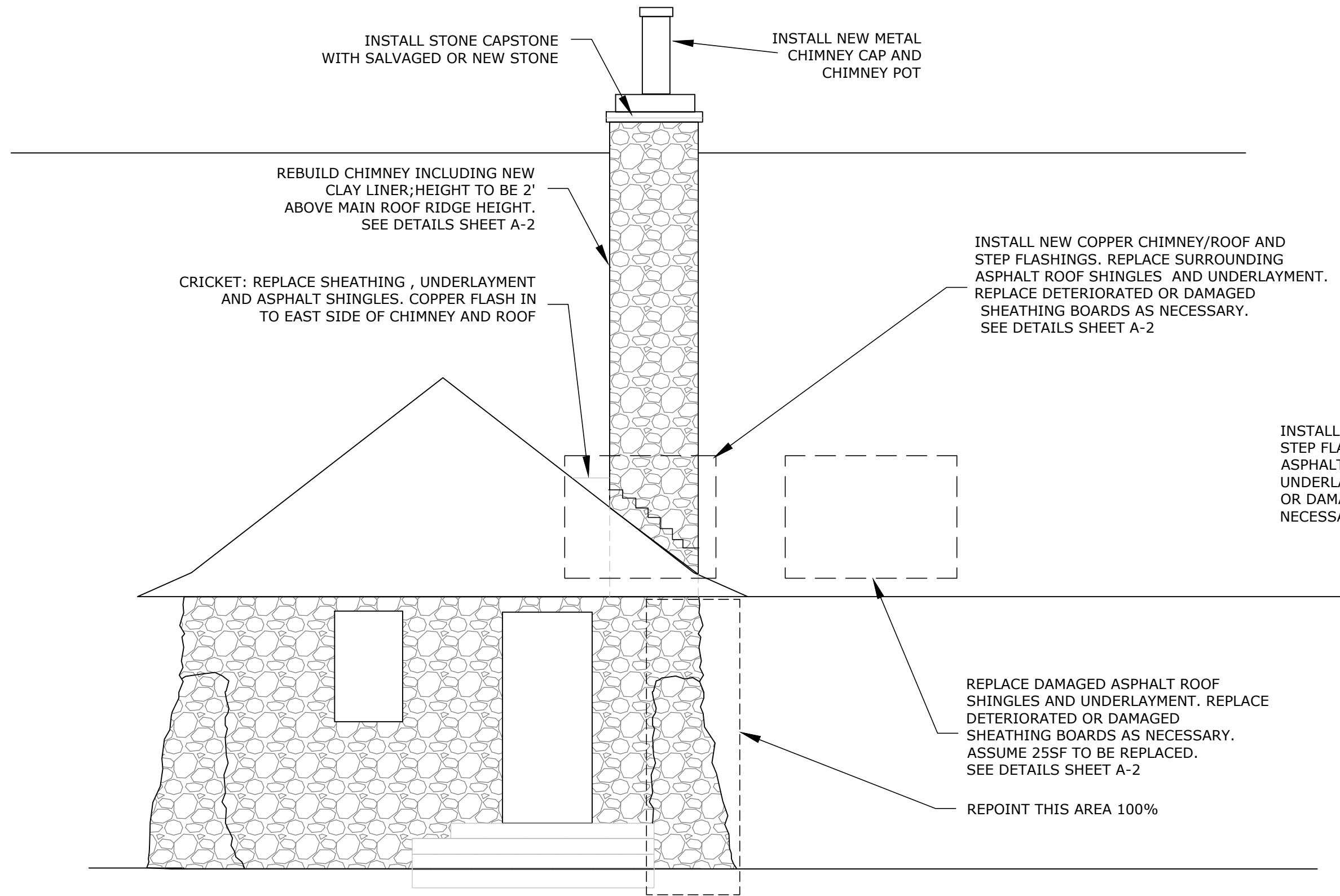


6 PARTIAL BASEMENT PLAN
A-1 1/4" = 1'-0"

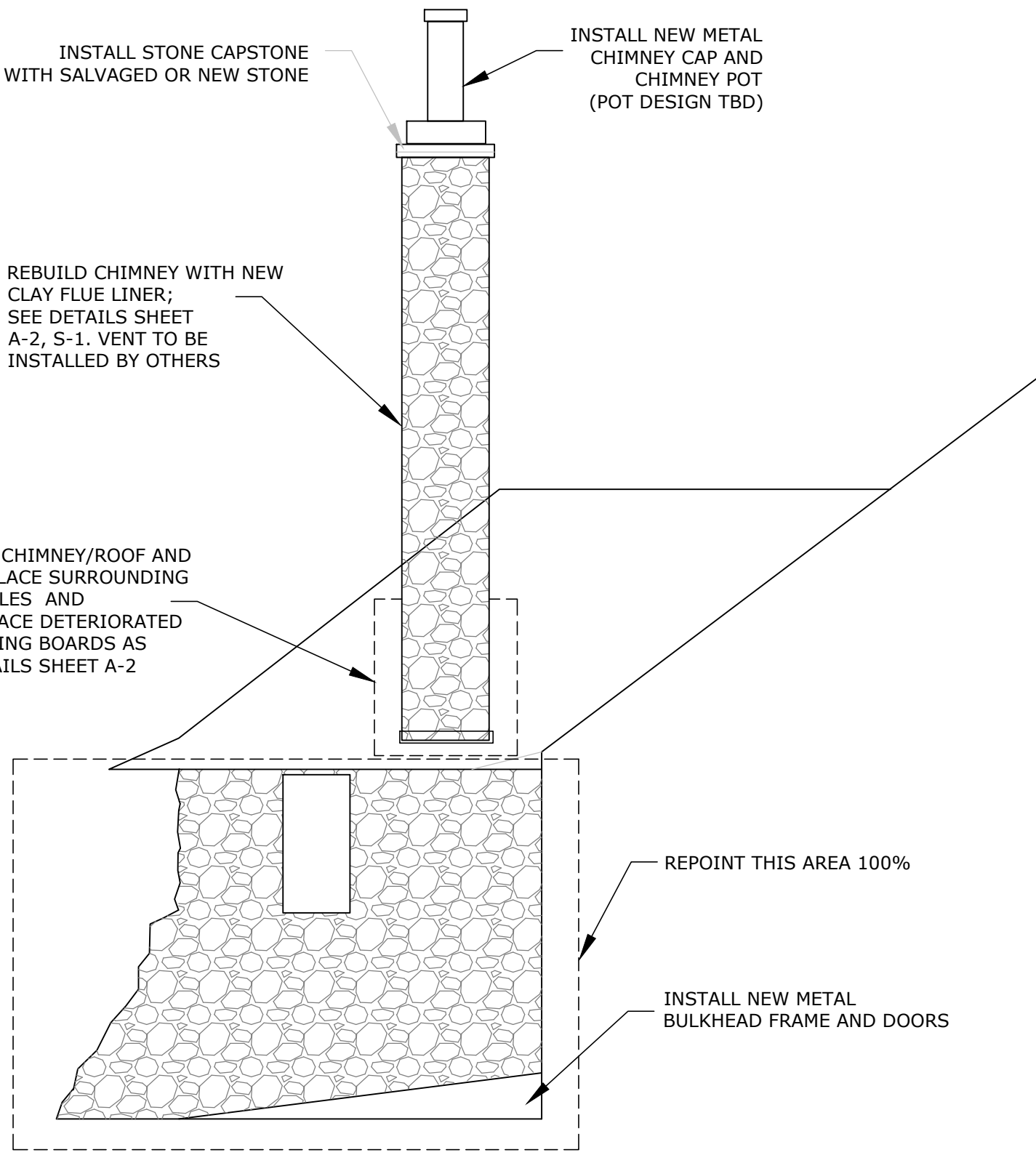
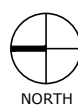
5 PARTIAL GROUND FLOOR PLAN
A-1 1/4" = 1'-0"



4 ROOF PLAN
A-1 1/4" = 1'-0"



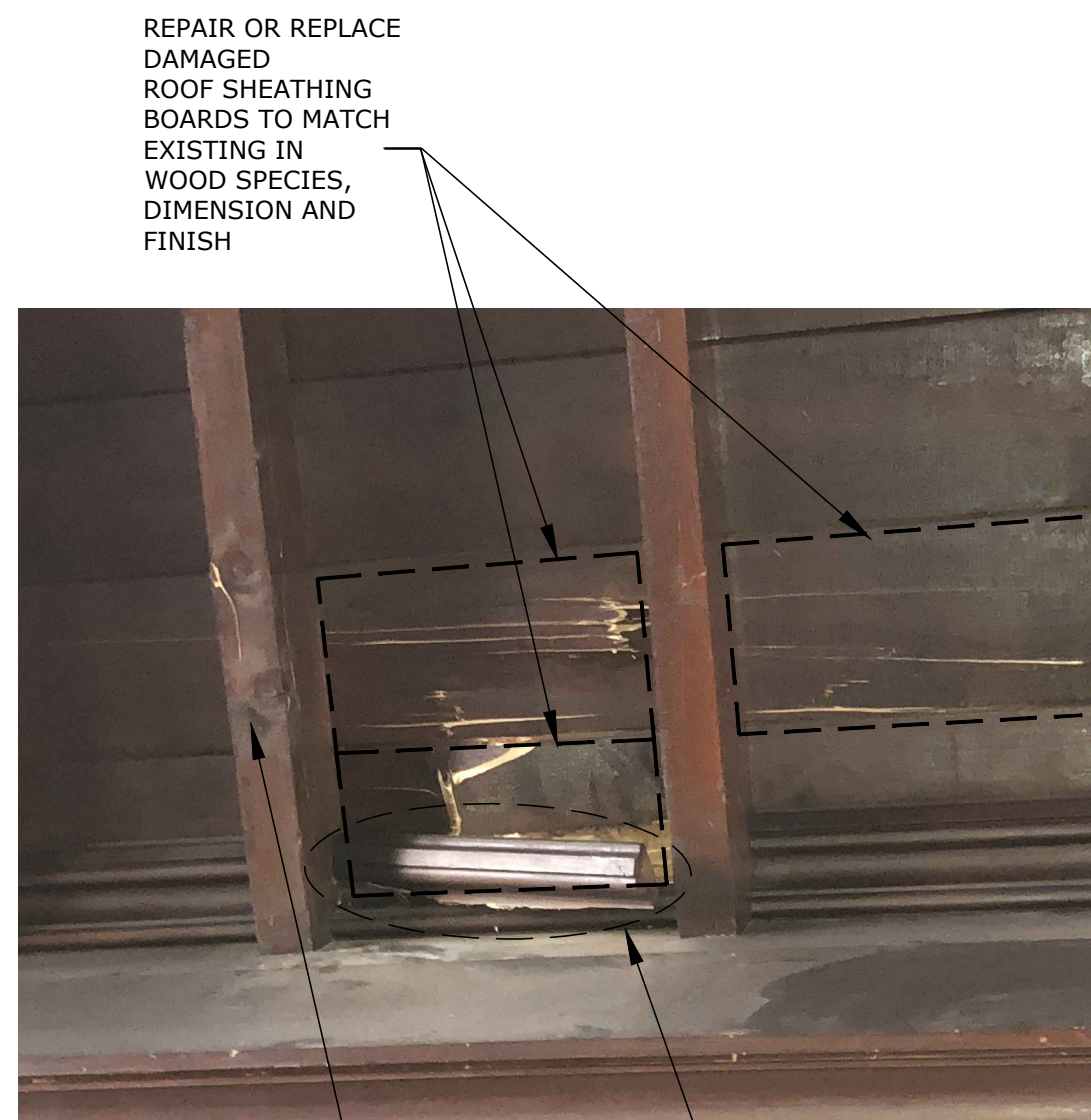
3 NORTH ELEVATION
A-1 1/4" = 1'-0"



2 WEST ELEVATION
A-1 1/4" = 1'-0"



CHIMNEY PRIOR TO COLLAPSE, LOOKING SOUTHEAST, DECEMBER 2021



REPAIR RAFTER, REFER TO S-1 DRAWING REPAIR AND REFINISH TO MATCH ADJACENT WOOD RAFTERS.

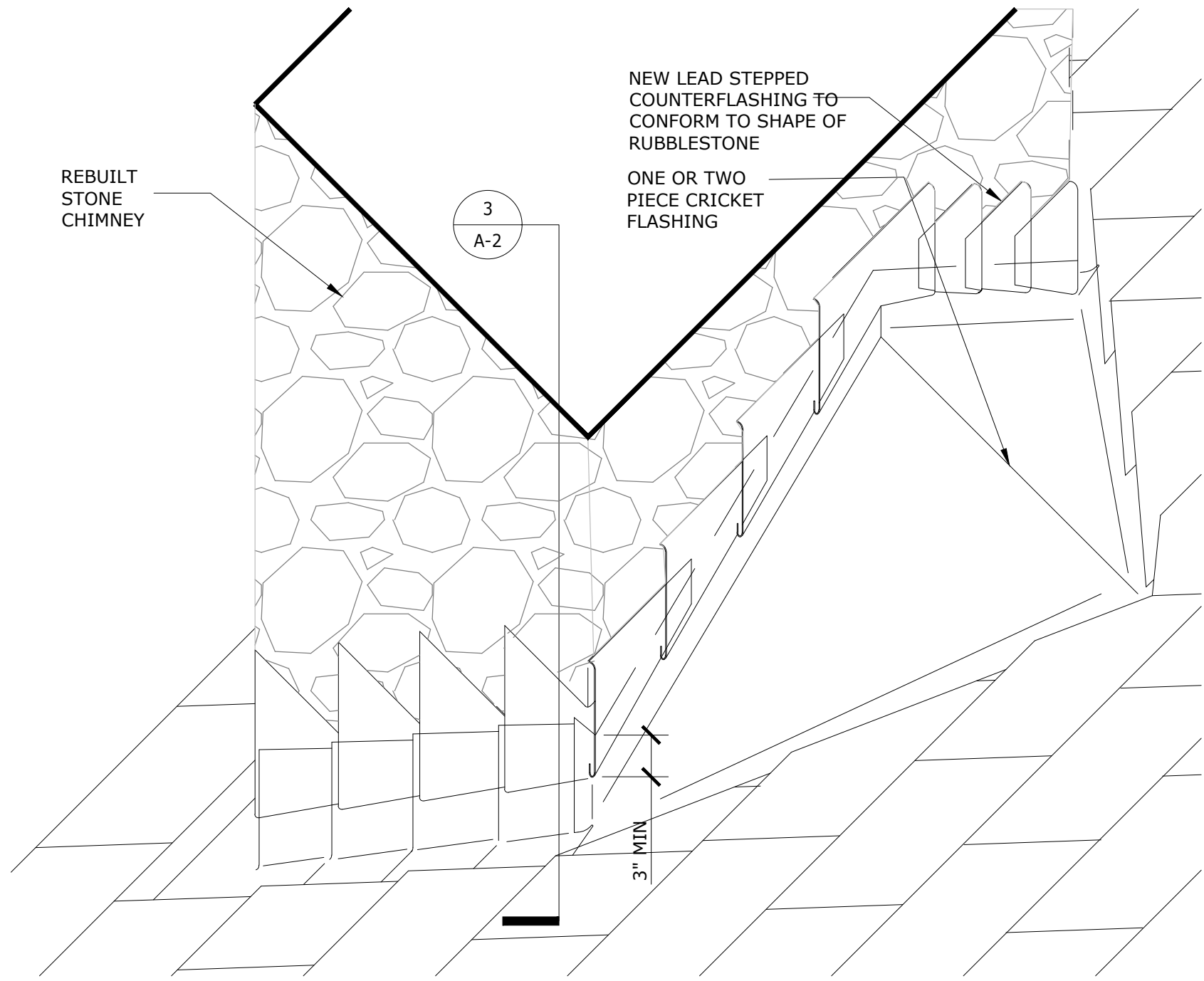
REPAIR OR REPLACE DAMAGED MOLDING TO MATCH EXISTING IN WOOD SPECIES, PROFILE, DIMENSION AND FINISH

READING ROOM INTERIOR;
NORTH ROOF CEILING

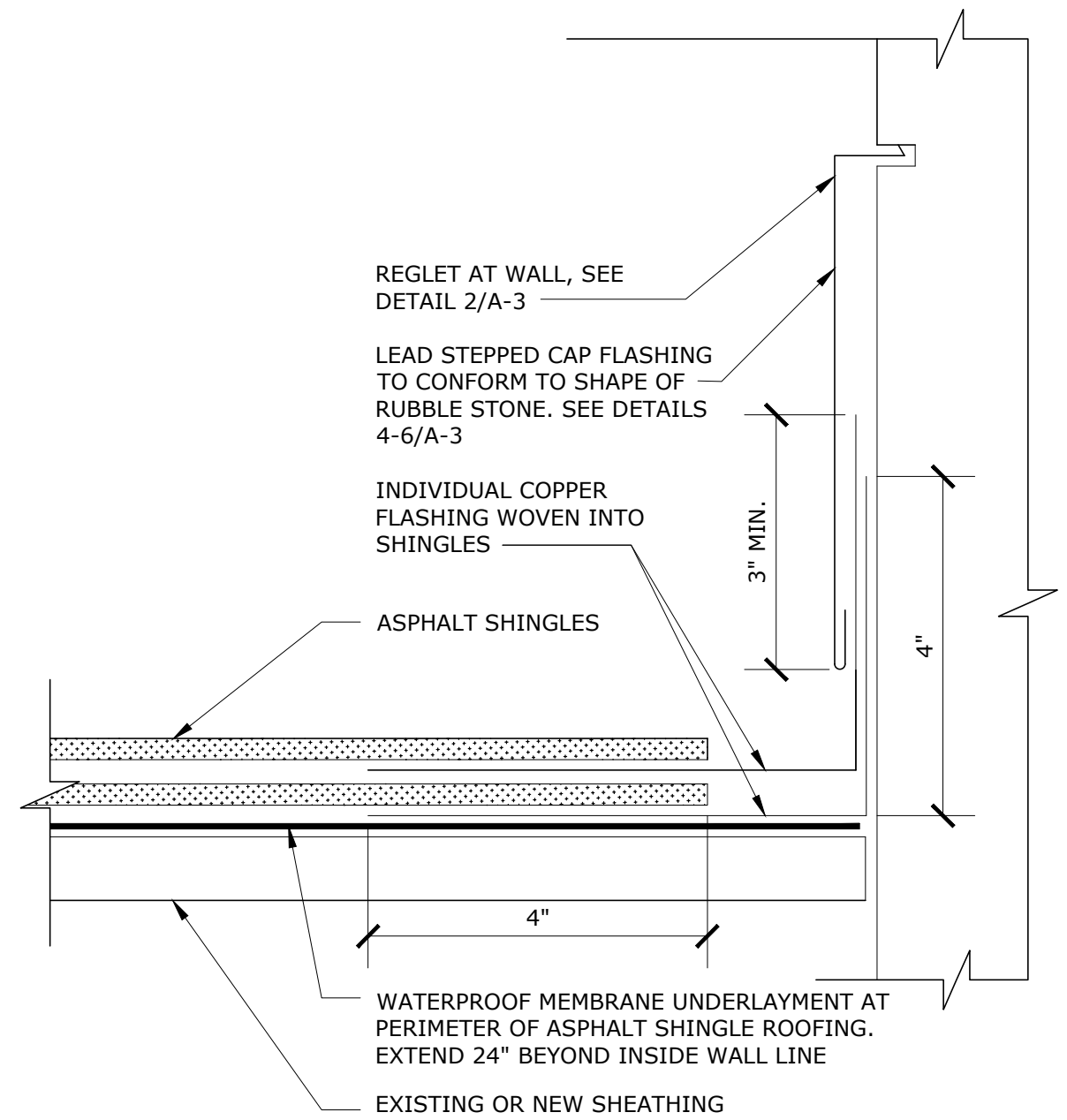
1 A-1 1/4" = 1'-0"

REVISIONS		
#	DATE	DESCRIPTION

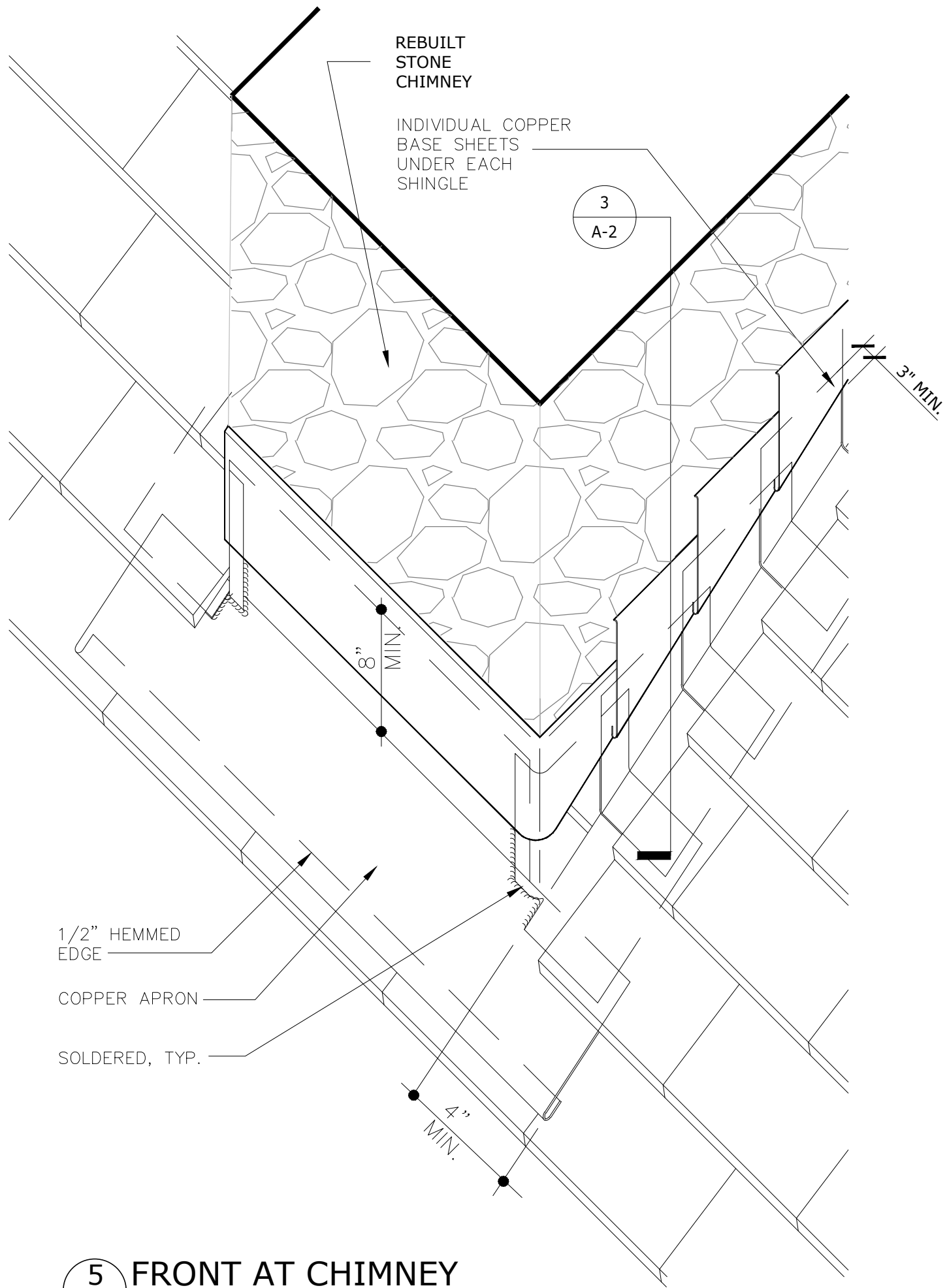
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Date of Issue: April 5, 2023	
Drawing Title: ELEVATIONS, ROOF PLAN, PHOTOS	
Scale: As Noted @ 22x34	
Drawing No: A-1	



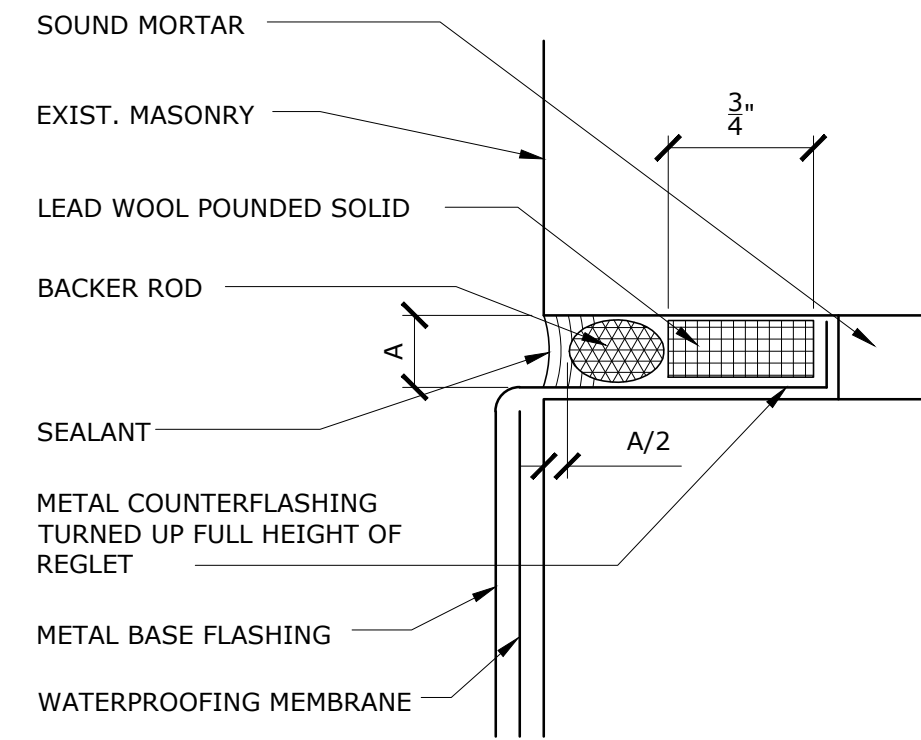
6 CRICKET AT CHIMNEY
NOT TO SCALE



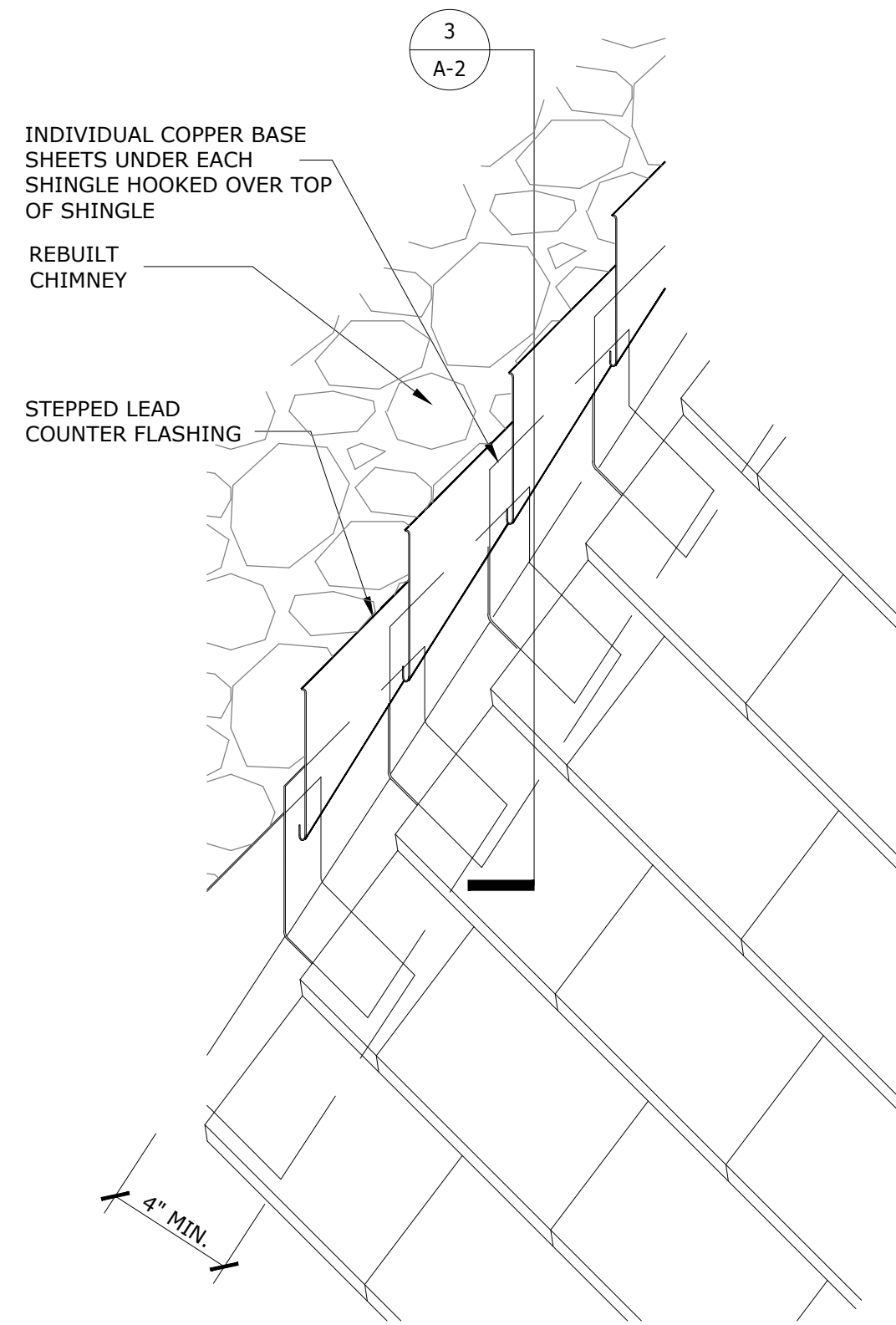
3 DETAIL AT WALL FLASHING
NOT TO SCALE



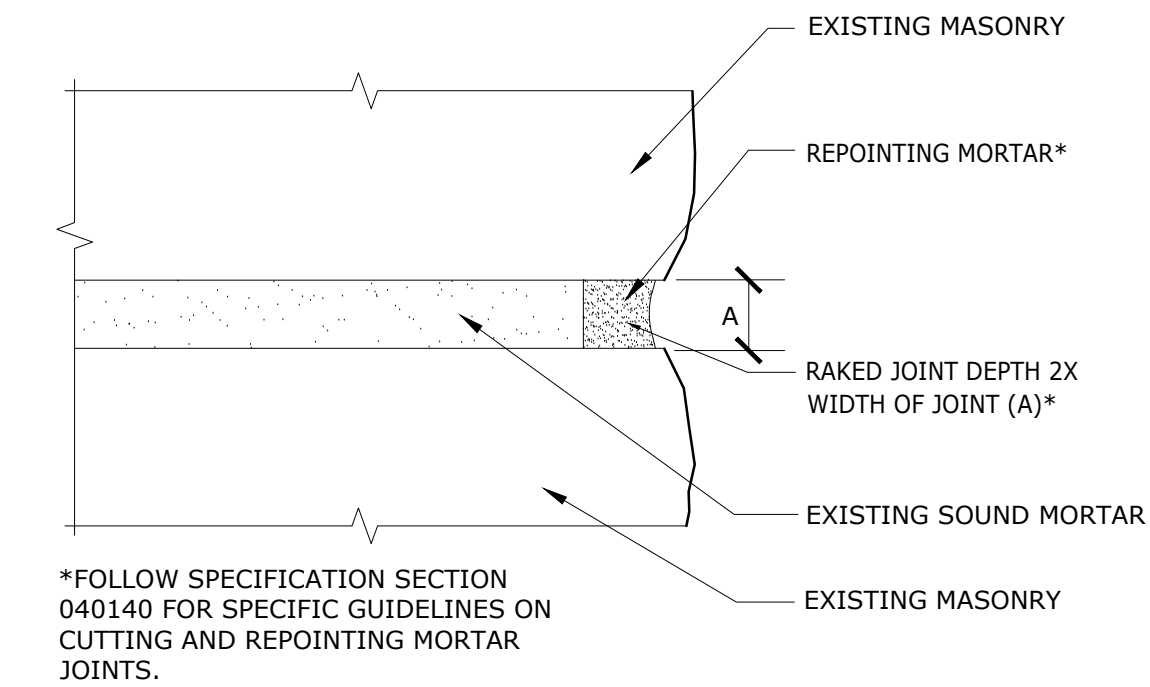
5 FRONT AT CHIMNEY
NOT TO SCALE



2 TYPICAL REGLET SECTION
NOT TO SCALE



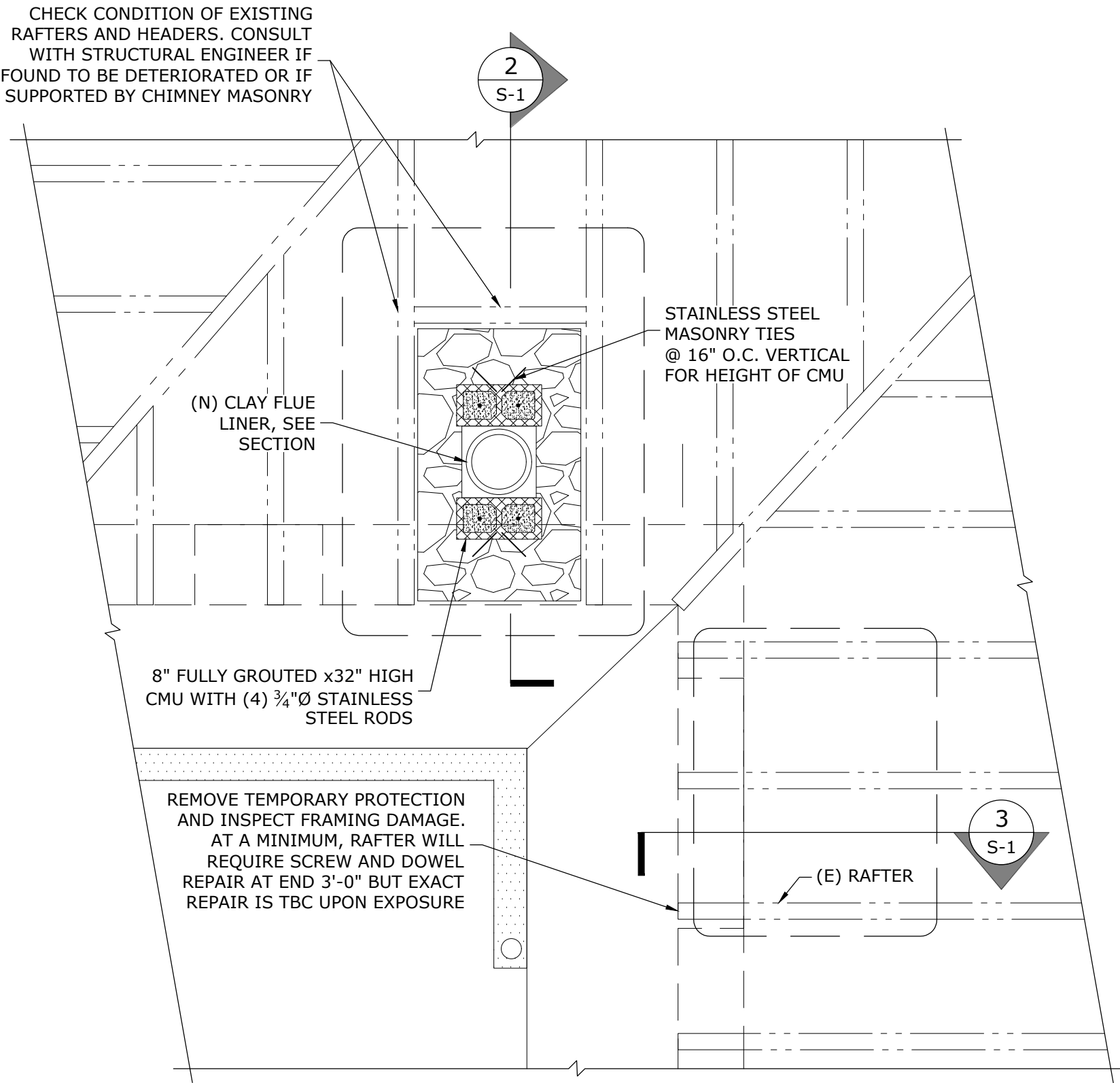
4 ASPHALT ROOF AT CHIMNEY
NOT TO SCALE



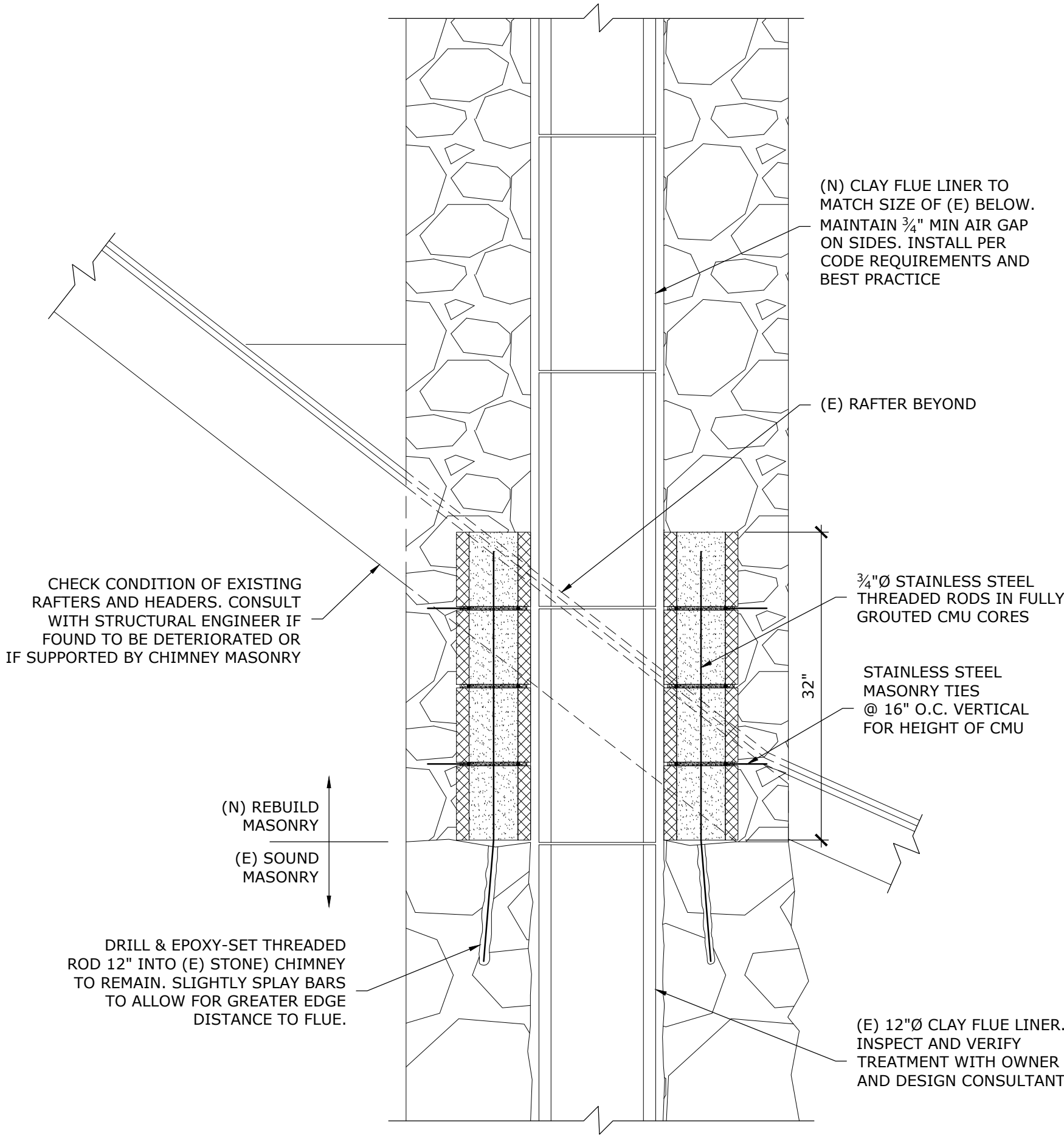
1 REPOINTING PROFILE
AND TYPICAL RAKED JOINT
NOT TO SCALE

REVISIONS		
#	DATE	DESCRIPTION

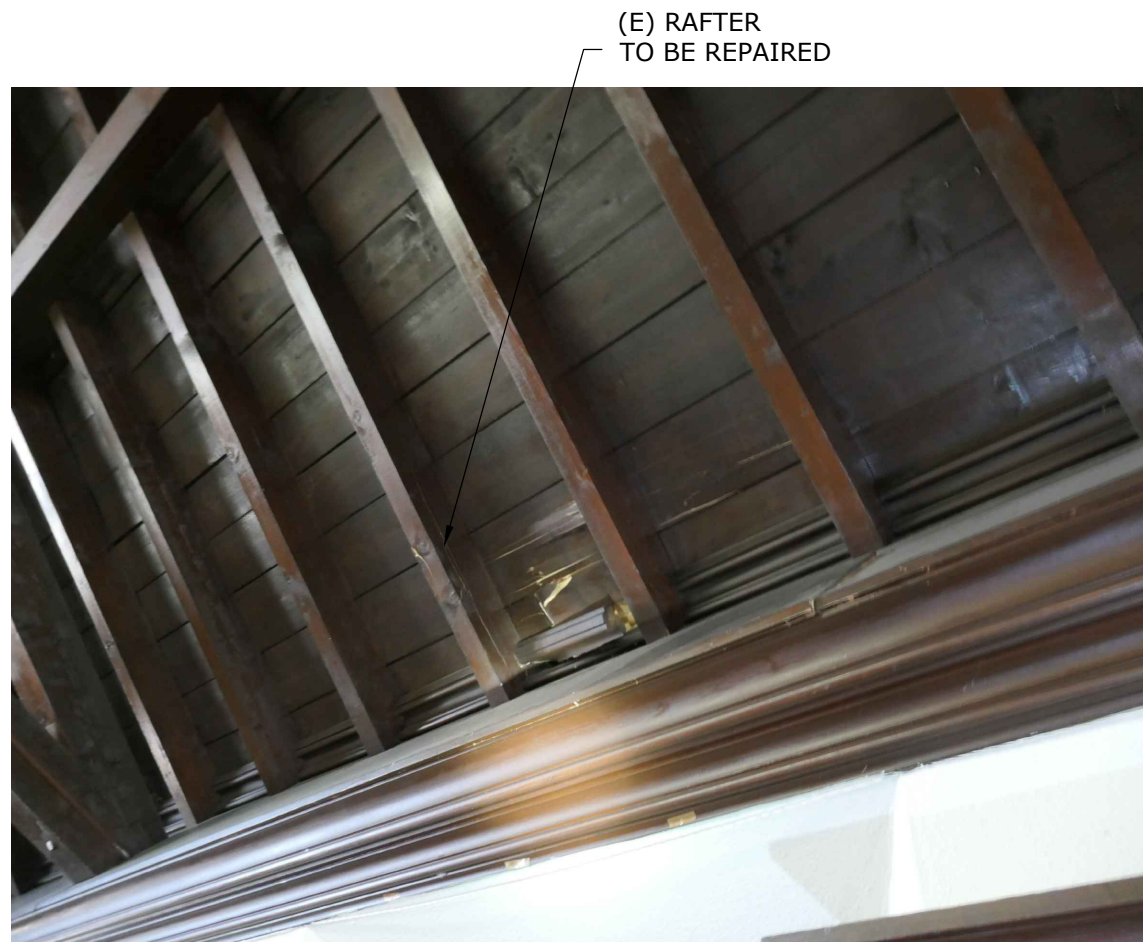
Drawn By: LNH	Checked By: LJH
Date of Issue: April 5, 2023	
Drawing Title: DETAILS	
Scale: As Noted @ 22x34	
Drawing No: A-2	



1 PARTIAL FRAMING PLAN
S-1 1/2" = 1'-0"



2 SECTION AT CHIMNEY REPAIR
S-1 1" = 1'-0"



3 SECTION AT RAFTER REPAIR
S-1 1" = 1'-0"



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Drawn By: PN	Checked By: BA
Date of Issue: April 5, 2023	
Drawing Title: STRUCTURAL DETAILS	
Scale: As Noted @ 22x34	
Drawing No: S-1	