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<td>02 11 00</td>
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<td>02 42 00-1 thru 5</td>
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<td>04 06 10</td>
<td>Mortar, Grout, and Repointing - Marble</td>
<td>04 06 10-1 thru 7</td>
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<td>04 86 10</td>
<td>New Stone - Marble</td>
<td>04 86 10-1 thru 5</td>
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<td>04 92 00</td>
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<td>04 92 10-1 thru 12</td>
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<td></td>
</tr>
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<td></td>
</tr>
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<td>Wood Blocking, Curbing and Sheathing</td>
<td>06 11 40-1 thru 3</td>
</tr>
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<td>DIVISION 7 - THERMAL AND MOISTURE PROTECTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07 21 00</td>
<td>Roof Insulation</td>
<td>07 21 00-1 thru 3</td>
</tr>
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<td>Modified Bitumen Roofing and Flashings</td>
<td>07 50 30-1 thru 17</td>
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</tr>
<tr>
<td>09 97 13</td>
<td>Steel Coatings</td>
<td>09 97 13-1 thru 7</td>
</tr>
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</table>
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22 14 23 Roof Drainage 22 14 23-1 thru 4

END OF SECTION
SECTION 00 02 00

INVITATION TO BID

Ms. Roseann Sillasen
Associate Director of Construction Services
Wesleyan University
170 Long Lane
Middletown, CT 06459

will receive bids for:

Building Envelope Repairs
Olin Library
Wesleyan University
Middletown, Connecticut

until: 11:00 a.m. local time April 3, 2017.

Providing all labor, materials, equipment and other items necessary to perform repairs to the following building envelope components, as shown on the drawings, including:

- Low-sloped roofs
- Slate roofs
- Copper gutters
- Marble cornice, pilasters, columns, and bands
- Granite elements
- Skylights
- Chimneys
- South entry stairway
- Interface between original 1928 building and 1980s building

Project Schedule: Due to the operation of the facility with summer classes, all work must be substantially completed by July 31st. The entire project, including punchlist must be completed prior to August 11th.

Copies of the Bid Documents are available for review and may be obtained from the Architect/Engineer's office of Wiss, Janney, Elstner Associates, Inc., Two Trap Falls Road, Suite 502, Shelton, Connecticut 06484 (203) 944-9424.

Bidders must submit their bids in accordance with Instruction to Bidders.

The Owner will privately open and review the bids after the specified closing time. The Owner reserves the right to waive any irregularities and reject any or all bids.

END OF SECTION
SECTION 00 10 00

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 BID DOCUMENTS

A. Bid Documents will be disseminated via email; they also are available to Bidders for review and may be obtained from the Architect/Engineer's office:

WISS, JANNEY, ELSTNER ASSOCIATES, INC.
Two Trap Falls Road, Suite 502
Shelton, Connecticut 06484

B. Bid Documents will not be available for distribution to sub-bidders.

1.2 EXAMINATION OF DOCUMENTS, SITE AND LOCAL CONDITIONS

A. The Bidders shall carefully examine and familiarize themselves with the Bid Documents. No extra compensation will be paid at a later date for lack of knowledge or neglect on the contractor's part.

B. The Bidders shall visit the site and fully acquaint themselves with conditions as they exist.

C. Bidders shall immediately report to the Architect/Engineer any errors, inconsistencies or ambiguities discovered.

1.3 INTERPRETATIONS OR CORRECTION OF BID DOCUMENTS DURING BIDDING

A. Bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect/Engineer. No inquiry received within five (5) days of the date fixed for opening of the bids will be given consideration.

B. Any interpretation, correction or change of the Bidding Documents, if such is issued, will be sent as promptly as is practicable to all persons to whom the Drawings and Specifications have been issued. All such addenda shall become part of the Contract Documents. Failure of the Architect/Engineer to send or any Bidder to receive any such interpretation, shall not relieve any Bidder from any obligation under his Bid as submitted.
C. Interpretations, corrections or changes of the Bidding Documents made in a manner other than an addendum will not be binding, and Bidders shall not rely upon such interpretations, corrections or changes.

1.4 TIME OF COMPLETION

A. Time of completion of the project is of extreme importance to the Owner and will be considered in the award of a contract. Bidders shall complete work during the times outlined in the Invitation to Bid. The Bidder shall state on the Bid Form the number of calendar days he/she will require to substantially complete the project. Failure of the Contractor to substantially complete the project in the number of days indicated on his Bid Form, plus any adjustments authorized by the Owner in writing, will be considered a substantial violation of the Contract.

1.5 PREPARATION OF BIDS

A. Each Bid must be submitted on the form indicated in Section 00 30 00. The Bid Form may be obtained from the Architect/Engineer.

B. The Bid Form shall be submitted in a sealed envelope addressed as indicated below. Also, the outside of the envelope shall bear the designations, "BID PROPOSAL, the name of the project, and the name of the Bidder and the Bidder's address. In the event the Bid is forwarded by mail or messenger, the sealed envelope containing the Bid shall be enclosed in another envelope addressed to the Bid recipient at the designated location for opening of the Bid.

C. Bids shall be addressed to:

Ms. Roseann Sillasen
Associate Director - Construction Services
Wesleyan University
170 Long Lane
Middletown, CT 06459

D. Bids must be received by the above-noted addressee prior to the specified closing time. Bids received after this time may be returned unopened.

1.6 CONSIDERATION OF BIDS

A. The Owner will privately open and review the Bids after the specified closing time.

B. The Owner reserves the right to waive any irregularities and reject any or all Bids.
C. The Bidder shall also submit a properly executed Bid Form. All proposed subcontractors shall also be included.

D. A Pre-Bid Conference will be held at the building. Bidders will be notified of a time and specific location. Your company representative must be present and should be familiar with the project and any bid documents received and have any questions or comments ready for review at this time. Subcontractors with questions pertaining to interpretation or clarification of the bidding documents are invited to attend. The Owner and the Architect/Engineer will be represented. The Pre-Bid Conference is mandatory. Bidders not attending Pre-Bid Conference subject their bid to disqualification.

1.7 PERFORMANCE BOND AND MATERIAL PAYMENT BOND

A. Each Bidder shall qualify for a Performance Bond and Material Payment Bond each equaling 100 percent of the Bid. The costs associated in providing these bonds shall be indicated in the appropriate area of the Bid Form.

B. The Performance Bond must be in a standard form, such as AIA Document A312, from a satisfactory Surety made payable to the Owner.

C. The Payment Bond must be in a standard form, such as AIA Document A312, from a satisfactory Surety made payable to the Owner.

1.8 AWARD OF CONTRACT

A. A Contract shall be deemed as having been awarded when a formal notice of award has been duly served.

B. The Bidder to whom the Contact is awarded shall execute a Contract, AIA Document A101, "Standard Form of Agreement Between Owner and Contractor," 1997 Edition, within 7 days after the date of notice to award.

END OF SECTION
SECTION 00 30 00

BID FORM

BID TO: Olin Library - Building Envelope Repairs
Wesleyan University
c/o Roseann Silasen
170 Long Lane
Middletown, CT 06459

Submit bid no later than April 3, 2017 at 11:00 a.m.

BID FORM:

________________________________________________________________________

(Bidder's Name)

________________________________________________________________________

(Bidder's Address)

DATE:

________________________________________________________________________

THE UNDERSIGNED

1. Acknowledges receipt of:

A. Project Manuals for:
   1. Olin Library - Building Envelope Repairs
      Wesleyan University
      252 Church Street
      Middletown, CT 06459
      Dated: March 10, 2017

   2. Wesleyan Project Manual - Divisions 00 and 01, as provided by Wesleyan University.

B. Drawings: C001 through C002, A100 through A102, A200 through A204, A300 through A315, dated March 10, 2017

C. Addenda: No.________ Dated: ________________

   No.________ Dated: ________________

   No.________ Dated: ________________

   No.________ Dated: ________________

2. Has visited and examined the site of Work and has examined the Bidding Documents for the Work.

Olin Library - Wesleyan University 00 30 00 - 1
WJE No. 2015.1483.1
Bid Form
March 10, 2017
3. Agrees:

A. To hold the Bid Proposal open for not less than 45 days after the scheduled Bid Opening Date.

B. To execute an Agreement, Performance Bond and Payment Bond (if required), and provide proof of insurance coverage with the Owner for the entire Work in accordance with the Contract Documents within seven (7) days after notice of award.

4. General Condition Costs

A. Costs on the project, such as permit fees, mobilization, demobilization, scaffolding costs, fixed cost rentals, or fixed costs shall be considered General Condition Costs, and shall be included in all unit and lump sum prices.

5. Changes in the Work

A. To address changes in the work, either an addition or deletion, not indicated under unit costs by the Contract Documents and Specifications, and upon written instructions of the Owner, the following prices shall prevail in accordance with the General Conditions.

1. Labor - including all profit and overhead. All trades at their prevailing hourly rate plus ______________________________ percent (_____ %) for profit and overhead.

2. Material costs at cost plus _____FIVE_____ percent (___5___%) for profit and overhead.

6. Taxes

A. The undersigned agrees that the Grand Total price includes all taxes applicable to the work of whatever character or description, which are levied by federal, state or municipal governments.

7. Rights Reserved

A. In submitting this Proposal, the undersigned understands that the Owner reserves the right to reject any or all proposals submitted, in whole or in part, to waive any information therein, and to accept any proposal, as the Owner may consider to be in his/her interests.
8. **BASE BID**

A. For all Work required to complete the project in its entirety, the contractor bids:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Total Bid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>General Conditions</strong> - All work defined in the Contract documents other than itemized below.</td>
<td>$</td>
</tr>
</tbody>
</table>
| 2   | **Masonry Repairs** - All Lump Sum masonry repairs including scope of work items:  
  - JR-1 - Rake and Repoint (Stone Masonry)  
  - JR-2 - Rack and Repoint (Brick Masonry) at Chimneys  
  - JR-4 - Lead Weathercap Joints  
  - JR-5 - Sealant Joints  
  - JR-6 - Staple at Baluster Railing  
  - BT-1 - Building Transition Flashing  
  - CP-1 - Cornice Probe | $         |
| 3   | **Stair Railing Repairs** - All Lump Sum stair railing repairs including scope of work items:  
  - MM-2 - Stair Railing Repairs  
  - MM-3 - Entrance Landing Railings | $         |
| 4   | **Roofing and Flashings** - All Lump Sum roofing repairs including scope of work items:  
  - SR-1 - Slate Roof Replacement  
  - LS-1 - 1980s Lower Perimeter Roof  
  - LS-2 - 1980s Upper Roof  
  - LS-3 - 1928 North Roof  
  - LS-4 - 1980s First Floor Roof at West Elevation  
  - LS-5 - Roof Walkpads  
  - FS-1 - 1928 South Roof  
  - FS-2 - 1928 South Roof Abatement  
  - FS-3 - Chimney Caps | $         |
| 5   | **Skylights** - All Lump Sum skylight work including scope of work items:  
  - SL-1 - North Roof Sloped Skylight Infill  
  - SL-2 - South Roof Sloped Skylights  
  - SL-3 - Ridge Skylight | $         |

**GRAND TOTAL IN WORDS**

<table>
<thead>
<tr>
<th>GRAND TOTAL IN WORDS</th>
<th>$</th>
</tr>
</thead>
</table>
This bid includes all labor, materials, services and equipment necessary for completion of the Work specified.

B. The contractor estimates he/she substantially complete the project in ____ days from award of contract.

C. Due to the operation of the facility, the project shall commence on May 29, 2017 or as indicated below:

9. **UNIT PRICES**

The unit prices included in the following schedule will be used for adjustments to the scope of work indicated on the drawings. The unit prices shall include labor and material costs and costs associated with required access.

<table>
<thead>
<tr>
<th>Repair ID</th>
<th>Description</th>
<th>Unit</th>
<th>Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR-3</td>
<td>Rake and Repoint Brick Masonry</td>
<td>S.F.</td>
<td>$</td>
</tr>
<tr>
<td>CR-1</td>
<td>Virgin Crack Repair</td>
<td>L.F.</td>
<td>$</td>
</tr>
<tr>
<td>CR-2</td>
<td>Wide or Routed Crack Repair</td>
<td>L.F.</td>
<td>$</td>
</tr>
<tr>
<td>MP-1</td>
<td>Minor Patch</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>MP-2</td>
<td>Reinforced Patch</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-0 (M)</td>
<td>Dutchman Plug Repair at Marble</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-0 (G)</td>
<td>Dutchman Plug Repair at Granite</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-1 (M)</td>
<td>Single Face Dutchman Patch at Marble</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-1 (G)</td>
<td>Single Face Dutchman Patch at Granite</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-2 (M)</td>
<td>Double Face Dutchman Patch at Marble</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-2 (G)</td>
<td>Double Face Dutchman Patch at Granite</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-3 (M)</td>
<td>Triple Face Dutchman Patch at Marble</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-3 (G)</td>
<td>Triple Face Dutchman Patch at Granite</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>DP-4</td>
<td>Profiled Face Dutchman Patch at Marble</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>PR-1</td>
<td>Epoxy Pin Anchor</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>PR-2</td>
<td>Helical Pin Anchor</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>PR-3</td>
<td>Heavy Duty Face Anchor and Grout</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>PR-4</td>
<td>Helical Pin Anchor and Grout</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>AR-1</td>
<td>Replace Ferrous Anchor with S.S.</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td>Pricing</td>
<td>Unit</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>BR-1</td>
<td>Brick Crack Repair</td>
<td>Each</td>
<td></td>
</tr>
<tr>
<td>BR-2</td>
<td>Facebrick Brick Replacement</td>
<td>S.F.</td>
<td></td>
</tr>
<tr>
<td>BR-3</td>
<td>Concealed/Back-Up Brick Replacement</td>
<td>S.F.</td>
<td></td>
</tr>
<tr>
<td>NM-1</td>
<td>Replacement of Marble Baluster</td>
<td>Each</td>
<td></td>
</tr>
<tr>
<td>MM-1</td>
<td>Louver Repairs</td>
<td>L.F.</td>
<td></td>
</tr>
<tr>
<td>MM-4</td>
<td>Reset Metal Security Grates</td>
<td>Each</td>
<td></td>
</tr>
<tr>
<td>LS-5</td>
<td>Roof Walkpads</td>
<td>L.F.</td>
<td></td>
</tr>
<tr>
<td>SM-1</td>
<td>Lap Solder / Seam Repair</td>
<td>L.F.</td>
<td></td>
</tr>
<tr>
<td>SM-2</td>
<td>Repair Hole in Flashing</td>
<td>Each</td>
<td></td>
</tr>
<tr>
<td>SM-3</td>
<td>Locked and Soldered Joint Repair</td>
<td>L.F.</td>
<td></td>
</tr>
</tbody>
</table>

10. **ALTERNATES**

For all Work required to complete the Alternates in their entirety, the contractor bids:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Pricing</th>
<th>Unit</th>
<th>Total Bid / Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt-1</td>
<td>New Cornice Stone</td>
<td>Provide Unit Price</td>
<td>Each</td>
<td>$</td>
</tr>
<tr>
<td>Alt-2</td>
<td>1980s Upper Roof Alternate</td>
<td>Provide Lump Sum Price</td>
<td>---</td>
<td>$</td>
</tr>
<tr>
<td>Alt-3</td>
<td>Salvage Existing Slate Roofing</td>
<td>Provide Lump Sum Price</td>
<td>---</td>
<td>$</td>
</tr>
</tbody>
</table>

11. If the Owner exercises his/her right to require Bonds and Certificates as stipulated in the Contract Documents, add the following amount to the Base Bid:

$\text{Dollars (\rule{1cm}{0.5mm})}$

12. Agrees to the following conditions:

A. Expedite all submittals and obtain any and all permits required to perform this Work.

B. Work at least five full working days per week, when weather permits.

C. Work hours to be as allowed by local ordinance.

D. **Due to the operation of the facility with summer classes, the entire project including punchlist must be completed prior to August 11, 2017.**
13. **Bidder's Subcontractors:**

The Contractor submits for consideration the following subcontractors as appropriate, who are incorporated into the Bid Proposal and are intended to be used to complete this project.

<table>
<thead>
<tr>
<th>Work</th>
<th>Subcontractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing</td>
<td></td>
</tr>
<tr>
<td>Sheet Metal</td>
<td></td>
</tr>
<tr>
<td>Demo</td>
<td></td>
</tr>
<tr>
<td>Abatement</td>
<td></td>
</tr>
<tr>
<td>Skylights</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

14. **Signature of Bidder**

A. **Firm Name:**
B. **Address:**
C. **Signatory:**
D. **Title:**
E. **Date:**
F. **Witness:**
15. Bidders Resume

A. Provide the following information for at least three projects completed within the last five (5) years which are similar in scope and size as this project. Use additional sheets as/if required:

1. Client: ____________________________________________
   Structure: ____________________________________________
   Year Completed: ____________________________
   Address: ____________________________________________
   Contact and Phone: ____________________________

2. Client: ____________________________________________
   Structure: ____________________________________________
   Year Completed: ____________________________
   Address: ____________________________________________
   Contact and Phone: ____________________________

3. Client: ____________________________________________
   Structure: ____________________________________________
   Year Completed: ____________________________
   Address: ____________________________________________
   Contact and Phone: ____________________________

16. Contract

A. If Undersigned is notified of acceptance of this Bid within 90 calendar days after due date of this Bid, he agrees to execute a standard AIA Document A101 (1997 Edition) – Standard Form of Agreement Between Owner and Contractor for the above work for the stated compensation.

END OF SECTION
SECTION 00 40 00

CONTRACT FORM

PART 1 GENERAL

1.1 AGREEMENT


PART 2 NOT USED

PART 3 NOT USED

END OF SECTION
### SECTION 00 80 0

### INDEX OF DRAWINGS

The following is the list of Drawings dated 10 March 2017, which are to be part of the Contract Documents.

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<th>Index</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-001</td>
<td>Cover Sheet</td>
</tr>
<tr>
<td>C-002</td>
<td>Scope of Work Table</td>
</tr>
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END OF SECTION
PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this project consists of repairs to the following building components, as shown on the drawings and described in the scope of work table on sheet C-002:
   1. Low-sloped roofs
   2. Slate roofs
   3. Copper gutters
   4. Marble cornice, pilasters, columns, and bands
   5. Granite elements
   6. Skylights
   7. Chimneys
   8. South entry stairway
   9. Interface between original 1928 building and 1980s building

B. Contractor's Duties:

1. Except as specifically noted, provide and pay for:
   a. Labor, materials and equipment
   b. Tools, construction equipment and machinery
   c. Heat and utilities required for construction
   d. Other facilities and services necessary for proper execution and completion of the Work.

2. Secure and pay for, as necessary, for proper execution and completion of work, and as applicable at time of receipt of bids:
   a. Permits
   b. Government fees
   c. Licenses.

3. Give required notices.
4. Comply with local codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.
5. Promptly submit written notice to Architect/Engineer of observed variance of Contract Documents from legal requirements. It is not the Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations.
a. Propose appropriate modifications to Contract Documents for necessary changes.
b. Assume responsibility for Work known to be contrary to such requirements, without notice.

6. Enforce strict discipline and good order among employees. Do not employ on Work:
   a. Unfit persons.
   b. Persons not skilled in assigned task.

1.2 CONTRACTS

A. This project will be constructed under a single contract under the direction of a single Contractor.

B. There shall be complete cooperation between Contractor and subcontractors to ensure satisfactory progress and performance of the Work.

C. The Owner reserves the right to award other contracts for additional work in connection with this project as required to install improvements, furnish, or equip the building.

1.3 WORK BY OTHERS

A. None anticipated.

1.4 WORK SCHEDULE AND SEQUENCE

A. The schedule of work hours at the jobsite shall be at the discretion of the Contractor to complete the Work within the time for substantial completion allowed in the Contract and within hours allowed by the Owner.

B. During the Work, the Contractor shall take all necessary precautions to avoid damaging the exterior paving, sidewalks, roofing, landscaping, walls and glass, as well as any personal property of the Owner. Any damage shall be promptly repaired by the Contractor at his/her own expense.

C. The Contractor shall restrict placement of equipment and storage of materials to those areas designated on the drawings, or as otherwise directed by the Owner.

1.5 OWNER-FURNISHED ITEMS

A. For construction purposes only, water and electricity may be taken from the existing building at locations designated by the Owner. All extensions or modifications required to provide water
and electricity are to be done by the Contractor by licensed contractors, at no expense to the Owner.

### 1.6 ABBREVIATIONS

A. Reference to a technical society, institution, association, or governmental authority is made in the Specifications in accordance with the following abbreviations:

- **AIA** American Institute of Architects
- **APA** Engineered Wood Association
- **ASLC** American Lumber Standard Committee
- **ASTM** ASTM International
- **AWPA** American Wood Preservers Association
- **BIA** Brick Industry Association
- **FM** Factory Mutual Global
- **FS** Federal Standard
- **NFPA** National Forest Products Association
- **NRCA** National Roofing Contractor's Association
- **SFPA** Southern Forest Products Association
- **SMACNA** Sheet Metal and Air Conditioning Contractor's National Association.
- **UL** Underwriters Laboratories

**END OF SECTION**
PART 1 GENERAL

1.1 REQUIREMENTS INCLUDE

A. Prime Contractor (Contractor):
   1. Attend specified meetings
   2. Ensure attendance of subcontractors and suppliers when specified or directed.

1.2 PRECONSTRUCTION MEETING

A. The Contractor will schedule a preconstruction meeting within ten (10) business days after Notice of Award and a roofing kick-off meeting five (5) business days prior to application of roofing materials.

B. Attendance: Contractor, subcontractors, other contractors, manufacturer's representatives and Owners Representative.

C. Agenda:
   1. Designation of responsible personnel
   2. Emergency procedures, contact people and telephone numbers
   3. Relation and coordination of contractors
   4. Discuss list of contractors
   5. Tentative construction schedule
   6. Critical work sequencing
   7. Submittals, shop drawings, project data and sampling
   8. Use of Premises:
      a. Office and storage areas
      b. Owner's requirements
      c. Staging areas.
   9. Major equipment deliveries and priorities
   10. Processing of field decisions and Change Orders.
   11. Security procedures
   12. Housekeeping procedures
   13. Schedule of progress and coordination meetings, if necessary.

1.3 PROGRESS AND COORDINATION MEETINGS

A. Hold weekly meetings as progress of work dictates.

B. Location of Meetings: At the offices of the Owner's representative at the job site, or as otherwise designated.

C. Attendance: Contractor, subcontractor, other contractors, suppliers, manufacturer's representatives and other parties as required or requested by the building owner.

D. Minimum Agenda:
1. Review work progress since last meeting; review schedule
2. Review applications for payment.
3. Note field observations, problems and decision.
4. Identify problems which impede planned progress
5. Review status of submittals
6. Develop corrective measures and procedures, if necessary
7. Coordinate projected progress with other contractors.

END OF SECTION
SECTION 01 30 00

SUBMITTALS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work includes submission of submittals to the Architect/Engineer as required by the Specifications and specified therein.

1.2 DEFINITIONS

A. Shop Drawings: Shop drawings are original drawings prepared by Contractor, Subcontractor, Sub-subcontractor, supplier or distributor, which illustrate some portion of the Work; showing fabrication, layout, setting or erection details.
   1. Prepared by qualified detailer
   2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
   3. Minimum sheet size 8 1/2 in. by 11 in.

B. Project Data:
   1. Manufacturer's standard schematic drawings:
      a. Modify to delete information which is not applicable to project
      b. Supplement standard information to provide additional information to project.
   2. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
      a. Clearly mark each copy to identify pertinent materials, products or models.
      b. Show dimensions and clearances required.
      c. Show performance characteristics and capacities.
      d. Provide Safety Data Sheets (SDS) where required.

C. Samples: Physical samples to illustrate materials, equipment or workmanship, and to establish standards by which complete work is judged.
   1. Office Samples: Of sufficient size to clearly illustrate:
      a. Functional characteristics of product of materials, with integrally related parts and attachment devices
      b. Full range of color samples
      c. After review, samples may be used for construction of the project.

D. List of Manufacturers
   1. Tabulate list of each Specification Section
   2. For products specified under reference standards, include with listing of each product:
      a. Name and address of manufacturer
      b. Trade name
      c. Model or catalog designation
      d. Manufacturer's data.
         1) Performance and tests data.
   3. Reference standards
1.3 SUBMITTAL REQUIREMENTS

A. At time specified, submit all required submittals to Architect/Engineer with a copy of the transmittal letter to the Owner.

B. Submit the quantity of documents required for return plus two (2) copies; one copy will be retained by the Architect/Engineer, one copy will be forwarded to the Owner. If transmitting copies electronically, only one is required.

C. Accompany submittals with transmittal letter containing:
   1. Date
   2. Project title and number
   3. Contractor's name and address
   4. The number of each shop drawing, product data and sample submitted
   5. Notification of deviations from Contract
   6. Other pertinent data including lead time and impact on project schedule.

D. Submittals shall include:
   1. Date and revision dates
   2. Project title and number
   3. Identification of product or material
   4. Field dimensions, clearly identified as such
   5. Specification Section and page number
   6. Applicable Standards, such as ASTM number or Federal Specification
   7. A blank space 3 in. x 3 in., for Architect/Engineer's stamp
   8. Identification of deviation(s) from the Contract Documents
   9. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field conditions and measurements, and compliance with Contract.

E. The Architect/Engineer will check and review, with reasonable promptness, submittals only for conformance with the design concept of the project and compliance with the information given in the Contract Documents. The revised copies will be returned to the Contractor and any further distribution required will be the responsibility of the Contractor.

F. Samples shall be of sufficient size to show general visual effect. When samples must show range of color, texture, finish, graining, or other properties, submit in sets of three showing the full scope of this range. Each sample shall bear identifying labels stating project name, material, manufacturer, and location on project. Each sample or set of samples shall be accompanied by a transmittal.

G. Samples will be reviewed for conformance with only the design intent and specified approvals. Conformance to all requirements of the Contract Documents remains the responsibility of the Contractor.

H. Samples will be reviewed and the Contractor notified in writing if the sample conforms to the design concept and requirements of the Contract Documents.

I. Samples will be retained by the Architect/Engineer and will serve as the standard by which all material delivered to the job will be judged.
J. Certain samples may be incorporated into the Work when approved by the Architect/Engineer or may be retrieved by the Contractor at the completion of the Work where so stated in the Specifications.

1.4 RESUBMISSION REQUIREMENTS

A. Shop Drawings:
   1. Revise initial drawings as required and resubmit as specified for initial submittal.
   2. Indicate on drawings all changes which have been made other than those requested by Architect/Engineer.
   3. In the event the submittal is returned stamped "Amend and Resubmit or Rejected," a revised submittal of the shop drawings shall be resubmitted to the Architect/Engineer for review as above.
   4. Drawings received by the Architect/Engineer which do not bear the Contractor's stamp of approval or contain numerous errors indicating a superficial check on the part of the Contractor will be returned for resubmission and will not be reviewed by the Architect/Engineer. The Architect/Engineer's review of drawings or schedules shall not relieve the Contractor of the responsibility for deviations from the Contract Documents, unless he/she has in writing called the Architect/Engineer's attention to such deviations at the time of submission and secured his written approval, nor shall it relieve him/her of responsibility for errors of any kind.
   5. Shop drawings bearing the stamp "No Exceptions Taken" or "Make Corrections Indicated" and bearing the Architect/Engineer's signature shall be kept at the jobsite, and the Architect/Engineer will order the removal of any not so noted.

B. Product Data and Samples: Submit new data and samples as required for initial submittal.

C. Make resubmittal so as not to delay work. No extension of contract will be allowed for delays due to improper submittals.

1.5 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. The Architect/Engineer will distribute copies of submittals to the Owner.

B. The contractor shall distribute copies of submittals which carry the Architect/Engineer's stamp to:
   1. Contractor's file
   2. Jobsite file
   3. Record documents file
   4. Other Contractors
   5. Subcontractors
   6. Suppliers
   7. Fabricators.

1.6 CONTRACTOR RESPONSIBILITIES

A. Review shop drawings, product data and samples prior to submission.

B. Verify:
   1. Field dimensions
   2. Field construction criteria
3. Catalog numbers and similar data.

C. Coordinate each submittal with requirements of:
   1. The Work
   2. The Contract Documents
   3. The Work of other contractors.

D. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect/Engineer's review of submittals.

E. Notify Architect/Engineer, in writing at time of submissions, of deviations in submittals from Contract requirements, and adverse impact on the project schedule.

F. Contractor's responsibility for deviations in submittals from Contract Documents’ requirements is not relieved by Architect/Engineer's review of submittals.

G. Do not begin any work which requires submittals without having Architect/Engineer's stamp and initials or signature indicating approval.

H. After Architect/Engineer's review, make response required by the Architect/Engineer's stamp and distribute copies.

1.7 ARCHITECT/ENGINEER'S DUTIES

A. Review submittals with reasonable promptness (approximately 14 calendar days).

B. Review for:
   1. Design concept of Project
   2. Information given in Contract Documents.

C. Review of separate item does not constitute review of an assembly in which item functions.

D. Affix stamp, date and initials or signature certifying to review of submittal, and with instructions for Contractor response.

E. Return submittals to Contractor for response of distribution.

F. The Architect/Engineer will distribute copies of submittals to the Owner.

END OF SECTION
PART 1 GENERAL

1.1 REQUIREMENTS

A. All Bids shall be based upon providing all products exactly as specified.

B. Where, in the specifications, the materials, products or equipment of a certain manufacturer are indicated, it is done for the purpose of establishing a standard or required function, dimension, appearance and quality and is not intended to limit competition. Where "(or approved equal)" is stated, the Architect/Engineer shall be the approving party.

C. For products specified only by reference or performance standards, select any product which meets or exceeds standards, by any manufacturer, subject to the Architect/Engineer's approval.

1.2 SUBSTITUTIONS, BIDDER/CONTRACTOR OPTIONS

A. PRIOR TO BID OPENING: The Architect/Engineer will consider written requests to amend the Bidding Document to add products not specified provided such requests are received at least 7 calendar days prior to bid opening date. Requests received after that time will not be considered. When a request is approved, the Architect/Engineer will issue an appropriate addendum not less than five calendar days prior to bid opening date.

B. AFTER AWARD OF CONTRACT: No substitutions will be considered after Notice of Award except under one or more of the following conditions:
   1. Unavailability of specified products, through no fault of Contractor
   2. Subsequent information discloses inability of specified product to perform properly or to fit in designated space
   3. Manufacturer/fabricator refusal to certify or guarantee performance of specified product as specified
   4. When a substitution would be substantially to Owner's best interests.

1.3 SUBSTITUTION REQUIREMENTS

A. Submit the documents required to fully describe the requested substitution. Include in request:
   1. Complete data substantiating compliance of proposed substitution with Contract Documents
   2. For products:
      a. Product identification, including manufacturer's name and address.
      b. Manufacturer's literature:
         1) Product description
         2) Performance and test data
         3) Reference standards.
      c. Samples
      d. Name and address of similar projects on which product was used and date of installation.
   3. For construction methods:
a. Detailed description of proposed method
b. Name and address of similar projects on which product was used and date of installation.
4. Itemized comparison of proposed substitution with product or method specified
5. Data relating to changes in construction schedule
6. Identify:
a. Other contracts affected
b. Changes or coordination required.
7. Accurate cost data on proposed substitution in comparison with product or method specified.

B. In making request for substitution, Bidder/Contractor represents:
1. He/she has personally investigated the proposed product or method and determined that it is equal or superior in all respects to that specified
2. He/she will provide the same guarantee for substitution as for product or method specified
3. He/she will coordinate installation of accepted substitutions into work, making all changes for work to be complete in all respects
4. Cost data is complete and includes all related costs under his/her contact, but excludes:
a. Costs under separate contracts
b. Architect/Engineer's redesign
c. Administrative costs of Architect/Engineer.
5. Bidder/Contractor will assume full responsibility for all additional costs and expenses for Owner, Architect/Engineer, and other contractors.

C. Substitutions will not be considered when:
1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with Paragraph 1.03.
2. Acceptance will require substantial revision of Contract Documents.

END OF SECTION
PART 1 GENERAL

1.1 CUTTING AND PATCHING

A. If the Project includes work that is affected by existing conditions, make adjustments in the Work as required to accommodate existing conditions, as directed by the Architect. Where products are to be installed in existing construction, perform cutting, removal of old products, installation of new products, rebuilding of adjacent construction, and other operations as required.
   1. Architect will issue prompt instructions when unanticipated conditions are encountered.
   2. If unanticipated conditions are such as to impose a hardship on Contractor as interpreted by Architect/Engineer, such as faulty structure that must be rebuilt, Architect/Engineer will issue Change Orders for approval by Owner. Work not in Contract Documents will not be ordered without Change Order for reasonable compensation.
   3. Make adjustments in the Work, other than those described in paragraph 2 above, without additional compensation.

B. "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.
   1. Cutting and patching is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
   2. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
   3. "Demolition" and "Selective Demolition" are recognized as related-but-separate categories of work, which may or may not require cutting and patching as defined in this section; refer to "Demolition" and "Selective Demolition" sections of Division 2.

C. "Removals" includes disconnecting, physically relocating, or temporarily putting out of service existing items or assemblies which are in good condition, presently operating and otherwise functional at the time this Work is conducted, with the intent of protecting and storing for subsequent reinstallation at or near the original location.
   1. Items or assemblies scheduled under Selective Demolition for storage and future use are not "removals". Comply with specified crating and storage requirements.
   2. Salvageable products of demolition are not regarded as a "removal".

D. Other sections of these specifications describe specific cutting and patching, or removal requirements and limitations applicable to individual units of work.
E. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio. Prior to such work, obtain approval of Architect.

F. Do not remove equipment or assemblies without adequate gripping, stabilizing and lifting equipment. Verify that the path for removal has adequate structural capacity to support item being moved as well as the equipment to move it.

G. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Replace work judged by the Architect to be cut and patched in a visually unsatisfactory manner.

H. If possible, retain the original installer or fabricator, or if not available, a recognized, experienced and specialized firm to cut and patch or remove work.

I. Use original shop drawings, manufacturers' instructions or similar authentic data prior to removing material or equipment.
   1. Confer with Owner's Administrative representative if removals affect University utility system. Schedule shut-downs well in advance.
   2. Obtain Owner’s approval before cutting into existing risers, mains, ductwork, etc.

J. Where prior approval of cutting and patching or removals is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information in the submittal, as applicable:
   1. Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.
   2. List products to be used and firms including their qualifications, which will perform work.
   3. Give dates when work is expected to be performed.
   4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily. Indicate how long utility service will be disrupted.
   5. When cutting and patching structural work, submit details and engineering calculations to show how additional reinforcement is integrated with original structure to satisfy requirements.
   6. Identify areas for test finishes, mock-ups or other full scale samples to establish the standards of the Work.

PART 2 PRODUCTS

2.1 PRODUCTS FOR PATCHING AND EXTENDING WORK

A. Except as otherwise indicated, or as directed by the Architect, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.
B. New Materials: As specified in individual Sections.
C. Match existing products and Work for patching and extending Work.
D. Determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as a standard. Presence of a product, finish, or type of work, requires that patching, extending, or matching shall be performed as necessary to make Work complete and consistent with the contiguous construction.

2.2 PRODUCTS FOR REMOVALS
A. Refer to the Section requiring Removal for specific product requirements. In general, use covers, plugs, caps or other protective measures which are chemically and electrolytically compatible to exclude contaminants from entering piping, building cavities or bond surfaces.

PART 3 EXECUTION

3.1 INSPECTION
A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.
   1. Meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.
   2. Investigate and confirm the location of concealed services. Make probe holes prior to substantial cutting.

3.2 PREPARATION
A. Provide temporary support of work to be cut or removed.
B. Cut, move, or remove items as necessary for access to Work; replace and restore at completion.
   1. Protect other work during Work of this Section to prevent damage. Provide protection from adverse weather conditions of that part of the project that may be exposed during cutting and patching operations.
   2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
C. Take precaution not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.
D. Whenever possible, employ the installing mechanics for cutting or disassembly. When unavailable, use journeymen skilled in such work.
E. Make cuts neatly. Use saws wherever possible. Do not use percussion tools without prior approval. When cutting monolithic, structural materials such as concrete, core-bore corners to receive termination of saw-cut. Do not overlap cuts or extend cut beyond the limit of the intended opening.
F. Remove material in easily handled units.

G. Layout cuts and prepare openings consistent with good installation practices. Plan for use of entire masonry units, full boards, or other whole components to facilitate restoration according to natural or customary joint lines.

H. Remove unsuitable material not marked for salvage, such as rotted wood, rusted metals, and deteriorated masonry and concrete; replace materials as specified for finished Work.

I. Remove debris and abandoned items from area and from concealed spaces.

J. Prepare surfaces and remove surface finishes to provide for proper installation of new Work and new finishes.

K. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

3.3 INSTALLATION

A. Coordinate work to expedite completion sequentially and to accommodate Owner occupancy.

B. Install products for patching as specified in individual Sections.

C. Installation shall be complete in all respects, including operational mechanical, electrical, and related systems.

3.4 TRANSITIONS

A. Where new Work abuts or aligns with existing, make a smooth and even transition. Patched Work shall match existing adjacent work in texture and appearance.

B. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and confer with Architect.

3.5 REPAIR OF DAMAGED SURFACES

A. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.

B. Repair substrate prior to patching finish.

3.6 FINISHES

A. Finish surfaces as specified in individual Sections to match adjacent surfaces.

B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest corners, edges or intersections with contrasting material.

END OF SECTION
SECTION 01 78 30
WARRANTIES AND BONDS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Preparation and submittal.
B. Time and schedule of submittals.

1.2 RELATED SECTIONS
A. Contract for Construction: Performance bond and labor and material payment bonds, warranty, and correction of work, if requested.
B. Individual Specification Sections: Warranties required for specific Products or Work.

1.3 FORM OF SUBMITTALS
A. Bind in commercial quality 8-1/2 x 11 in. three D side ring binders with durable plastic covers.
B. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor; and name of responsible company principal.
C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of Product or work item.
D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.4 PREPARATION OF SUBMITTALS
A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
B. Verify that documents are in proper form, contain full information, and are notarized.
C. Co-execute submittals when required.
D. Retain warranties and bonds until time specified for submittal.
1.5 TIME OF SUBMITTALS

A. Make submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.

B. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.6 SCHEDULE OF SUBMITTALS

A. Performance and Payment Bond - Section 00 10 00, Section 00 30 00 and Section 00 40 00 (if requested by the Owner).

B. Contractor’s Guarantee - See individual specification sections.

C. Manufacturer’s Guarantee - See individual specification sections.

END OF SECTION
SECTION 02 08 30

DEMOLITION FOR NON-FRIABLE ASBESTOS ROOF REMOVAL

PART 1 GENERAL

1.1 WORK INCLUDES

A. Remove and dispose of existing roofing layers, including non-friable asbestos-containing materials in the existing roof membrane flashings. All of the existing bitumen-based roofing flashings should be considered to contain asbestos. The existing asbestos-containing materials (ACM) are described in paragraph 1.04B of this section.

B. By Owner
   1. Sign waste shipment record.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01010 - Summary of Work

B. Section 02050 - Demolition, Cutting and Patching

C. Section 07311 - Asphalt Shingles

1.3 REGULATORY REQUIREMENTS

A. Prior to start of work, the Contractor must prepare and submit all filings, notifications, etc., required by all city, state and federal regulatory agencies having jurisdiction. Including providing an asbestos report performed by a Connecticut certified testing professional.

B. The Contractor shall comply with all city, state and federal rules, laws and requirements including but not limited to:
   1. NESHP – National Emissions Standards for Hazardous Air Pollutants
   2. OSHA – Occupational Safety and Health Administration
   3. Connecticut Department of Labor
   4. Connecticut Department of Environmental Protection

1.4 EXISTING CONDITIONS

A. Existing Asbestos-Containing Materials: Laboratory testing conducted to date has indicated that the existing 1928 roofing systems consist of asbestos-containing roofing membrane on top of the existing structural concrete slab. The laboratory results indicated the following Asbestos Components: 5-10% Chrysotile.

B. Work Sequence: Prior to undertaking the roof replacement work specified within this Contract, the Contractor shall remove the existing roofs, including the asbestos-
containing materials and install the specified roofing system or vapor retarder specified in Section 07 50 30 - Modified Bitumen Roofing.

1.5 QUALITY CONTROL

A. Air Monitoring:
   1. Any air monitoring that may be required shall be conducted by an independent air sampling professional (ASP) employed by the Contractor to ensure that no employee is exposed to an airborne concentration of asbestos in excess of city, state or federal limits.

1.6 SUBMITTALS

A. Submit prior to beginning work.
   1. Plan of Action: Submit a detailed plan of the procedures proposed for use in complying with the regulation included in this specification. The plan shall include the location and layout of the sequencing of asbestos work, the interface of trades involved in the performance of the work, methods to be used to assure the safety of building occupants and visitors to the site, disposal plan, including location of approved disposal site, and a detailed description of the methods to be employed to control fiber release. Expand upon the use of any portable HEPA ventilation system, isolating the building’s HVAC system, method of removal to prohibit visible emissions in work area, and packaging of removed (loose) asbestos debris. The plan must be approved by the Owner’s Representative prior to commencement of work. A complete work schedule shall be submitted prior to beginning of work. Schedule shall be subject to approval by the Owner’s Representative.
   2. Make all submittals as required by law to the governing bodies.

1.7 WORK SEQUENCE

A. Do not remove existing roofing or flashing when precipitation is imminent

B. Do not remove more existing material than can be replaced with permanent roofing or the vapor retarder by the end of the work day.

C. Coordinate demolition and roof removal operations with new installation specified in Section 02 42 00 – Selective Demolition.

D. Conduct demolition and removal operations in a manner to minimize traffic over newly installed areas.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Shut down ventilation system and protect rooftop ventilation system intakes and exhausts as required. Coordinate with the Owner.
B. Protect existing items not indicated to be demolished.

C. Restricted Area:
   1. Establish a restricted area in all work areas where non-friable roofing ACM is to be removed. Post and limit access to the restricted area to authorized persons.
   2. Allow no eating, drinking, smoking, tobacco or gum chewing or application of cosmetics.

3.2 NON-FRIABLE ASBESTOS REMOVAL

A. Remove all designated roofing materials in a careful manner.

B. Conduct air sampling.

C. Transport of ACM materials through the building is prohibited.

D. Legally dispose all materials in compliance with all city, state and federal laws, rules and regulations.

3.3 COORDINATION

A. Coordinate demolition and removal operations with new installation specified in Division Seven Specifications.

B. Do not remove more roofing than can be replaced with new materials and made watertight by the end of the work day.

3.4 CLEANUP

A. Upon completion of work, leave area in clean condition.

END OF SECTION
SECTION 02 11 00
SITE RESTORATION

PART 1 GENERAL

1.1 DESCRIPTION
   A. Repair and/or replace areas of the site damaged during construction operations including, but not limited to canopies, landscaping, sidewalks, plaza, curbs, pavements, site furnishing, lighting fixtures, existing roofing, windows, etc., immediately after completion of all operations in that area. Repairs must, as a minimum standard, be equal to or exceed the condition which existed prior to the start of work under this Contract, in accordance with the requirements of General Conditions of the Contract and completely coordinated with the work of all other trades.

1.2 QUALITY ASSURANCE
   A. Qualifications:
      1. Contractor shall employ subcontractors and/or tradesmen with a minimum of two (2) years experience in performing the work required.

1.3 SUBMITTALS
   A. The Contractor shall submit to the Owner and Architect/Engineer for approval three (3) copies of a statement detailing the restoration work required.
   B. The statement shall as a minimum contain the following:
      1. Description of work
      2. Location and quantity of work
      3. Materials and standard for workmanship
      4. Schedule of operations.
   C. Approval of this statement by the Owner and/or Architect/Engineer shall not constitute approval of methods or materials. No work shall proceed until the Owner and/or Architect/Engineer has approved the statement.

PART 2 PRODUCTS

2.1 PAVING AND SURFACING
   A. Replacement of all damaged paving, plaza, walks curbs and other surfacing on the site shall match the adjacent material to remain in color, shape, texture and durability.

2.2 LANDSCAPING
   A. The Contractor shall guarantee the landscaping work against defects in materials and workmanship in accordance with the General Conditions, except that the guarantee period shall be one (1) planting season beyond the date of substantial completion.
1. This guarantee includes furnishing new plants as well as labor and materials for installation of replacements. All replacement plants shall be guaranteed and maintained for a period of one (1) year. Replacement stock must meet specifications and quality of original stock.

2. Contractor will not be held responsible for damages to or loss of plants caused by fire, flood, lightning storms, freezing rain, winds over 60 miles per hour, or vandalism.

3. Inspection of the planting will be made jointly by the Contractor and Architect/Engineer at the completion of planting. All plants not in a healthy, growing condition shall be removed and replaced with plants of like kind, size and quality as originally specified before the close of the next planting season.

4. At the end of the guarantee period, the Contractor shall remove all guying, staking, wrapping, saucers and mulch from the site.

B. Plant materials shall be replaced with the same species and size.

2.3 ROOFING

A. Replacement and/or repair of existing roofing scheduled to remain shall be performed by a manufacturer approved applicator and shall include any such repair and/or replacements determined necessary to bring the roof to its original state. This may also include removal and replacement of wet or moist insulation. These repairs will be determined by the Architect/Engineer and the roof membrane manufacturer.

PART 3 EXECUTION

3.1 PAVING AND SURFACING

A. Means and methods for the installation of replacement pavings, plaza, walks, curbs and other surfacing shall be in accordance with manufacturer's instructions, the project specifications and local construction standards for the type of work performed and shall be subject to the approval of the Owner and Architect/Engineer prior to the start of work.

3.2 LANDSCAPING

A. Plantings shall be set in appropriate pits, backfilled, mulched, guyed, staked or otherwise protected and installed in accordance with local construction standards for the type of plantings and subject to the approval of the Owner and Architect/Engineer prior to the start of Work.

3.3 ROOFING

A. Prior to commencing roof repairs, the contractor shall prepare a scope of work including details and specifications to the roof membrane manufacture and Architect/Engineer for review.

B. The contractor’s work shall comply with the roof membrane manufacturer’s instructions and installation details. If such information is not available, the contractor shall comply with NRCA and SMACNA instructions and installation details.

END OF SECTION
SECTION 02 42 00
SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY
A. Section Includes: General administrative and procedural requirements for demolition and removal of existing roofing materials and related components.

1.2 REFERENCES
A. Definitions:
   1. Existing to remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
   2. Remove: Detach items from existing construction and legally dispose of off-site, unless indicated to be removed and salvaged or removed and reinstalled.
   3. Remove and reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
   4. Remove and salvage: Detach items from existing construction and deliver to Owner ready for reuse.

1.3 SUBMITTALS
A. Submit, prior to beginning demolition work, documentation of existing conditions of adjoining construction, including finish surfaces, which might be misconstrued as damage caused by demolition activities.
B. Submit identification codes and inventory of materials to be salvaged or reinstalled.
C. Permits and notices authorizing demolition.
D. Permits for transporting and disposing of debris.

1.4 QUALITY ASSURANCE
A. Codes: Conform to requirements and codes of the governing authorities.
B. Permits: Obtain and pay for all permits and fees for demolition, protection of public and property, and transportation and disposal of debris.
C. Certification: The Contractor shall issue a written certification to the Owner that all materials have been removed, handled, transported and disposed of in conformance with the requirements and codes of the governing authorities.
1.5 PROJECT CONDITIONS

A. Notify Architect/Engineer of discrepancies between Drawings and existing conditions before proceeding with Work.

B. Assume responsibility for actual condition of existing construction.

C. Occupancy: The building will remain in use for other construction activities during the work. No means of egress or access to the exterior shall be blocked without approval of the Owner and establishment of alternate means of egress.

D. Damages: Promptly repair any damage caused by demolition operations to structure and facilities to remain at no cost to the Owner. The Contractor shall promptly notify the Owner and Architect/Engineer in writing of any damage and the proposed method of repair.

E. Traffic:
   1. Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
   2. Conduct demolition and removal operations in a manner to minimize traffic over areas to remain.

F. Protection:
   1. Ensure safe passage of persons entering or exiting the building. Conduct operations to prevent injury to the structure, other facilities, and persons.
   2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures or building materials during demolition. Contractor shall design shoring as required.
   3. Provide temporary canopies, walls and signage to protect building users, and to maintain a safe condition at all times. Exits shall not be blocked at any time during the Work.
   4. Provide temporary protection of existing construction and interior stored materials from the weather until removed portions are completely replaced with new construction. Any damage associated with improper protection from weather and elements shall be repaired at Contractor's cost.

G. Pollution Control: The Contractor shall design, provide, and maintain a containment system to collect all of the dust and debris generated during the course of the work. This containment system shall prevent any dust or other fine particles from entering the building interior, the surrounding air or coming in contact with pedestrians and vehicles. Use water sprinkling, temporary enclosures, and other suitable methods. Comply with governing regulations pertaining to environmental protection.

1.6 WORK SEQUENCE

A. Do not remove existing materials when precipitation is imminent.

B. Do not remove more existing material than can be replaced with new material or made watertight by the end of the work day.

C. Conduct demolition and removal operations in a manner to minimize traffic over newly installed areas. Protect completed installation areas and installations in progress from damage resulting from ongoing demolition or removal operations.
PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION OF EXISTING CONDITIONS

A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
   1. Inventory and record condition of items to be removed and salvaged or reinstalled.

B. Document with photographs or videotape, or both, existing conditions of adjoining construction, including finish surfaces, which might be misconstrued as damage caused by demolition activities.

C. Examination and Acceptance of Conditions: Before proceeding with each component of Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Verify compatibility with and suitability of substrates.
   2. Examine walls and roofs for suitable conditions where products and systems are to be installed.
   3. Provide written description of conditions detrimental to performance of Work, including substrates and unacceptable installation tolerances, and recommend corrections.
   4. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected. Proceeding with Work indicates acceptance of surfaces and conditions.

D. When unanticipated structural, electrical, or mechanical elements that conflict with intended function or design are encountered, investigate and measure nature and extent of conflict. Promptly submit written report to Architect/Engineer.

E. Survey existing conditions as Work progresses to detect hazards resulting from construction.

F. Provide access to Work areas and perform localized demolition as necessary for inspection of concealed underlying conditions by Architect/Engineer and Owner.

3.2 UTILITIES AND MECHANICAL AND ELECTRICAL SYSTEMS

A. Disconnect and seal or cap off indicated utility services and mechanical and electrical systems in Work areas.

B. Where existing utility services or mechanical or electrical systems are required to be removed, relocated, or abandoned, bypass such services/systems before beginning Work to prevent interruption to occupied areas.

3.3 OPERATIONS

A. Locate the dumpster(s) as directed by the Owner.

B. Stockpiling debris on the roof is not permitted without approval by the Architect/Engineer and the Owner.
3.4 SELECTIVE DEMOLITION

A. Demolish and remove existing construction and installations only as necessary and required for proper installation of Work indicated on Drawings and Specifications.
   1. Conduct removals carefully to avoid damaging existing construction and installations that will remain. Protect construction that will remain against damage and soiling. When permitted by Architect/Engineer, items may be removed to suitable, protected storage location during selective demolition and cleaned and reinstalled in original locations after selective demolition operations are complete.
      a. Neatly cut openings and holes plumb, square, and true to dimensions required.
      b. Cut or drill from exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
      c. Use cutting methods least likely to damage construction to remain.
      d. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
      e. Temporarily cover openings to remain.
   2. Provide and maintain shoring, bracing, and structural supports, as required to preserve stability and prevent movement, settlement, or collapse of construction or finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   3. Remedy damage to existing construction and installations caused by Contractor operations.
      a. Materials for use in repair of original surfaces, but not otherwise specified, shall conform to the highest standards of the trade involved, and be in accordance with approved industry standards and shall be as required to match existing surfaces.
      b. Workmanship for repair of existing material shall, unless otherwise specified, be equal to similar workmanship existing in or adjacent to the space where the work is being done.

B. Items to be Salvaged or Reinstalled.
   1. Carefully remove from building, clean, and mark with identifying code.
   2. Store in secure area and protect from damage.
   3. Replace damaged items to be reinstalled with new items to match undamaged originals.
   4. Items to be salvaged.
      a. Pack or crate, and label contents of containers.
      b. Store in secure area until delivery to Owner.
      c. Transport to Owner’s on-site storage area.
      d. Protect from damage during transport and storage.

3.5 ROOFING REMOVALS

A. Remove all roof membranes, insulation, fasteners, and asbestos containing flashings complete to metal or concrete substrates, as indicated in drawings.
B. All roofing materials containing asbestos and must be removed in compliance with all Federal, State, and local regulatory agencies. Additionally, the requirements of Wesleyan for the removal of asbestos containing materials must be satisfied.

3.6 DISPOSAL OF DEMOLITION MATERIALS

A. Unless noted otherwise, promptly remove demolition debris from site and dispose of legally. Do not burn.

3.7 CLEANING

A. Clean adjacent surfaces and structures of dust, dirt, and debris including the stored materials below. Return all areas to condition existing before Work began.

END OF SECTION
SECTION 04 01 21
BRICK MASONRY REPAIR AND REPLACEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Repairing masonry, including replacing damaged units.
   2. Reinstalling existing salvaged brick or new brick.

B. Products installed but not supplied under this Section
   1. Masonry Mortar as specified in Section 04 91 60

C. Related Sections include the following:
   1. Division 4 Sections
   2. Division 7 Sections

1.2 REFERENCES

   1. ASTM International, Inc.
      a. ASTM C 67 - Test Methods of Sampling and Testing Brick and Structural Clay Tile
      c. ASTM D 1056 - Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
   2. Brick Institute of America (BIA)
      a. BIA Technical Notes 1 - All-Weather Construction
      b. BIA Technical Note 7B - Water Resistance of Brick Masonry - Construction and Workmanship
   3. American Concrete Institute (ACI)

1.3 DEFINITIONS

A. Pointing: Installing new mortar in an open or raked joint between masonry units.

B. Repointing: Removal of the outer portion of existing mortar joints to a specified depth and installing new mortar as specified.

1.4 SUBMITTALS

A. Product Data: For each product listed in Part 2.

B. Samples: Before beginning work, submit samples of the following:
   1. Each type of specified masonry wall tie
   2. Each type of specified masonry repair anchor

C. Repair Program:
1. Provide detailed description of materials, methods, equipment, and sequence of operations to be used including protection of surrounding materials on building and Project site.

2. If materials and methods other than those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

- **A. Field Supervision:** maintain experienced full-time supervisors on Project site during times that masonry restoration is in progress. Employ supervisor with minimum 5 years of experience as supervisor on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change supervisors during Project except for causes beyond the control of Contractor.

- **B. Workers and installers:** minimum 2-years experience in related masonry construction. Fully supervise apprentices with an experienced tradesperson.

- **C. Source Limitations:** Obtain each type of material for masonry restoration from one source with resources to provide materials of consistent quality in appearance and physical properties.

- **D. When concealed Work is included,** notify Engineer/Architect at least 48 hours in advance of completion of concealed Work so that Work can be assessed, and corrected if necessary, prior to concealment. Photograph the approved installation before concealing the Work, and retain the photographs at the site.

1.6 DELIVERY, STORAGE, AND HANDLING

- **A. Deliver, store, and handle materials in such a manner as to prevent damage.**
  1. Deliver masonry units to the site strapped together in suitable packs or pallets, or in heavy-duty cartons.
  2. Deliver other materials to the site in the manufacturer's original and unopened containers, labeled with the manufacturer's name and type of products, and store unopened until required for use.

- **B. Store masonry units, accessories, and packaged materials on elevated platforms and protect from weather, moisture including condensation, and neglect. Comply with the manufacturer’s recommendations for minimum and maximum temperature requirements for storage. Remove damaged or otherwise unsuitable material from the site.**

- **C. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.**

- **D. Remove and replace materials that cannot be applied within stated shelf life.**

1.7 PROJECT CONDITIONS

- **A. Verify existing dimensions and details prior to start of repair Work. Notify Architect/Engineer of conditions found to be different than those indicated in Contract Documents. Architect/Engineer will review situation and inform Contractor of changes.**

- **B. Comply with Owner's limitations and restrictions for Site use and accessibility.**
C. Environmental Limitations: Install repairs only when air temperature is between 40 degrees F and 90 degrees F and is forecast to remain so for at least 7 days after completion of Work, unless precautions acceptable to Architect/Engineer are taken.

D. Handle and install materials in strict accordance with safety requirements required by material manufacturer, Material Safety Data Sheets, and local, state, and federal rules and regulations. Maintain Material Safety Data Sheets with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with Contract Documents. Such conditions may interfere with Work and may consist of damage or deterioration of substrate or surrounding materials that could jeopardize integrity or performance of Work.

1. Notify Architect/Engineer of conditions that may interfere with proper execution of Work or jeopardize performance of Work prior to proceeding with Work.

PART 2 PRODUCTS

2.1 GENERAL

A. Source Limitations: Obtain each type of material from 1 source with resources to provide materials of consistent quality in appearance and physical properties.

B. For units that will be exposed in completed Work, use units with uniform texture and color, within accepted ranges for these characteristics.

C. Defective Units: Referenced brick masonry unit standards may allow certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in standards. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in completed Work or will impair quality of completed brick masonry.

2.2 MASONRY MATERIALS AND ANCHORS

A. Face Brick, Building Brick:

1. New brick to be supplied by contractor, to match existing. Provide samples for Owner and Architect/Engineer approval.

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 5000 psi.

3. The “Absorption Alternate” in paragraph 6.1.2 of ASTM C216 shall not be used to illustrate conformance with these project specifications. Also, for units where the 24-hour cold water absorption is greater than 8%, the saturation coefficient must be less than 0.68 (average) and 0.70 (individual).

4. Initial Rate of Absorption: Less than 25 g/30 sq. in. per minute when tested per ASTM C 67. Individual units shall not vary in IRA by more than 5 percent.

5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated “not effloresced.”

6. Provide face brick matching color range, texture, and size of existing adjacent brickwork.

7. Application: Use where brick is exposed, unless otherwise indicated.
8. Coatings: Units shall not have coatings or clear water repellants of any kind applied to the surfaces by any means without the written permission of WJE.


B. Building (Common) Brick

1. ASTM C62, Grade SW.
   a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 5000 psi.
   b. The “Absorption Alternate” in paragraph 4.2.4 of ASTM C 62 shall not be used to illustrate conformance with these project specifications. Also, for units where the 24-hour cold water absorption is greater than 8%, the saturation coefficient must be less than 0.68 (average) and 0.70 (individual).
      1) Initial Rate of Absorption: Less than 25 g/30 sq. in. per minute when tested per ASTM C 67. Individual units shall not vary in IRA by more than 5 percent
   c. Size: Match size of existing units.
   d. Application: Use where brick is indicated for concealed locations. Face brick complying with requirements for grade, compressive strength, and size indicated for building brick may be substituted for building brick.

C. Mortar: Type N as specified in Section 04 05 01 - Masonry Mortar

2.3 BRICK REPAIR MATERIALS

A. Brick Ties: Type 304 stainless-steel anchors as selected by Architect/Engineer in the field after completing pull tests to verify capacity of backup masonry.
   1. Triangular wire veneer anchor, No. 345-BT-Flexible Tire manufactured by Hohmann & Barnard, Inc. or approved equal.
   2. DW-10HS X-Seal Veener Anchor, 12 gauge, 6 inches long with 3-5/8 inch vertical adjustability and two 1/4 inch dia. fastener holes as manufactured by Hohmann & Barnard, Inc. or D/A 210/W TRI-TIE Veneer Tie Assembly as manufactured by Dur-O-Wal, Inc. or approved equal.

2.4 MISCELLANEOUS MATERIALS

A. Weep Vents: match height, depth, and thickness of new head joints. Use one of the following products or an approved equal.
   1. Quadro-Vent, supplied by Hohmann & Barnard, Inc.
   2. No. 85 Cell Vent, supplied by Heckmann Building Products, Inc.

B. Expansion Anchors:
   1. Zamac Nailin nail anchor with stainless steel nails by Powers Fasteners or approved equal. Anchor for flashings at concrete masonry unit surfaces.

2.5 CLEANERS TO REMOVE MORTAR AND DEBRIS FROM REPAIR WORK

A. Cleaning Solution: Provide one of the following or approved equal
   1. Enviro-Klean Safety Klean, as manufactured by Prosoco, Inc.
   2. Limestone and Masonry Afterwash as manufactured by Prosoco, Inc.
   3. DO NOT use products containing the following:
      a. Hydrochloric (muriatic) acid
      b. Hydrofluoric acid
      c. Ammonium bifluoride
B. Clean, potable water

C. Soft, bristle brush or roller, as recommended/required by product manufacturer

D. Pressure rinsing equipment that can provide controlled application of heated water
   1. Allowable pressure: 100-200 psi, or as approved during cleaning mockups
   2. Water flow rate: 6 to 8 gallons per minute
   3. Water may be heated to 180 degrees F to assist in improving cleaning
   4. Use 15-45 degree stainless steel fan tips
   5. Equipment shall have no ferrous parts

PART 3 EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from Work.
   1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that will remain in service during course of Work.

B. Prevent mortar from staining face of surrounding masonry and other surfaces.
   1. Cover sills, ledges, and projections to protect from mortar droppings.
   2. Keep wall area wet below Work area to discourage mortar from adhering.
   3. Immediately remove mortar in contact with exposed masonry and other surfaces.

3.2 MASONRY REMOVAL AND REPLACEMENT

A. As locations indicated on the Drawings or designated by the Architect/Engineer, remove bricks that are cracked, spalled, displaced, or deteriorated. Perform removal also at areas where required to perform substrate wall repairs.
   1. Carefully remove entire units and mortar from joint to joint, without damaging the surrounding masonry, in a manner that permits replacement with full-size units. Remove and replace sound bricks that are damaged during the Work at no cost to the Owner.

B. Support and protect remaining masonry that surrounds removal area. Maintain adjoining construction in an undamaged condition.

C. Notify Architect/Engineer of unforeseen detrimental conditions including voids, cracks, bulges, displacements, and loose masonry units in existing masonry backup, rotted wood, corroded metal, and other deteriorated items.

D. Remove in an undamaged condition as many whole units as possible.
   1. Remove mortar, loose particles, and soil from masonry units by cleaning with hand chisels, brushes, and water.
   2. Store masonry units for reuse, as indicated.
   3. Deliver cleaned units not required for reuse to Owner, unless otherwise directed.

E. Cover openings and partially completed Work with strong waterproofing membrane at the end of the day, or when the Work is not in progress. Extend the cover at least 2 feet beyond the opening edges and secure in place.
F. Clean areas surrounding removal by removing mortar, dust, and loose particles in preparation for replacement.

G. Brick Installation
1. Install brick in accordance with BIA Technical Note 7B in the bonding and coursing pattern of the existing brick.
2. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
3. Wet both the replacement and the surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 25 grams/30 square inch per minute (25 grams/194 square cm per minute). Use wetting methods that ensure that the units are nearly saturated but surface dry when laid (no visible moisture on the surface).
4. Lay the replacement brick as plumb and true to line as the adjacent surfaces will permit; new brickwork shall be flush with the existing.
5. Lay the replacement brick with completely filled bed, head, and collar joints. Do not furrow the bed joints. Butter the ends with sufficient mortar to fill the head joints, and shove into place.
6. Maintain the joint width for the replacement units to match the existing joints. 
   a. Tool the exposed mortar joints in the repair areas when the mortar is thumbprint hard, with a round jointer slightly larger than the width of the joint. Tool the joints to match the joints in the surrounding existing brickwork.
7. Do not pound the corners and jambs to fit stretcher units after they are set in position. Where an adjustment must be made after the brick has been placed, remove and replace the mortar.
8. Install mortar at the top and ends of the repair by packing layers of mortar into the joint with a tuckpointer’s tool.
9. Install veneer ties 16 inch on center horizontally and vertically typically, and 8 inch on center around the perimeter of the repair. Embed the ties 3/4 inch minimum and 1-3/4 inch maximum from the exterior face of the veneer, in the mid-thickness of the joint.
10. Install weep holes, a maximum of 24 inch on center, in the head joints in the first course immediately above the flashing. Keep the weep holes free of mortar droppings.
11. Keep the wall cavity (collar joint) free of mortar. Back bevel bed joints down toward the cavity to prevent mortar from extruding into the cavity when the units are placed. As the Work progresses, trowel mortar fins flat against the veneer face.
12. If the brick placement is stopped while in progress, either at the end of the day or for some other reason, stop horizontal runs by racking back the mortar of each course one half unit length; do not terminate in a vertical tooth pattern.

3.3 FINAL CLEANING OF NEW MASONRY

A. Wipe excess mortar from masonry surface adjacent to mortar joint with a damp sponge or cloth. Note: Use only sponges or cloth that is damp, not wet or saturated. When tightly squeezed water should not run from damp sponge or cloth. Surface of the masonry shall not have visible accumulation of water immediately following cleaning. Do not touch or disturb newly installed pointing mortar during cleaning. Clean until mortar and mortar haze is removed from adjacent masonry surfaces.

B. Upon completion of repointing, thoroughly rinse surfaces of walls at repointed areas to remove dust and other surface residue from repointing process. Use only low pressure (less than 100 psi) water rinse. Rinse may be eliminated only with Architect approval.
C. After mortar has fully cured, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at low pressure. 
   1. Do not use metal scrapers or brushes.

D. The use of weak acidic cleaners as specified in this specification may be used with approval by Architect.
   1. Chemical Cleaning to remove Mortar from Surface
      a. Prewet wall surface with very low pressure.
      b. Scrub on cleaning solution with soft, natural bristle brush. Allow to dwell for approximately 15 minutes.
      c. Rinse thoroughly with low pressure water. Agitate with scrubbing brush during rinsing.
      d. Rinse the wall with clean water until the pH of the surface has returned to neutral.
      e. Repeat cleaning sequence described above as necessary until cleaning standard established by approved samples is met.
      f. The wall should be rinsed until the pH of the surface has returned to neutral for a minimum of 5 minutes.

E. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.

F. Clean masonry debris from roof; remove debris from drains. Rinse off roof and flush drains.

G. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.

H. Remove scaffolding, equipment, surplus materials, debris, and refuse from the site.

3.4 FIELD QUALITY CONTROL

A. A project representative of the Architect/Engineer will periodically observe the progress and quality of the Work. Notify the project representative of any field conditions that deviate from the repair details. Allow the project representative use of the scaffolding, as needed, to observe the progress and quality of the Work.

B. Notify the Architect/Engineer in advance of times when a lift device or scaffolding will be relocated. Do not relocate the lift device or scaffolding until the project representative has had reasonable opportunity to make observations of the work areas at the lift device or scaffold location.

C. Material Testing: Tests may be requested by the Architect/Engineer after certification and delivery of the material. The cost of tests shall be paid by the Owner unless the test results indicate that material does not conform to the Specification requirements, in which case the Contractor shall pay the cost of testing.
SECTION 04 06 10
MORTAR, GROUT, AND REPOINTING FOR MARBLE

PART 1 GENERAL

1.1 WORK INCLUDED

A. Furnish all labor, materials, tools, equipment and supervision and perform all Work necessary for and incidental to Mortar, Grout and Pointing of marble as shown on the Drawings and specified herein.

B. The work of this section shall include, but not be limited to, the following:
   1. Provide and install new pointing mortar at joints.
   2. Provide setting mortar for new dutchman units.
   3. Provide patching mortar for repair patches.
   4. Provide grout for filling small cracks and voids.

C. Related Work
   1. Section 04 92 00 - Stone Repair

1.2 REFERENCE STANDARDS


B. ASTM C 0114-2006 Chemical Analysis of Hydraulic Cement

C. ASTM C 1218/ C1218M-99 Standard Test Method for Water-Soluble Chloride in Mortar and Concrete

D. ASTM C1152/ C 1152M-04 Standard Test Method for Acid-Soluble Chloride in Mortar and Concrete

1.3 SUBMITTALS & MOCK-UPS

A. Submit the following items prior to beginning of work:
   1. Written certificates from the mortar supplier stating that all craftspeople installing the pointing mortars have successfully completed on-site training for the installation of the mortar, have previously completed workshop training by the mortar manufacturer; or have met alternative workmanship qualifications.
   2. Certificates, except where the material is labeled with such certification by the producers of the materials, stating that all materials supplied comply with all the requirements of these specifications and the appropriate standards.
   3. Mortar supplier’s written description of mortar mix design, stating proportions and nature of each component, including sieve analysis for sand gradations and binder/aggregate ratio. Submit separate description for each mix design recommended.

B. Prior to beginning work, provide samples of all components included in each mortar mix, with Material Safety Data Sheets (MSDS) as appropriate.
C. Prior to installing mortar samples at the project, provide a material and color sample of the mortar for joint pointing on a mockup not less than 6 inches in length. The mortar shall match the color of the original mortar (existing mortar behind exterior pointing lift work) and shall be approved by Architect/Engineer.

D. Prepare mock-up areas of approximately 10 linear feet for each type of pointing required, demonstrating methods and quality of materials and workmanship for pointing mortar joints. Prepare, install and finish each sample according to specifications. Before any pointing sample is carried out, a cleaned exposed prepared joint shall be provided for examination and approved by Architect/Engineer. Architect/Engineer shall approve joint profile. Apply samples to the actual masonry, in location selected by the Architect/Engineer. Samples shall cure a minimum of 14 days prior to Architect/Engineer’s approval. The approved sample shall be the standard for the work. Retain acceptable areas in undisturbed condition, suitably marked, during restoration as a standard for judging completed work.

E. Each worker to perform work on the project shall provide a sample. Before work by that worker commences, the sample shall be approved by the Owner and Architect/Engineer.

1.4 QUALITY ASSURANCE

A. Obtain materials for each restoration procedure specified from a single manufacturer to ensure matching quality, color, texture and detailing.

B. Specialty Mortar Based Materials Training: All mortar based work must be performed by craftspersons who are familiar with lime and other specialty mortar formulations, curing conditions and performance characteristics. Training sessions and mock-ups are required so as to allow for the certification of masons who will be performing each of the primary based mortar or grout procedures including repointing, crack repairs, setting of dutchman patches, mortar patching, and grouting.
   1. Lime Based Materials: Contractor shall arrange for a minimum of three (3) training sessions of at least two (2) days each to be provided by the manufacturer(s) of the specified lime based mortars and grouts.
   2. Patching Mortar: Contractor shall arrange for a minimum of three (3) training sessions of at least one (1) days each to be provided by the manufacturer of the specified patching mortar.
   3. Develop training schedule(s) in consultation with Architect/Engineer.
   4. Provide additional training if application procedures are not yielding consistent results.
   5. Provide additional training sessions as required for new workmen.

C. Work in place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original unopened containers and packaging, bearing labels as to manufacturer, type and name of products, grade, batch and production data.

B. Protect materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.
C. Protect mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.6 PROJECT CONDITIONS

A. Cold Weather Requirements: Do not work in temperatures below 40 degrees Fahrenheit, when the substrate is colder than 40 degrees Fahrenheit, or when the temperature is expected to fall below 40 degrees Fahrenheit for 48 hours after installation of repairs. Remove work exposed to lower temperatures as directed by the Architect/Engineer.

B. Hot Weather Requirements: Phase pointing during hot weather by completing process on the shady side of the project or schedule installation of materials during cooler evening hours to prevent premature evaporation of the mortar. Supply temporary screening and protection where necessary. Protect mortar from direct sunlight and wind using protection measures submitted and approved when the ambient air temperature exceeds 70 degrees Fahrenheit. Do not use or prepare mortar when ambient air temperature is above 85 degrees Fahrenheit.

C. Do not use frozen materials or materials mixed or coated with ice or frost. Do not lower the freezing point of mortar by the use of admixtures or anti-freeze agents, and do not use chlorides in the mortar.

D. Cover partially completed work when work is not in progress.

E. Protect persons, animals, motor vehicles, site, site features, and surrounding buildings from injury resulting from work.

F. Prevent repointing mortar from staining the face of masonry or other surfaces to be left exposed. Immediately remove all repointing mortar that comes in contact with such surfaces.

G. Protect masonry projections from droppings.

H. Damage occurring to the building as a result of the work of this section as a result of Contractor’s failure to protect against such damage shall be the Contractor’s responsibility. The Contractor shall restore damaged areas to the complete satisfaction of the Architect/Engineer at no expense to the Owner.

PART 2 PRODUCTS

2.1 MORTARS AND GROUTS - GENERAL

A. All mortars and grouts shall be pre-blended in single containers in a factory-controlled environment. All ingredients will be converted from volume measurements to weight measurements to ensure quality production of the mortar.

B. Mixing of individual mortar or grout ingredients at the construction site will not be permitted.

C. All containers shall be marked including manufacturing date and batch number. Manufacturer is required to maintain production-sampling procedures for each batch for quality control purposes. Manufacturer to provide samples of proposed materials for mock up panels at the
site. All pre-blended products are to meet applicable ASTM standards and project
specification requirements.

2.2 MORTARS

A. Pointing Mortar: The pointing mortar shall be composed of lime, sand, crushed limestone, and
water as determined by the manufacturer and supplier.
1. Pre-bagged Pointing Mortar: Mix & Go, NHL 3.5 and NHL 5.0
   a. Distributed by Limeworks, 3145 State Road, Telford, PA 18969  Tel: 215-536-
      6706 Fax: 215-453-1310
2. Mix design shall be in accordance with manufacturer’s recommendations and approved
   submittal, as required to meet joint width requirements as specified by the Architect/Engineer.
3. No Portland cement, masonry cements, admixtures, additives, accelerators, colorants, or
   pigments shall be added or used in the mortar at any time.

B. Dutchman Setting Mortar: The setting mortar for dutchman patches shall be composed of
   lime, crushed limestone, and water as determined by the manufacturer and supplier.
1. Pre-bagged Setting Mortar (hydraulic lime grout): St. Astier, NHL 5.0
   a. Distributed by Limeworks, 3145 State Road, Telford, PA 18969  Tel: 215-536-
      6706 Fax: 215-453-1310
2. Mix designs shall be in accordance with manufacturer’s recommendations and approved
   submittal, as required to meet joint width requirements as specified by the Architect/Engineer.
3. No Portland cement, masonry cements, admixtures, additives, accelerators, colorants, or
   pigments shall be added or used in the mortar at any time.

C. Patching Mortar: The patching mortar for repair and simulation of marble shall be composed
   of lime, aggregates, and water as determined by the manufacturer and supplier.
1. Pre-bagged Patching Mortar: FTB Lithos Arte, stone repair and restoration mortar.
   Distributed by Remmers FTB bvba, B-2280 Grobbendonk, Belgium; tel: +32 (14) 84
   8080; fax: +32 (14) 84 8081; Email: info@ftbrestoration.com
2. Patching mortar shall be custom formulated to match existing marble color, texture, and
   consistency.
3. Up to four (4) color/texture variations in the patching mortar may be required to
   adequately match varying field conditions for each Phase of the work. Distributor shall
   visit site as required to ascertain color variations in cleaned stone and submit alternate
   sample mortar colors as required for approval by the Architect.
4. Mix designs shall be in accordance with manufacturer’s recommendations and approved
   submittal, as required to meet field conditions and requirements as specified by the
   Architect/Engineer.
5. No portland cement, masonry cements, admixtures, additives, accelerators shall be added
   or used in the mortar at any time.

2.3 GROUTS

A. Cementitious Crack Repair and Filler: Inject an ultrafine superplasticized dispersed hydrated
   lime grout into cracks, which is suitable for application to wet or dry cracks, exhibits low
   shrinkage, and develops high bond strength to each type of stone.
   Heritage Group, 3516 N. Kostner, Chicago, IL. 60641; tel: (773) 286-2100.
B. Repair Grouts: The repair grouts shall be composed of lime, aggregates, and water as determined by the manufacturer and supplier.
   1. Pre-bagged Lime Grouts NHL 5.
      a. Distributed by Limeworks, 3145 State Road, Telford, PA 18969 Tel: 215-536-6706 Fax: 215-453-1310
   2. Mix design shall be in accordance with manufacturer’s recommendations and approved submittal, as required to meet field conditions and requirements as specified by the Architect/Engineer.
   3. No portland cement, masonry cements, admixtures, additives, accelerators, colorants, or pigments shall be added or used in the grout at any time.
   4. The repair grouts shall consist of four (4) customized types of pre-bagged grouts. Selection of the appropriate grout for each use is based on the size of the crack or void to be filled, as follow:
      a. Type I Grout: Limeworks NHL 5, [premixed NHL 5 - size: 40 - 60 microns] shall be used for very fine cracks up to a width 1/16 inch.
      b. Type II Grout: Limeworks NHL 5, [premixed NHL 5 - size: 300 microns] shall be used for fine cracks or voids between 1/16 inch and 1/8 inch.
      c. Type III Grout: Limeworks NHL 5, [premixed NHL 5 - size: 600 microns] shall be used for cracks or voids between 1/8 inch and 1/4 inch.
      d. Type IV Grout: Limeworks NHL 5, [premixed NHL 5 - size: 800 microns] shall be used for cracks or voids between 1/4 inch and 1/2 inch.

2.4 WATER

A. Water shall not contain any mineral content that would result in staining of stone. Clean, potable water, with iron content of less than two (2) parts per million, or 0.0002 percent (by weight) shall be used.
   1. Contractor shall arrange for laboratory testing of water before starting work and every three (3) months thereafter.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions for installation tolerances and other specific conditions.

B. Do not proceed until unsatisfactory conditions have been corrected.

C. For each crack occurrence, select repair material from those specified in cooperation with Architect/Engineer prior to proceeding with crack repair. Refer to Section 04520.

3.2 RAKING OUT OF MORTAR JOINTS

A. Rake out existing mortar joints between stone units to a depth as indicated on the drawings, or three times the width of the joint, or until reaching original sound mortar, whichever is greater.

B. Use of a grinder is permitted subject to approval by the Architect/Engineer of each workman who will be using a grinder. A fine grinder blade shall be used so that a thin layer of the existing pointing mortar remains attached to the adjacent stones on either side of the joint.

C. Remove remaining mortar using hand tools only.
D. Do not damage masonry units during joint preparation.

### 3.3 Pointing of Mortar Joints

A. Brush, vacuum, blow out, or flush joints with water to remove dirt and loose debris, working from top to bottom of wall. If washing joints to remove debris, all lower sections of masonry must be pre-wetted to avoid old lime mortar adhering to the surface of the walls. Remove all dust as any loose dust that is left in the joints will deplete the bond of the mortar to the stone.

B. Rinse stone joints with water to remove dust and mortar particles. Time the rinsing application so that at the time of pointing excess water has evaporated or run off. Joint surfaces should be damp but free from standing water.

C. Dampen to control suction of exposed surface of stone adjacent to joint prior to repointing. Maintain a water sprayer on site at all times during the repointing process. Surface of stone where mortar is to be placed shall be damp, without visible water on the stone surface.

D. Mortar shall be mixed according to manufacturer recommendations. The mortar should be plastic and workable but as stiff as possible. This drier consistency enables the material to be tightly packed into the joint, allows for cleaner work, and prevents shrinkage cracks as the mortar cures.

E. The mortar should be pushed into the back of the joints in layers, avoiding large volumes of deep filling. Avoid slicking the surface of the mortar, pushing into the joint is preferable.

F. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer. For joints 1/4 inch or less in width, fill joint to a depth of three times the joint width. For joints greater than 1/4 inch in width, fill joint to a depth of two inches.

G. When mortar is thumbprint hard the joints shall be finished to match joint profile of approved sample.

H. Promptly clean any excess mortar from face of stone with water and soft brush or damp cloth.

### 3.4 Protection of Freshly Pointed Mortar Joints

A. Mist newly pointed masonry joints with water for a duration of at least 3 minutes at the end of the day of initial installation.
   1. During hot weather (greater than 70 degrees Fahrenheit) protect freshly pointed areas with burlap or plastic sheeting for the first 24 hours after installation. If plastic sheeting is used, it should never come into direct contact with the mortar during initial curing and until fully set. It can be hung 3-4” clear of the work.

B. Protect newly pointed joints from direct sun and winds for the first 3 days after installation.
   1. During hot weather (greater than 70 degrees Fahrenheit) thoroughly dampen the limestone masonry wall with water mist a minimum of two or three times per day for the first 3 days following installation. Care should be exercised on stone surfaces to avoid water run off from the face of the stone oversaturating the mortar joints.

C. Do not proceed with water washing activities for at least 28 days following repointing of stone.
3.5 CLEAN-UP

A. Upon completion of work, properly dispose of debris and leave work area in broom clean condition.

END OF SECTION
SECTION 04861
NEW STONE - MARBLE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes new marble material for masonry restoration work specified under other sections.

B. Related Sections include the following:
   1. Division 4 Sections

1.2 DEFINITIONS

A. dimension stone—natural stone that has been selected and fabricated to specific sizes or shapes. dressed stone—See cut stone, finished stone.

B. finished stone—dimension stone with one or more mechanically exposed surfaces.

C. filling—the application of materials, often cements or synthetic resins, into natural voids in a stone during fabrication.

D. marble—a crystalline rock composed of predominately of one or more of the following minerals: calcite and dolomite capable of taking a polish

E. microcrack—a crack too small to be seen with the unaided eye (see crack, fracture, seam).

F. open seams—unfilled fissures or naturally occurring cracks in stone.

G. pits—small depressions, voids or pinholes in stone, especially on a finished surface.

H. rift—(1) a consistent direction or trend in a rock body along which the rock is most easily split or broken. (2) The grain orientation in stone, particularly in sedimentary stones, showing more or less clearly how the stone was originally bedded, and with or without color or grain-size changes, or voids and hollow.

I. seam—a naturally filled or bonded crack which does not adversely affect the strength of a stone (see crack, fracture, microcrack).

J. slab—a piece of stone produced by shaving or splitting in the first milling or quarrying operation. A slab has two parallel surfaces.

K. spalls—(1) fragments or chips from a piece of dimension stone. (2) waste stone usually of small size from the quarrying and milling of dimension limestone.

L. veining—the presence in an otherwise homogeneous stone of bands, streaks or irregular bodies of a contrasting color or appearance, and frequently having a different mineralogical composition to the predominant material. “Veining” does not apply to gneiss, commercial granite types, and slate (see ribbon).ones that remain after this Section has been edited.
1.3 REFERENCES

A. Marble Institute of America, “Dimension Stone Design Manual”

B. American Society for Testing and Materials (ASTM)
   1. C97 - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
   3. C119 - Standard Terminology Relating to Dimension Stone

1.4 SUBMITTALS

A. Product Data: For marble proposed for use on Project, include test data substantiating that stones comply with requirements.

B. Samples for Verification: Before purchasing stone, submit samples of the following:
   1. For each stone type indicated. Include ten 12-by-12-inch by 4 inch samples for each type of stone, exhibiting extremes of the full range of color and other visual characteristics expected in completed Work.
   2. The samples shall be finished to match that of existing stone on the building.
   3. Approved samples are for comparison of texture, finish and color of new stone supplied for the building.
   4. Replace new stone that does not match the approved samples. Additional costs related to acquiring new stone for replacement of rejected stone shall be borne by the Contractor, including costs related to removing and replacing new stone that has been installed on the building prior to review and acceptance by the Architect/Engineer and Owner.

C. Literature
   1. Stone quarry literature and test results certifying that stone to be supplied has the specified minimum properties. Test results must not be older than 2 years.
   2. Testing agencies must submit test procedures to owner for review prior to testing.
   3. Test reports from testing agency for required tests.

D. Shop Drawings
   1. For all shop fabricated units of stone.

1.5 QUALITY ASSURANCE

A. Comply with provisions, references documents, and standards listed in specification unless otherwise noted.

B. Source Limitations for stone: All marble shall be Olympian White marble as quarried by Vermont Quarries Corporation in Rutland County, Vermont, United States. All marble is to be of soundness group A per ASTM C503.

C. General
   1. Field Quality Control: Work in place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.
2. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.

D. Laboratory Material Testing - General
1. Employ and pay for the services of an independent testing agency acceptable to the Owner and Architect/Engineer to perform the tests specified herein.
2. The Testing Agency will be responsible for conducting and interpreting the tests, and shall state in each report whether or not the test specimens conform to the requirements of the contract documents, and shall specifically note deviations.
3. Testing agencies must submit test procedures to owner for review and approval prior to testing.

E. Preconstruction Testing
1. Test as follows representative stone specimens from each type of stone, prior to acceptance for use:
   a. Absorption and Bulk Specific Gravity - ASTM C97
   b. Compressive Strength - ASTM C170
   c. Modulus of Rupture, tested in accordance with ASTM C99
2. Petrographic/geologic evaluation of quarry; identification of foliation/bedding, slabbing orientation, location/area of samples obtained from quarry. Evaluation shall be in accordance with ASTM C295.
3. Provide five (5) references of other prior uses of the material, including use, age, and condition in an environment similar to the project location.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery
1. Deliver, store, and handle materials to prevent deterioration or the intrusion of foreign matter. Deliver and store packaged materials in the original packages. Removed from the jobsite damaged or otherwise unsuitable material.
2. Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.
3. Receive and unload stone panels at the site or other facility with necessary care in handling to avoid damaging or soiling.
4. Do not use materials in broken packages or which show evidence of damage.
5. Notify the Architect/Engineer and the Owner of damage observed to existing and salvaged units prior to commencing work.

B. Storage
1. Verify adequacy of support or portion of the structure for loading with equipment and materials. Storage of large amounts of stone panels and other materials on the roof or within the attic structure is not permitted.
2. Coordinate location of stone storage area with Owner.
3. Store stone sections clear of the ground on non-staining skids (cypress, white pine, poplar, or yellow pine without an excessive amount of resin). Do not use chemically treated wood. DO NOT use chestnut, walnut, oak, fir, and other woods containing tannin or other substances that may stain the stone.
4. Store stone above grade on wood or other suitable surfaces using polyethylene film to separate stone from wood or other supporting or protecting members.
5. Protect materials during storage and construction. Keep containers tightly closed and away from damage. Protect liquid components from freezing. Comply with
manufacturer's recommendations for minimum and maximum temperature requirements for storage.

6. Cover stone panels with waterproof paper, clean canvas or polyethylene.
7. Secure stone panels against theft, contractor is responsible for the security of the stone panels and will replace any stolen items.

PART 2 PRODUCTS

2.1 STONE MATERIALS

A. General Requirements
1. New Stone: Match the color, finish, and appearance of existing stone on building
2. Stone thickness: as needed to match existing masonry construction, unless otherwise indicated on Drawings.
3. Products: Subject to compliance with requirements, all marble shall be the following:
   a. Mountain White marble as quarried by Vermont Quarries Corporation, Rutland County, United States. Contact: Todd Robertson, Phone: (802) 775-1065.

B. Material Property Requirements
1. New Stone: Meet the following minimum requirements as specified by ASTM:

<table>
<thead>
<tr>
<th>Physical Property/ Test</th>
<th>ASTM</th>
<th>Published properties of selected stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorption by weight, max %</td>
<td>0.20</td>
<td>0.08</td>
</tr>
<tr>
<td>Density, min lb/ft³ (kg/m³)</td>
<td>162 (2595)</td>
<td>170.4</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>--</td>
<td>2.729</td>
</tr>
<tr>
<td>Compressive strength, min, psi (MPa)</td>
<td>7500 (52)</td>
<td>8,580</td>
</tr>
<tr>
<td>Modulus of rupture, min, psi (MPa)</td>
<td>1000 (7)</td>
<td>2,029</td>
</tr>
</tbody>
</table>

2. New Stone: Test results within 10 percent of the published properties listed above.
3. Marble for exterior dimension use shall be Soundness Group A stone, free of spalls, cracks, open seams, pits, or other defects that are likely to impair its structural integrity in its intended use.

C. Finish Requirements
1. Match existing weathered stone on building.

2.2 FABRICATION

A. Approved Fabricators:
1. Granite Importers Inc., PO Box 712, 16 South Vine Street, Barre, VT 05641. Contact: Mary Tousignant, Phone: (802) 476-5812.
2. Or other fabricators subject to approval.

B. General:
1. Cut panels accurately to shape and dimension.
2. Dress exposed faces true.
3. Drill holes in stone panels for anchors as shown on drawings.

C. Fabrication:
1. Determine field dimensions necessary for fabrication.
2. Cut stone accurately to shape and dimensions, with required jointing. Cut beds and joints at right angles to the face, and provide joints with uniform thickness unless otherwise shown or noted on Drawings. Cut and fabricate stone units within tolerances shown provided in the contract documents or in accordance with the latest edition of Marble Institute of America, Dimension Stone Design Manual, which ever is more stringent.
3. Exactly match decorative carvings of units being replaced.

D. Fabrication Tolerances: Compliance with current MIA requirements for marble including, but not limited to the following:
   1. Flatness Tolerances
   2. Variation from true plane, or flat surfaces, determined by a 4’ dimension in any direction on the surface.
      a. For variations on polish, hone, and fine rubbed surfaces do not exceed tolerances listed below or 1/3 of the specified joint width, whichever is greater. On surfaces having other finishes, the maximum variation from true plane do not exceed the tolerance listed below or 1/2 of the specified joint width, whichever is greater {insert appropriate finish from below}.
      b. Polished, honed or fine rubbed finishes: 1/16 in.
      c. Sawn, 4-cut, 6-cut, and 8-cut finishes: 1/8 in.
      d. Pointed or other rough cut finishes: 1 in.
   3. Beds and Joints
      a. Bed and joint pieces as shown on the approved shop drawings.
      b. Bed and joint surfaces shall be cut sawn through the full thickness of the piece. Bed and joint surfaces shall be within ±3% of 90-degrees to the face of the piece unless otherwise specified.
   4. Backs of Pieces:
      a. Wherever clearly shown and detailed on the approved shop drawings, pieces shall be backed off to clear structural and mechanical components or other obstructions.
   5. Mouldings, Washes and Drips:
      a. Fabricate constant in profile throughout their length, in strict conformity with details shown on approved shop drawings.
   6. Incidental Cutting and Drilling
      a. Units in excess of 100 pounds (45 kg) may include lifting clamp dimples, Lewis holes, or other provisions as required to accommodate the lifting device(s) utilized by the installing contractor. Fill lifting holes in the top beds of panels or other locations where moisture collection can occur with non-expanding grout or high-modulus elastomeric sealant after installation and final alignment.

PART 3 EXECUTION

(Not Used - See Section 04 92 00 ‘Stone Repair’)

END OF SECTION
SECTION 04 91 60
MORTAR AND REPOINTING - GRANITE AND BRICK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes repointing of brick and stone masonry as follows:
   1. Provide sample areas for repointing joints between granite masonry units.
   2. Preparing and repointing mortar joint between existing granite masonry units.
   3. Pointing mortar joints between new and reinstalled brick masonry units.
   4. Full repointing of masonry in areas designated on drawings
   5. Removal of masonry anchors and any masonry brackets and other extraneous items no longer in use unless identified or indicated to remain.

B. Related Sections include the following:
   1. Section 04 21 10 - Brick Masonry Repair and Replacement
   2. Section 07 90 00 - Joint Sealants

1.2 REFERENCES

A. Except as modified by Construction Documents, applicable portions of the latest editions of following reference documents shall govern the Work.
   3. Secretary of Interior’s Standards for the Treatment of Historic Properties.

1.3 DEFINITIONS

A. In-situ mortar: Existing mortar including original setting mortar, pointing mortar and subsequently installed setting and repointing mortar

B. Half Moon: Refers to the configuration of a head joint that has been prepared by removing only a portion of the mortar in the joint be inserting a grinder into the joint and removing the mortar from bed joints.

C. Original mortar: Mortar used in the original construction of the masonry wall

D. Original pointing mortar: Mortar placed into a joint at the exposed outer edge from which fresh setting mortar is raked out during original construction of the masonry wall.

E. Point: The act of placing mortar into a properly prepared joint.

F. Repointing: The process of removal of hardened pointing mortar from between masonry units to a depth less than 1/3 of the depth of the units and placement of fresh mortar.

G. Setting mortar: Mortar used in original construction to act as a leveling and bonding agent for the masonry units.
H. Thumbprint hard: Mortar that has reached an initial set. Time required to achieve initial set varies based on masonry characteristics, weather conditions and mortar.

I. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

J. Very Low Pressure Spray: less than 100 psi

K. Qualification Data: For restoration specialists including field supervisors

L. Restoration Program: For each phase of restoration process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials on building and Project site.
1. Include curing methods.
2. Mortar removal techniques and equipment

M. Written Certificates: Submit certificates from the mortar supplier stating that masons installing the mortars have successfully completed on-site training for the installation of the mortar, have previously completed workshop training by the mortar manufacturer; or have met alternative workmanship qualifications.

1.4 QUALITY ASSURANCE

A. Contactor Qualifications: Engage an experienced and preapproved masonry restoration firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
1. Contractor: Must have a minimum of ten (10) years’ experience in construction and supervision of masonry work.
2. Masons: Must have a minimum of five (5) years’ experience in the installation of repointing mortar. Apprentices must be fully supervised by an experience tradesman.
3. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning are in progress. Supervisors shall not be changed during Project except for causes beyond the control of restoration specialist firm.

B. Mock-ups: Each mason is to prepare mock-ups of repointing as follows to demonstrate aesthetic effects and qualities of materials and execution. Prepare mockups on existing walls under same weather conditions to be expected during remainder of the Work.
1. Provide a sample(s) of each type of mortar installation. Rake out joints in two separate areas approximately 36 inches high by 72 inches wide for each type of repointing required. After approval of joint preparation, repoint one of the two areas for review.
2. Samples shall be prepared by qualified personnel who will be performing the work.
3. Before work commences, the sample shall be approved by the Owner and Architect/Engineer. The approved sample shall be the standard for the work. Retain acceptable areas in undisturbed condition, suitably marked, during restoration as a standard for judging completed work.
4. Sample should match existing historic profile.
5. Sample should include a sample of cleaning mortar from masonry units adjacent to joints.
6. Samples should cure a minimum of 14 days prior to Architect/Engineer’s approval

C. Field Quality Control: Work in place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.
1.5 PROJECT CONDITIONS

A. Repoint mortar joints and repair masonry only when air temperature is between 40 and 90 degrees Fahrenheit and is predicted to remain so for at least 7 days after completion of work. The low temperature at night must be above freezing for at least three (3) days following repointing work.

B. Hot-Weather Requirements: Do not perform repointing when the ambient air temperature is greater than 90 degree Fahrenheit, unless Contractor provides hot weather protection recommended by BIA for hot weather masonry construction as outlined in BIA Technical Note 1.

1.6 SEQUENCING AND SCHEDULING

A. Order materials at earliest possible date, to avoid delaying completion of the Work.

B. Order repointing mortar immediately after approval of Samples and large area mockups. Take delivery of and store at Project site a sufficient quantity of sand to complete Project.

C. Perform masonry repointing work in the following sequence:
   1. Rake out joints that are to be repointed.
   2. Point mortar joints.
   3. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   4. Rake out joints that are to be repointed.

D. Coordinate pointing with window repair and replacement. Do not damage windows or glazing.

E. As scaffolding is removed, repair anchor holes used to attach scaffolding.

PART 2 PRODUCTS

2.1 MORTARS

A. Pre-blended Cement-Lime Repointing and Setting Mortar mix as specified under sections 2.3 Materials and 2.4 Mixes below.
   1. Acceptable Suppliers:
      a. Edison Coatings [Spec-Joint 46], 3 Northwest Drive, Plainville, CT 06062, tel: (800) 697-8055, fax: (860) 747-2280. Email: info@edisoncoatings.com
      b. U.S. Heritage Group [Preblended Mortar], 3516 N. Kostner, Chicago, IL 60641, tel. (773) 286-2100, fax. (773) 286-1852, Email: info@usheritage.com
      c. Or approved equal.

2.2 MORTAR MIXES

A. General: Do not use admixtures, including air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Limit cementitious materials in mortar to Portland cement and lime.
B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
   1. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
   1. For masonry below grade or in contact with earth, use Type S.
   2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
   3. Repointing mortar shall be prehydrated Type N. Mortar: ASTM C270, Type N made up of one part lime, one part Portland cement and six parts sand by volume.

D. Color Matching: Match color of mortar to the architect’s sample, unless specified otherwise.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

PART 3 EXECUTION

3.1 PROTECTION

A. Comply with all applicable Building Codes regarding, but not limited to noise and dust mitigation to surrounding areas.

B. Provide and maintain means to prevent the spread of dust, fumes, smoke and excessive noise within the building.

C. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from the work.
   1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of the work.

D. Prevent mortar from staining face of surrounding masonry and other surfaces.
   1. Cover sills, ledges, and projections to protect from mortar droppings. Do not extend coverings into mortar joints.
   2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
   3. Immediately remove mortar in contact with exposed masonry and other surfaces.
   4. Clean mortar splatters from scaffolding at end of each day.

E. Remove gutters and downspouts adjacent to masonry and store in a secured location during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning is complete.
   1. Provide temporary rain drainage during work to direct water away from building.
3.2 FIELD QUALITY CONTROL

A. Mortar testing for each type of pointing mortar used:
   1. At least two weeks prior to the start of pointing work, one set of at least nine mortar cubes shall be taken from a batch of mortar prepared by the Contractor, in the presence of the testing laboratory personnel, with the materials to be used for the mortar during the pointing work, in accordance with ASTM C 270.
   2. One set of at least nine cubes shall be taken at a random day and time up to twenty (20) times during the progress of the pointing work in accordance with ASTM C 270. In general a set will be taken once every two weeks during pointing work. The time that each set will be taken will be determined by the Architect/Engineer. Mortar cubes which do not meet test requirements will not be considered as one of the twenty sets of cubes.
   3. Three cubes from each set shall be tested at three, seven, and twenty-eight days in accordance with ASTM C 270.
   4. The results achieved from the random sampling taken during the work will be expected to achieve results closely similar or better than that achieved from the set made prior to the start of pointing work.

3.3 MORTAR MIXING

A. All mortar mixing is to be accomplished using a mechanical mixer. Use a 1 cubic foot box or other device to ensure that mortar is properly proportioned in accordance with Contract Documents. Discard all unused mortar 2-1/2 hours after initial mixing.

B. Do not use any admixtures or accelerators in mortar other than specified herein.

C. Control batching procedure to ensure proper proportions by measuring materials by volume.

D. Do not measure mortar materials by shovels.

E. Mortar may be retempered by adding water and remixing as required for workability. Do not use mortar if more than 1-1/2 hours has elapsed since the pre-hydration of mortar has been completed.

F. Do not use frozen materials mixed with or coated with ice or frost. When temperature or surrounding air is 50 degrees Fahrenheit and falling, take precautions to protect masonry materials from freezing. Comply with “Cold Weather Masonry Construction and Protection Recommendations,” BIA Technical Note 1A.

3.4 REPOINTING MASONRY

A. Rake out and repoint mortar joints to the following extent:
   1. All joints in areas indicated.
   2. Joints where mortar is missing or where they contain holes.
   3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade or 0.027 inch thick.
   4. Cracked joints where cracks are 1/8 inch or more in width and of any depth.
   5. Joints where they sound hollow when tapped by metal object.
   6. Joints where they are worn back 1/4 inch or more from surface.
   7. Joints where they are deteriorated to point that mortar can be easily removed by hand.
   8. Joints, other than those indicated as sealant-filled joints, where they have been filled with substances other than mortar.
B. Rake out joints as follows:

1. Grind out a narrow line along the center of the length of the mortar joints to a depth of at least 1 inch or to sound mortar, whichever is deeper. Remove mortar for width of joint by cutting, using hand tools only. Remove mortar to a depth of 3 times the width of the joint, up to a maximum of 3 inches, removing all unsound mortar. Adjacent stone shall not be damaged during grinding, and cutting out of joints. Mortar shall be removed without loss or damage of adjacent granite.

2. Remove mortar from joints to depth of 3 times joint width, but not less than 1 inch or not less than that required to expose sound, unweathered mortar. If unsound mortar extends more than 3 inches from the face of the units, work should not proceed and the Architect/Engineer should be contacted immediately.

3. Remove mortar from masonry joint surfaces to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

4. Do not spall edges of masonry units or widen joints. Replace damaged masonry units as directed by Architect/Engineer.

5. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and mallet.

6. Strictly adhere to written quality-control program. Quality-control program shall include provisions for demonstrating ability of operators to use tools without damaging masonry, supervising performance, and preventing damage due to worker fatigue.

7. “Half moons” created by grinders in head joints will not be allowed. Use hand tool to remove the half moons as required and do not damage the masonry units.

8. All sealant joints at areas to be repointed are to be raked out and cleaned of all sealant residue during the mortar removal process.

C. Notify Architect/Engineer of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

D. Masonry units adjacent to the repair areas that are damaged during the Work shall be removed and replaced at Contractor’s expense and to the acceptance of the Architect/Engineer and Owner.

E. Repoint joints as follows:

1. Blow loose mortar out prepared joints with compressed air.

2. Rinse masonry-joint surfaces with potable water to remove residual dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.

3. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 1/4 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

4. After deeper areas have been filled to same depth as typical areas, point all joints by placing mortar in layers not greater than 1/4 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry has worn or rounded edges, slightly recess finished mortar surface from face of masonry to avoid wider joints. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.

5. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.
F. Cure mortar by maintaining in thoroughly damp condition for at least 72 hours including weekends and holidays.
   1. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
   2. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.

G. Where repointing work precedes building cleaning of existing masonry, allow mortar to cure at least 28 days before beginning cleaning work.

3.5 FIELD QUALITY CONTROL

A. Architect/Engineer’s Project Representatives: Architect/Engineer will assign project representatives to help carry out Architect/Engineer’s responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect/Engineer’s Project representatives use of scaffolding, as needed, to observe progress and quality of portion of the Work completed.

B. Notify Architect/Engineer’s Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect/Engineer’s Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.6 CLEAN UP

A. At the conclusion of repointing, remove all scaffolding and equipment used in the Work. Clean all debris, refuse and surplus of material and remove same from premises.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Cylinder plug dutchman repair: Provide drilled hole with mated plug set in specified grout, face tooled to match adjoining textures.
   2. Dutchman Repair: Install granite units with tooled face(s) set flush to adjoining stonework in specified mortar, face tooled to match adjoining textures. Minimum depth to be 2 inch. (Split or spring blind pins required if greater than 36 square inches in bedding area. Epoxy set hidden anchor required if more than 36 square inches and more than 8’-0” above grade.)
   3. Stone Resetting Repairs: Remove and reset existing granite masonry complete with anchorage as required.

B. Installation of granite repair samples for all repair items.

C. Products installed but not supplied under this Section
   1. Masonry mortars and grouts as Specified in Section 04 91 60

D. Related Sections include the following:
   1. Section 04 91 10 – Brick Masonry Repair and Replacement

1.2 REFERENCES

A. National Building Granite Quarries Association, Inc. (NBGQA)
   1. "Specifications for Architectural Granite"

B. Marble Institute of America, “Dimension Stone Design Manual”

C. American Society for Testing and Materials (ASTM)
   1. A276 - Standard Specification for Stainless Steel Bars and Shapes
   2. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
   3. C97 - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
   5. C119 - Standard Terminology Relating to Dimension Stone
   7. C615 - Standard Specification for Granite Dimension Stone
1.3 QUALITY ASSURANCE

A. Contractor Qualifications:
1. Contractor’s workmen performing this work must have at least five years proven experience in masonry repair and restoration and shall have successfully completed three projects similar in scope to the work of this project within the last three years.
2. Masons must have a minimum of three (3) years experience in the preparation of masonry mortar. Apprentices must be fully supervised by an experienced tradesman.

B. Except as modified by the Drawings and Specifications, all new granite material and installation shall be in accordance with the latest edition of “Specifications for Architectural Granite,” published by National Building Granite Quarriers Association, Inc. (NBGQA).

C. Field Quality Control: Work in place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.

D. Manufacturers:
1. Materials shall be obtained only from manufacturers who will, if required, send a qualified technical representative to the project site, for the purpose of advising the Contractor of the procedures and precautions for the use of the materials.
2. Source Limitations: Obtain each type of material for stone restoration (stone, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

E. Fabrication:
1. Except as modified by the Drawings and Specifications, provide stone and install stone in accordance with the latest edition of National Building Granite Quarries Association, Inc. (NBGQA) "Specifications for Architectural Granite"
2. Determine field dimensions necessary for fabrication.
3. Cut stone accurately to shape and dimensions, with required jointing. Cut beds and joints at right angles to the face, and provide joints with uniform thickness unless otherwise shown or noted on Drawings. Cut and fabricate stone units within tolerances in accordance with the latest edition of National Building Granite Quarries Association, Inc. (NBGQA) "Specifications for Architectural Granite."
4. Approved samples are for comparison of texture, finish and color of new stone supplied for the building. Replace new stone that does not match the approved samples replaced with new stone. Additional costs related to acquiring new stone for replacement of rejected stone shall be borne by the Contractor, including costs related to removing and replacing new stone that has been installed on the building prior to review and acceptance by the Architect/Engineer and Owner.
5. Exactly match decorative carvings of units being replaced.

F. Testing
1. General
   a. Employ and pay for the services of an independent testing agency acceptable to the Owner and Architect/Engineer to perform the tests specified herein.
   b. The Testing Agency will be responsible for conducting and interpreting the tests, and shall state in each report whether or not the test specimens conform to the requirements of the contract documents, and shall specifically note deviations.
   c. Testing agencies must submit test procedures to owner for review and approval prior to testing.
2. Preconstruction Testing
a. Test as follows representative stone specimens from each type of stone, prior to acceptance for use:
   1) Petrographic/geologic evaluation of quarry; identification of rift, slabbing orientation, location/area of samples obtained from quarry. Evaluation shall be in accordance with ASTM C295.

G. Quality Control Testing
1. Mock-ups
   a. Perform sample repairs to illustrate the type and quality of the work required to satisfy the requirements of the project. The approved sample repairs are the standard of quality for the remainder of the work.
      1) Three samples shall be performed for each repair type specified herein, except where Architect/Engineer determines upon completion of first or second sample that additional samples are not required.
      2) For each crack repair, each sample shall be a minimum of 12 linear inches each.
         Use grout colors selected by Architect/Engineer.
      3) For each dutchman installation, minimum dimension shall be 12 inches x 12 inches.
   b. Provide a sample of each repair type, using specified materials and methods, and using tools and equipment intended to be used. Samples shall be performed by the workers who will be performing the work.
   c. For repair mortar match the adjacent stone in color, texture, composition, texture, particle size and appearance.
   d. Provide mortar which meets requirements of Section 04061.
   e. Select sample locations in consultation with Architect/Engineer.
   f. Provide additional samples until results acceptable to the Architect/Engineer are achieved.
   g. Commence work only after each sample repair has been reviewed and accepted by Architect/Engineer and Owner.
   h. Commence installation of dutchman sample only after Architect/Engineer has inspected repair opening.
   i. Retain samples throughout the duration of the project as references for the work. Upon completion of the work, samples may be incorporated into the work with prior approval by the Architect/Engineer.
   j. Install samples using same personnel as those throughout project.

2. Fabricated Stone
   a. Inspect new fabricated stone for dimensional accuracy, finish, color, and defects.
   b. Reject stone delivered to the job site that does not meet the project specifications.
   c. Provide sufficient notification of the arrival of stone to the Architect/Engineer for their inspection prior to installing the stone.
   d. Provide assistance to move stones for proper visual inspections by the Architect/Engineer.

3. Do not use stone outside the color and texture ranges of the approved samples.

4. Do not use stone outside the specified fabrication tolerances.

1.4 SUBMITTALS

A. Quality Assurance Submittal:
1. Qualification Requirements: Review of the qualifications of the workmen for this section is a requirement of this project. In order to be qualified for this work, the Contractor shall
submit for review a list of projects showing the experience of each team member as outlined in the Quality Assurance section of this specification.

a. The Contractor shall, for each worker, identify each project by name and location, provide an outline description of the scope of work, dollar value of the contract, date of completion, a reference contract, and a description of the worker’s responsibility on the project.

b. If, in the opinion of the Architect/Engineer and the Owner, the worker does not meet the requirements for this section, the Contractor shall be required to submit alternate workmen providing a full set of quality assurance submittals for that worker for review.

B. Product Identification: Submit to Owner three copies of manufacturer's product literature, application instructions, and manufacturer's safety data sheets for all products used in repairs before the work begins.

C. Prior to beginning work, submit the following:
   1. Stone manufacturer's literature and test results certifying that stone to be supplied has the specified minimum properties. Test results must not be older than 2 years.
   2. Submit fabricator’s quality control procedures, including quarrying, sorting, blending, fabrication, and shipping.
   3. Submit three copies of granite fabricator’s literature and test results certifying that the granite to be supplied for use on the building has the required properties. The test results submitted shall be for granite material from all quarries to be used and for the finished used on this project.
   4. Shop drawings for review including complete cutting and setting drawings. Such drawings shall show in detail sizes, sections, and dimensions of stone, arrangement of joint locations, anchoring, and other necessary details.
   5. Manufacturer’s product data, specifications, and installation instructions for each item of proprietary material used, showing compliance with its use.
   6. Certified test reports (two copies) of anchorage components.
   7. Mill certificates for stainless steel bent plates, strap anchors, proprietary products, and gravity supports.

D. Shop Drawings: For the following:
   1. Replacement stone units. Complete cutting and setting drawings. Show in details, sizes, sections, and dimensions of stone, the arrangement of joint locations, anchoring and other necessary details. Follow jointing shown on Drawings, unless modifications are agreed upon in writing, or indicated upon the approved shop drawings.
   2. Typical anchorage for partial replacement stone units (dutchman).
   3. Replacement and repair anchors, including drilled-in pins. Include details of anchors within individual stone units, with locations of anchors and dimensions of holes and recesses in stone required for anchors, including direction and angle of holes for pins.

E. If materials and methods other than those indicated are proposed for repair work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this project.

F. Samples
1. Each type of replacement stone. Provide in sets of at least three 12” x 12” x 2” thick granite samples representing complete range of color variations. Each sample shall have same color and texture as existing granite on the building.

2. Three samples of each product used in the project including stone each specific anchor, fastener, accessory, and material to be used in granite repair.

3. One bag of Laticrete 1500 Series Tri-Poly Fortified Sanded Grout, as manufactured by Laticrete

4. Each type of masonry patching compound in form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each sample with manufacturer and stock number or other information necessary to order additional material.

G. As-built drawings created on the elevation drawing provided in the Contract Documents. The as-built drawings will indicate location and type of repairs performed.

1.5 JOB CONDITIONS

A. Construction plant, including all equipment, material and appliances required for the completion of the work, shall be so located, laid out, constructed and operated as to provide for maximum efficiency, safety of the public and all persons employed at the site, and to prevent damage to all new and existing construction.

B. Confine operations at site to areas permitted by laws, permits, contract, and the Owner.

C. Contractor shall assume full responsibility for protection and safekeeping of products stored on premises, and for their proper use.

D. Work of this section shall not commence until exterior cleaning specified under Section 04510 is completed.

E. Where conditions are uncovered that are not anticipated by the Drawings and/or Specifications, the Contractor shall notify the Architect/Engineer immediately, before any repairs are initiated.

F. Pointing shall be completed after or simultaneously with the execution of granite repairs.

G. Coordinate work of this project with other work in progress on the building.

H. Cold Weather Requirements: Comply with the following procedures for stone repair and patching:
   1. When air temperature is below 40 degrees Fahrenheit, heat mortar ingredients, repair materials, and existing stone to produce temperatures between 40 and 120 degrees Fahrenheit.
   2. When mean daily air temperature is below 40 degrees Fahrenheit, provide enclosure and heat to maintain temperatures above 32 degrees Fahrenheit within the enclosure for 7 days after repairs using products damaged by freezing.

I. Hot Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply cement based products to substrates with temperatures of 90 degrees Fahrenheit and above.
J. Patch stone only when air and surface temperatures are between and 55 and 100 degrees Fahrenheit and are predicted to remain above 55 degrees Fahrenheit for at least 7 days after completion of work. On days when air temperature is predicted to go above 90 degrees Fahrenheit, schedule patching work to coincide with time that surface being patched will be in shade or during cooler morning hours.

K. Unanticipated Conditions
   1. Examine facade elements, substrates, support and condition under which the Work is to be performed and notify the Architect/Engineer in writing of conditions detrimental to the proper completion of the Work. Do not proceed with work until unsatisfactory conditions are corrected. Where conditions are uncovered that are not anticipated by the Drawings and Specifications, notify the Architect/Engineer immediately before repairs are initiated.
   2. Contractor is not to perform repairs at areas of discrepancies until receipt of appropriate repair for the location in writing from the Architect/Engineer. Proceeding with repairs at these locations without description from the Architect/Engineer is entirely at the risk and cost of the Contractor.

L. Precautions
   1. Apply epoxies only to dry surfaces meeting the manufacturer’s recommendations for surface preparation and working temperatures.
   2. Apply epoxies to surfaces free of moisture, dirt, organic materials, efflorescent salts, and other contaminants.

1.6 PROTECTION OF WORK

   A. Temporarily mask stones, as required, to prevent repair materials from staining stone and existing or new materials in and adjacent to the area of work. Immediately clean exterior wall system and adjacent areas of spilled materials.

   B. Cover partially completed anchors, cracks and joints that are not sealed at the end of each working day or shutdown or when work is not in progress.

   C. Extend cover beyond each side of partially completed anchors, cracks and joints to prevent exposure to weather. Secure cover tightly in place.

   D. Cover exterior wall openings to prevent infiltration of animals, insects, and water during stone panel removal.

   E. Cover partially completed work at the end of each working day or when work is not in progress.

   F. Carefully cover tops and sides of incomplete areas when construction is discontinued at end of work day, to protect are from precipitation. Protect joints in stonework to make them watertight until they are permanently sealed.

   G. Secure stone to structure at end of each working period. Shore surrounding limestone panels as necessary to prevent shifting or collapse during removal and replacement of limestone panels.

   H. Protect wall from mortar droppings at all times. Mortar shall be prevented from staining existing and new materials in areas adjacent to area of work.
1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials to prevent deterioration or the intrusion of foreign matter. Deliver and store packaged materials in the original packages. Removed from the jobsite damaged or otherwise unsuitable material.

B. Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

C. Receive and unload stone panels at the site or other facility with necessary care in handling to avoid damaging or soiling.

D. Do not use materials in broken packages or which show evidence of damage.

E. Notify the Architect/Engineer and the Owner of damage observed to existing and salvaged units prior to commencing work.

F. Verify adequacy of support or portion of the structure for loading with equipment and materials.

G. Store stone sections clear of the ground on non-staining skids (cypress, white pine, poplar, or yellow pine without an excessive amount of resin). Do not use chemically treated wood. DO NOT use chestnut, walnut, oak, fir, and other woods containing tannin or other substances that may stain the stone.

H. Protect materials during storage and construction. Keep containers tightly closed and away from damage. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

I. Cover stone panels with waterproof paper, clean canvas or polyethylene.

J. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

K. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

L. Store sand where grading and other required characteristics can be maintained and contamination avoided.

M. Comply with manufacturer's recommendations for handling all materials.

1.8 PROTECTION

A. The Contractor shall exercise caution in performing the work so as not to damage adjacent building elements. It shall be the Contractor's responsibility to protect the adjacent masonry and windows from mechanical damage due to scaffolding and other equipment.

B. Any damaged materials, wood, metal, or glass that has been etched, the paint removed, or otherwise damaged, shall be repaired to the satisfaction of the Architect/Engineer without additional cost to the Owner.
PART 2 PRODUCTS

2.1 GRANITE

A. General Requirements
   1. Granite for replacement and dutchman units shall match the color, finish, and cut profile of units to be repaired or replaced.

B. Granite Sources:
   1. Contractor to provide stone from a single source.
   2. All stone to be sourced in North American unless approved otherwise by Architect/Engineer.

C. Finish Requirements
   1. Stone supplier to verify the various existing stone finishes.
   2. Match existing weathered condition and tooled or rock faced finish of masonry units.

D. New granite shall conform with the following physical requirements in accordance with ASTM C615 and shall have the following properties:
   1. Absorption by weight: 0.023 grams per square inch maximum when tested in accordance with ASTM C97
   3. Compressive strength: 16,500 psi minimum when tested in accordance with ASTM C170
   4. Modulus of rupture: 1,500 psi when tested in accordance with ASTM C99.
   5. Flexural strength: 1,200 psi minimum when tested in accordance with ASTM C88.
   6. All granite to be installed on the building shall be free of cracks, chips, and other defects.

E. All granite for Dutchman and replacement units shall be cut accurately to shape and dimensions and full to the square. All exposed faces shall be dressed true. Beds and joints shall be at right angles to the face, and joints shall have a uniform thickness to match size and profile shown on the drawings.

F. The fabricator and the Contractor shall determine all field dimensions necessary for fabrication of Dutchman and replacement units.

G. Decorative carvings shall exactly match those of units being replaced.

H. Provide dutchman units for review by Architect/Engineer prior to installation.

2.2 FABRICATION

A. General
   1. Cut panels accurately to shape and dimension.
   2. Dress exposed faces true.
   3. Drill holes in stone panels for anchors as shown on drawings.

B. Granite
   1. Fabrication Tolerances: Compliance with current NBGQA requirements.
      a. Beds and Joints
         1) Bed and joint pieces as shown on the approved shop drawings.
         2) Backs of Pieces:
            a) Sawn to approximately true planes.
3) Mouldings, Washes and Drips:
   a) Fabricate constant in profile throughout their length, in strict conformity with details shown on approved shop drawings.

4) Incidental Cutting and Drilling
   a) Panels in excess of 100 pounds (45 kg) may include lifting clamp dimples, Lewis holes, or other provisions as required to accommodate the lifting device(s) utilized by the installing contractor. Fill lifting holes in the top beds of panels or other locations where moisture collection can occur with dutchman plugs.

C. Salvaged Stone
   1. Select material for dutchman and replacement units which match color, finish, and cut profile of units to be repaired. Provide selected units for review by Architect/Engineer prior to installation.

D. Other Stone Components
   1. Stone Plugs
      a. Fabricate from cores taken from new/existing stone panel which meet above requirements.
      b. Thickness: 2 inches minimum thickness, diameter 1/16 inch less than required diameter of hole.
      c. Shop fabricate plugs.

2.3 FASTENERS

A. All anchors shall be stainless steel conforming with ASTM A 167, Type 316. Size of pins and anchors to be confirmed with Architect/Engineer.

B. Use drill, bits, and setting tools recommended by manufacturer.

C. Spring loaded dowel pins for installation of Dutchman unit shall be stainless steel spring and dowel pin (spring welded to dowel pin), or stainless steel drop pin. Pin shall be 3/16 inch diameter or greater. Pin dimensions shall be as shown on Drawings.

D. Provisions for anchorage of granite shall be clearly indicated on the shop drawings, and shall be in accordance with the drawings and specifications.

E. Stone Anchors
   1. Stone anchors: stainless steel conforming with ASTM A 167, Type 304
   2. Anchor embedment depth and countersink dimension as shown on Drawings

F. Threaded Rods, Fasteners, and Components
   1. Material
      a. Threaded rods, fasteners, and components: stainless steel conforming with ASTM A 167, Type 304.
   2. Proprietary Anchors
      a. Epoxy for embedment of threaded rods shall be two-component AC100+ Gold vinylster supplied by Powers Fasteners system.
      b. Snaptoggle, as manufactured by Toggler Anchor System, Div. of Mechanical Plastics Corp., 444 Saw Mill River Road, P.O. Box 554, Elmsford, NY 10523, (888) 864-4537
c. Proprietary Anchor installation training: Workers installing this system shall be trained by the manufacturer’s representative.
   1) Manufacturer is to provide written certification that each Workman has attended and successfully installed a minimum of 6 anchors.

2.4 STONE REPAIR PRODUCTS

   A. Epoxy for Dutchman Joints (Stone to Stone)
      1. Akemi North America; Akepox.
      3. Edison Coatings, Inc.; Flexi-Weld 520T.

2.5 WATER

   A. Clean, potable water. Water used for prewetting, mixing, and rinsing must have an iron content of less than two (2) parts per million, or 0.0002 percent (by weight). Water to be used shall be sampled and tested for iron content prior to beginning work each year.

2.6 MATERIALS FOR POINTING AND SETTING MORTAR

   A. Refer to Section 04 91 60

2.7 MATERIALS FOR JOINT SEALANT

   A. Refer to Section 07 92 00

PART 3 EXECUTION

3.1 PRECONSTRUCTION SURVEY AND RECORD DRAWINGS

   A. Provide close up access to Architect/Engineer for inspection of the stone units prior to performing the work

   B. Architect/Engineer shall confirm and/or update repair types and locations at each survey location.

   C. Contractor shall develop record drawing(s) based on the contract drawings, describing the types, sizes and locations of actual repairs.

   D. Record each existing distress condition before and after repair with a digital photograph keyed to the elevation drawing with a unique identifying code.

   E. Mark each removed unit with a unique identifying code. Record codes on a record drawing to ensure reinstallation in proper location. Sections of cracked units shall be marked with an identification code.

   F. Contractor shall update the drawings regularly as the work progresses to accurately record as-built conditions.

   G. Allow opportunity for required inspection of Work before permanently covering or concealing elements of Work.
3.2 GENERAL

A. Examine all substrates, support, and conditions under which the work is to be performed. Notify the Architect/Engineer of any conditions detrimental to the work. Do not proceed with work until unsatisfactory conditions are corrected.

B. Salvage of granite units designated for replacement or reinstallation:
   1. Remove units designated for use as Dutchman or replacement unit.
   2. Care shall be taken to avoid damaging units.
   3. Carefully protect and store units after removal.

C. Dutchman and replacement units shall be installed plumb, square, and true to line.

D. Shore and protect adjacent granite units, window frames, and other building elements adjacent to units to be repaired, removed and reinstalled, or removed and replaced.

E. Setting Tolerances
   1. Match existing adjacent stonework, following NBGQA requirements for installation tolerances.

3.3 DUTCHMAN REPAIRS

A. Perform dutchman repairs at locations indicated and at surface holes, chips, and spalls greater than 16 inches square and 3/4 inch or greater in depth, install Dutchman repair. For smaller or shallower repair locations, refer to patch repairs.

B. At locations designated for repair, cut out immediate area of spall and adjacent unsound stone to form a rectangular opening, to a minimum depth of 2 inches.

C. At locations requiring replacement of existing repair, cut out and remove previous patch and adjacent unsound stone to form a rectangular opening, to a minimum depth of 2 inches.

D. Prepare Dutchman unit to match color and texture of adjacent stone. Set Dutchman unit in mortar. Anchor with stainless steel pins and anchors as shown on Drawings.

E. Fabricate Dutchman to maintain following tolerances unless otherwise indicated on Drawings:
   1. Joints between Dutchman and parent stone of 1/32 in. min. and 1/16 in. max.
   3. Circular Dutchman plugs: Maintain a 1/32 inch joint around repair hole.

F. Set Dutchman units in specified epoxy.

G. At very limited locations and subject to Architect/Engineer’s case by case approval, collar (back) joint may be bedded with epoxy mortar. No epoxy mortars are permitted in head or bed joints of Dutchman units or anywhere within two (2) inches of exposed face of stone.

H. Anchoring Dutchman Units
   1. Spring / Drop Pins
      a. Provide holes 1/16 inch diameter larger than diameter of stainless steel pin, providing minimum engagement of 1-1/2 inches into stone and Dutchman on either side. Set pins in sealant; do not permit sealant to drip onto exterior face of stone.
      b. Install pins as indicated on Drawings. Unless otherwise indicated, install a minimum of two pins per Dutchman repair.
2. Threaded Rod Pins
   a. If wall cavity exists, provide shims at anchor locations to allow for proper positioning of Dutchman.
   b. At each anchor location, carefully drill a pilot hole into the new stone panel leaving 3/4” distance from face of the stone and into backup at embedment depth specified in Drawings. When drilling pilot hole, a rotary, non-impact type drill, core drill, other provisions should be used to reduce risk of stone spalling during drilling operations.
   c. Diameter of pilot hole as recommended by manufacturer, to be determined during pre-construction testing.
   d. Insert approved adhesive and anchor per manufacturer’s instructions.

3.4 REMOVAL OF FERROUS ANCHORS

   A. Remove existing abandoned ferrous from stone panels.
   
   B. Identify and bring to Architect/Engineer’s attention existing ferrous anchors still in service. Do not remove anchors unless directed to do so.
   
   C. Remove anchors by core drilling a small plug if direct removal is not successful.
   
   D. Patch hole after removal of anchor.
      1. Holes less than 1 inch diameter: Use specified patching mortar.
      2. Holes 1 in diameter and greater: Install stone plug cover Dutchman repair.

3.5 CLEAN-UP

   A. The premises shall be kept in clean and orderly condition at all times during the progress of the work. Rubbish, barriers, dirt, debris, tools, equipment, and unused materials shall be removed from the site each day.
   
   B. After work has been completed, remove all protection, equipment used in the work, debris, refuse, and surplus materials and remove same from premises.
   
   C. After stone repair work is completed and joints are pointed and sealed as shown on Drawings, stonework shall be washed with fiber brushes and clean water. No cleaning products containing hydrochloric (muriatic) acid, hydrofluoric acid, or ammonium bifluoride shall be used on this project at any time.

END OF SECTION
SECTION 04920
STONE REPAIR - MARBLE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Repairing stonework, including replacing damaged units.
   2. Test requirements for replacement stone

B. Products installed but not supplied under this Section
   1. Masonry mortars including pointing, setting and patching applications and grouts as Specified in Section 04 06 10
   2. New Marble specified in Section 04 86 10
   3. Flashings as specified in Section 07 62 00
   4. Joint Sealant as specified in Section 07 92 00

C. Related Sections include the following:
   1. Division 4 Sections
   2. Division 7 Sections

D. Allowances: Quantity allowances for stone repair are indicated on drawing sheet C-002 and in the Bid Form.
   1. Perform stone repair included in quantity allowances only as authorized. Authorized work includes work required by specifications and only work authorized in writing by Architect.
   2. Notify Architect weekly of extent of work performed that is attributable to quantity allowances.
   3. Perform work that exceeds quantity allowances only as authorized by Change Orders.

E. Unit Prices: Unit prices for stone repair and cleaning are specified in the Bid Form.
   1. Unit prices apply to additions to and deletions from the Base Scope of Work covered by quantity allowances.
   2. Unit prices apply to additions to and deletions from Base Scope of Work as authorized by Change Orders.

1.2 DEFINITIONS

A. chip—an irregularly-shaped piece of stone, usually with one convex surface, that has been dislodged from a snip.

B. dimension stone—natural stone that has been selected and fabricated to specific sizes or shapes.

C. dressed stone—See cut stone, finished stone.

D. finished stone—dimension stone with one or more mechanically exposed surfaces.
E. filling—the application of materials, often cements or synthetic resins, into natural voids in a stone during fabrication.

F. microcrack—a crack too small to be seen with the unaided eye (see crack, fracture, seam).

G. open seams—unfilled fissures or naturally occurring cracks in stone.

H. pits—small depressions, voids or pinholes in stone, especially on a finished surface.

I. rift—(1) a consistent direction or trend in a rock body along which the rock is most easily split or broken. (2) The grain orientation in stone, particularly in sedimentary stones, showing more or less clearly how the stone was originally bedded, and with or without color or grain-size changes, or voids and hollow.

J. seam—a naturally filled or bonded crack which does not adversely affect the strength of a stone (see crack, fracture, microcrack).

K. slab—a piece of stone produced by shaving or splitting in the first milling or quarrying operation. A slab has two parallel surfaces.

L. snip—the concave surface from which a chip has been dislodged.

M. spalls—(1) fragments or chips from a piece of dimension stone. (2) waste stone usually of small size from the quarrying and milling of dimension stone.

N. veining—the presence in an otherwise homogeneous stone of bands, streaks or irregular bodies of a contrasting color or appearance, and frequently having a different mineralogical composition to the predominant material. “Veining” does not apply to gneiss, commercial granite types, and slate (see ribbon).

1.3 REFERENCES

A. Marble Institute of America, “Dimension Stone Design Manual”

B. American Society for Testing and Materials (ASTM)
   1. C97 - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
   3. C119 - Standard Terminology Relating to Dimension Stone

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
B. Shop Drawings: For the following:
1. Replacement stone units. Complete cutting and setting drawings. Show in details, sizes, sections, and dimensions of stone, the arrangement of joint locations, anchoring and other necessary details. Follow jointing shown on Drawings, unless modifications are agreed upon in writing, or indicated upon the approved shop drawings.
2. Partial and representative typical types of replacement stone units (Dutchmen).
3. Replacement and repair anchors, including drilled-in pins. Include details of anchors within individual stone units, with locations of anchors and dimensions of holes and recesses in stone required for anchors, including direction and angle of holes for pins.
4. Fabrication hardware assemblies.

C. Samples for Verification: Before erecting mockup, submit samples of the following:
1. Each type of masonry patching compound in form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each sample with manufacturer and stock number or other information necessary to order additional material.

D. Qualification Data: For restoration specialists including field supervisors.
1. Restoration Specialists: list of projects showing experience of each team member.
   a. For each worker, identify each project by name and location, provide an outline description of the scope of work, dollar value of the contract, date of completion, a reference contract, and a description of worker’s responsibility on project.
   b. If, in the opinion of the Architect/Engineer and the Owner, the worker does not meet requirements for this section, submit alternate workmen providing a full set of quality assurance submittals for that worker for review.

E. Repair Program: For each phase of repair process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of repair work including protection of surrounding materials on building and Project site.
1. If materials and methods other than those indicated are proposed for repair work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.
2. Stone Installation Contractors and [Stone Fabricators] must submit comprehensive quality control programs indicating means and methods and related quality control procedures [during quarrying, fabrication, shipping, and installation]. This program shall be subject to review and approval by owner.

F. Literature
1. Technical literature on stone repair materials describing material properties, storage and handling, installation procedures, and testing requirements of manufacturer.
2. Mill certificates for stainless steel bent plates, strap anchors, proprietary products, and gravity supports.
3. MSDS sheets for specified products.
4. Sample manufacturer standard and extended warranties.
5. Stone manufacturer's literature and test results certifying that stone to be supplied has the specified minimum properties. Test results must not be older than 2 years.
6. Testing agencies must submit test procedures to owner for review prior to testing.
7. Test reports from testing agency for required tests.

G. Samples
1. Each type of replacement stone. Provide in sets of at least 3 12-by-12-inch Samples for each type.
2. The samples shall be finished to match that of existing stone panels to be replaced.
3. Three (3) samples of each product used in the project including:
   a. Hardware including nuts, bolts, and washers
   b. Compressible filler materials
   c. Stone anchors
   d. Shims
   e. Epoxy
   f. Patching material
   g. Stone plugs

H. As-built drawings created on the elevation drawing provided in the Contract Documents. The as-built drawings will indicate location and type of each repair performed.

1.5 QUALITY ASSURANCE

A. Comply with provisions, references documents, and standards listed in specification unless otherwise noted.

B. Project Team Requirements
   1. Contractor: Must have a minimum of 25 years experience in construction and supervision of stone repair work.
      a. Designate an individual with commensurate experience to act as the "stone foreman" to oversee stone repair activities through the duration of the project. The individual shall participate in the in initial sample installations. Changes in foreman during the course of the project may require Contractor to perform additional sample installation under the directions of the new foreman and subject to review/acceptance by Owner/Engineer/Architect.
      b. Qualification Requirements: Review of the qualification of the workmen for this section is a requirement of this project. In order to be qualified for this work submit for review a list of projects showing the experience of each team member as outlined in the Quality Assurance section of this specification.
         1) For each worker, identify each project by name and location, provide an outline description of the scope of work, dollar value of the contract, date of completion, a reference contract, and a description of the worker’s responsibility on the project.
         2) If, in the opinion of the Architect/Engineer and the Owner, the worker does not meet the requirements for this section submit alternate workmen providing a full set of quality assurance submittals for that worker for review.
   2. Stone Masons: Minimum of 10 years experience in Stone Repair and shall have successfully completed three projects similar in scope to the work of this project within the last three years.
      a. Fabricator: Member in good standing with the Marble Institute of America (MIA) and shall have previous experience in similar projects.
      b. Manufacturers: Only those who will, if required, send a qualified technical representative to the project site, for the purpose of advising the Contractor of the procedures and precautions for the use of the materials.
   4. Welding: Welders, welding operations and procedures shall be certified for the type of welding being done in accordance with the American Welding Society.
   5. Proprietary anchor installation training: Train workers installing proprietary anchors by manufacturer's representative.
a. Manufacturer Certification
b. Strength test worker installed anchors
c. Minimum training duration

C. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.

1. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that stone restoration is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm.

2. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing. When stone units are being patched, assign at least one worker among those performing patching work who is trained and certified by manufacturer of patching compound to apply its products.

D. Source Limitations: Obtain each type of material for stone restoration (stone, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

E. General

1. Field Quality Control: Work in place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.
2. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this section.

F. Fabrication: Except as modified by the Drawings and Specifications, provide stone and install stone in accordance with the latest edition of Marble Institute of America, “Dimension Stone Design Manual”.

1. Determine field dimensions necessary for fabrication.
2. Cut stone accurately to shape and dimensions, with required jointing. Cut beds and joints at right angles to the face, and provide joints with uniform thickness unless otherwise shown or noted on Drawings. Cut and fabricate stone units within tolerances in accordance with the latest edition of Marble Institute of America, Dimension Stone Design Manual.
3. Approved samples are for comparison of texture, finish and color of new stone supplied for the building. Replace new stone that does not match the approved samples replaced with new stone. Additional costs related to acquiring new stone for replacement of rejected stone shall be borne by the Contractor, including costs related to removing and replacing new stone that has been installed on the building prior to review and acceptance by the Architect/Engineer and Owner.
4. Exactly match decorative carvings of units being replaced.

1.6 TESTING

A. General

1. Employ and pay for the services of an independent testing agency acceptable to the Owner and Architect/Engineer to perform the tests specified herein.
2. The Testing Agency will be responsible for conducting and interpreting the tests, and shall state in each report whether or not the test specimens conform to the requirements of the contract documents, and shall specifically note deviations.

3. Testing agencies must submit test procedures to owner for review and approval prior to testing.

B. Anchors: Test anchors used for stone anchorages for the following conditions as applicable to project.
   2. Five (5) direct pull-out tests from weathered stone.
   3. Direct tension pullout in substrate.
   4. Anchor compression used for cavity wall application for inward loading
   5. Shear loading in stone.
   6. Shear loading in substrate.

C. Mockups
   1. At the trial repair areas designated by the Owner and Architect/Engineer, perform sample repairs listed below at locations selected by Architect/Engineer and Owner to illustrate the type and quality of the Work required to satisfy the requirements of the Project.
      a. Crack injection repair with DHL grout
      b. Mortar Patch Repair
      c. Pin Anchor Repair
      d. Flush Dutchman installation, set in Lime Putty
      e. Decorative carved Dutchman installation set in epoxy grout
      f. Architect/Engineer may require additional trial repairs.
   2. Provide a sample of each repair type, using specified materials and methods, and using tools and equipment intended to be used by the workmen performing work.
   3. For repair mortar match the adjacent stone in color, texture, composition, texture, particle size and appearance.
   4. Provide mortar which meets requirements of Section 04061.
   5. Select sample locations in consultation with Architect/Engineer.
   6. Provide additional samples until results acceptable to the Architect/Engineer are achieved.
   7. Commence work only after each sample repair has been reviewed and accepted by Architect/Engineer and Owner.
   8. Commence installation of Dutchman sample only after Architect/Engineer has inspected repair opening.
   9. The accepted samples are the standard for subsequent work. Retain samples throughout the duration of the project as references for the work and upon completion incorporate samples into the work.
   10. Install samples using same personnel as those throughout project.

D. Fabricated Stone
   1. Inspect new fabricated stone for dimensional accuracy, finish, color, and defects.
   2. Reject stone delivered to the job site that does not meet the project specifications.
   3. Provide sufficient notification of the arrival of stone to the Owner, Architect/Engineer for their inspection prior to installing the stone.
   4. Provide assistance to move stones for proper visual inspections by the Owner, Architect/Engineer.
5. Allow Architect/Engineer to inspect stone panels, rebates, kerfs and dowel holes of panels prior to installation.
6. Do not use stone outside the color and texture ranges of the approved samples.
7. Do not use stone outside the specified fabrication tolerances.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery
1. Deliver, store, and handle materials to prevent deterioration or the intrusion of foreign matter. Deliver and store packaged materials in the original packages. Removed from the jobsite damaged or otherwise unsuitable material.
2. Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.
3. Receive and unload stone panels at the site or other facility with necessary care in handling to avoid damaging or soiling.
4. Do not use materials in broken packages or which show evidence of damage.
5. Notify the Architect/Engineer and the Owner of damage observed to existing and salvaged units prior to commencing work.

B. Storage
1. Verify adequacy of support or portion of the structure for loading with equipment and materials. Storage of large amounts of stone panels and other materials on the roof or within the attic structure is not permitted.
2. Store stone sections clear of the ground on non-staining skids (i.e. cypress, white pine, poplar, or yellow pine without an excessive amount of resin). Do not use chemically treated wood. DO NOT use chestnut, walnut, oak, fir, and other woods containing tannin or other substances that may stain the stone.
3. Store stone above grade on wood or other suitable surfaces using polyethylene film to separate stone from wood or other supporting or protecting members.
5. Cover stone panels with waterproof paper, clean canvas or polyethylene.
6. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
7. Store hydrated lime in manufacturer’s original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
8. Store lime putty covered with water in sealed containers.
9. Store sand where grading and other required characteristics can be maintained and contamination avoided.

C. Handling
1. Comply with manufacturer's recommendations for handling epoxy materials.

1.8 PROJECT CONDITIONS

A. Cold-Weather Requirements: Comply with the following procedures for stone repair and patching:
1. When air temperature is below 40 deg F, heat mortar ingredients, repair materials, and existing stone to produce temperatures between 40 and 120 deg F.

2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repairs using products damaged by freezing.

B. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply cement based products to substrates with temperatures of 90 deg F and above.

C. Patch stone only when air and surface temperatures are between and 55 and 100 deg F and are predicted to remain above 55 deg F for at least 7 days after completion of work. On days when air temperature is predicted to go above 90 deg F, schedule patching work to coincide with time that surface being patched will be in shade or during cooler morning hours.

D. General

1. Examine facade elements, substrates, support and condition under which the Work is to be performed and notify the Architect and/or Engineer in writing of conditions detrimental to the proper completion of the Work. Do not proceed with work until unsatisfactory conditions are corrected.

E. Unanticipated Conditions

1. Where conditions are uncovered that are not anticipated by the Drawings and Specifications, notify the Owner and Architect immediately before repairs are initiated.

2. Contractor is not to perform repairs at areas of discrepancies until receipt of appropriate repair for the location in writing from the Engineer. Proceeding with repairs at these locations without description from the Engineer is entirely at the risk and cost of the Contractor.

F. Precautions

1. Apply epoxies only to dry surfaces meeting the manufacturer’s recommendations for surface preparation and working temperatures.

2. Apply epoxies to surfaces free of moisture, dirt, organic materials, efflorescent salts, and other contaminants.

G. Protection of Work

1. Temporarily mask stones, as required, to prevent repair materials from staining stone and existing or new materials in and adjacent to the area of Work. Immediately clean exterior wall system and adjacent areas of spilled materials.

2. Cover partially completed anchors, cracks and joints that are not sealed at the end of each working day or shutdown or when work is not in progress.

3. Extend cover beyond each side of partially completed anchors, cracks and joints to prevent exposure to weather.

4. Secure cover tightly in place.

5. Cover exterior wall openings to prevent infiltration of animals, insects, and water during stone panel removal.

6. Cover partially completed work at the end of each working day or when work is not in progress.
7. Carefully cover tops and sides of incomplete areas when construction is discontinued at end of work day, to protect area from precipitation. Protect joints in stonework to make them watertight until they are permanently sealed.
8. Secure stone to structure at end of each working period.
9. Shore surrounding stone panels as necessary to prevent shifting or collapse during removal and replacement of stone panels.
10. Protect wall from mortar droppings at all times.

1.9 SEQUENCING AND SCHEDULING

A. Install new stone anchors prior to cutting or grinding existing joints or removal of joint sealants. Stone joint repairs performed prior to stone anchorage could result in loss of panel support should the process accidentally cut existing stone anchors located at the joints.

B. As scaffolding is removed, patch anchor holes used to attach scaffolding.

C. Patch holes in stone made or that are the result of construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 STONE MATERIALS

A. See Section 04861 for new stone material and fabrication requirements.

B. Finish Requirements
   1. Match existing weathered condition of panels.
   2. Stone supplier to verify the existing stone finish.
   3. Exposed surface finish shall be factory honed to lightly sandblasted finish to match adjacent surrounding stone.
   4. Provide further surface treatments in field as required to match adjoining surface profiles and textures.

2.3 HARDWARE

A. General
   1. Metal in direct contact with stone is to be non-corrosive.

B. Extrusions, straps, and plates
   1. Material
      a. Stainless Steel Plate
         1) ASTM A276, Type 304, 316
         2) Other ASTM references ASTM A167, ASTM 666
2. Fabrication
   a. Manufacturers
      1) Blok-Lok Inc., 30 Millwick Drive, Toronto, ON, CANADA, M9L1Y3, tel: (800) 561-3026
      2) Hohmann and Barnard, Inc. (www.h-b.com), 30 Rasons Court, P.O. Box 5270, Hauppauge, NY 11788-0270, tel: (631) 234-0600
      b. Size and thickness as shown on the Drawings
      c. Remove cutting oils prior to the installation of the stainless steel

C. Stone Anchors
   1. Stone anchors: stainless steel conforming with ASTM A 167, Type 304, 316
   2. Anchor embedment depth and countersink dimension as shown on Drawings
   3. Undercut Stone Anchors
      a. Blok-Lok Helical Wall ties (HWT 8/155 and HWT 10/155), 8 mm and 10 mm diameter, at 2 inch minimum embedment, as manufactured by Blok-Lok Inc. http://www.blok-lok.com, telephone: (800) 561-3026. Anchor embedment as shown on Drawings.

D. Threaded Rods, Fasteners, And Components
   1. Material
      a. Threaded rods, fasteners, and components: stainless steel conforming with ASTM A 167, Type 304, 316.
   2. Proprietary Anchors
      a. Hilti HY-70, HY-200 epoxy anchors, as manufactured by Hilti Inc., PO Box 21148, Tulsa, OK 74121, (800) 879-8000
      b. Snaptoggle, as manufactured by Toggler Anchor System, Div. of Mechanical Plastics Corp., 444 Saw Mill River Road, P.O. Box 554, Elmsford, NY 10523, (888) 864-4537
      c. Proprietary Anchor installation training: Workers installing this system shall be trained by the manufacturer’s representative.
         1) Manufacturer is to provide written certification that each Workman has attended and successfully installed a minimum of 100 anchors.
         2) After training session, each Worker is to install a minimum of {insert number} anchors. These anchors will be load tested. Workers with installed anchors meeting the required minimum strength will receive certification to work on the project.

E. Assembly Type Anchors (Multi-Component)
   1. Spring loaded dowel pin
      a. Heckmann #355, Type 304 stainless steel spring and dowel pin, size as shown on drawings
      b. Custom fabrication. Pin shall be 3/16 inch diameter minimum unless shown in Drawings. Spring shall be Pin and spring length shall be as shown on Drawings.

F. Miscellaneous Hardware
   1. Self Drilling / Tapping Stainless Steel Screws.
   3. Shims
a. Shim material
   1) High Density Polyethylene by Korolath.
   2) Wood shims are not to be used
   3) Plastic horseshoe shaped shims shall not be used
b. Setting
   1) Thickness, as Required
   2) Shims supporting the gravity load of the panel shall be continuous unless otherwise stated on the Drawings.
c. Adhere together shim packs that resist forces in the plane of the shim, to form a monolithic shim in order to avoid slippage of shims.

4. Compressible Filler
   a. Sleeve around portion of bolt and threaded rod in stone panel: Closed cell polyethylene sleeve manufactured to fit around a ¼ in. diameter bolt or threaded rod.

5. Thread Locking Compound
   a. Locking and sealing coating for threaded fasteners: ND Vibra-Tite Formula 3, manufactured by ND Industries, Troy, Michigan 48084.

2.4 ADHESIVE MATERIALS

A. Dutchman (flush) Stone to Stone: Lime Putty - see Section 04 06 10 for material requirements.

B. Dutchman (overhead) Stone-to-Stone: 2-part polyester or epoxy-resin stone adhesive with a 15- to 45-minute cure at 70 deg F, recommended by adhesive manufacturer for type of stone repair indicated, and matching stone color.
   1. Akemi North America; Akepox.
   3. Edison Coatings, Inc.; Flexi-Weld 520T.

C. Anchor Embedment: Epoxy used in conjunction with steel anchor components
   1. Epoxy for embedment of threaded rods shall be two-component Hilti HY70 system.
   2. Two-component Hilti HY200 for non-cavity walls
   3. Epoxy for pin installation: Fast Set Extreme adhesive as manufactured by Bonstone, Mukwonago, Wisconsin or approved equal.

2.5 SURFACE APPLIED REPAIR PRODUCTS

A. See Section 04 06 10 for Patching Mortar and Crack Filler material requirements.

2.6 WATER

A. Clean, potable water which shall not contain any mineral content that would result in staining of stone.
   1. Water shall have elemental iron content of less than two (2) parts per million, or 0.0002 percent (by weight).
   2. Contractor shall arrange for laboratory testing of water before starting work and every three (3) months thereafter.
2.7 SPECIAL EQUIPMENT

A. Drill for anchor installation holes into concrete, masonry and stone shall be high speed, rotary percussion drill (3 jaw chuck type). SDS hammer drills (i.e. Hilti hammer drill) shall not be used for drilling anchor installation holes.

B. Coring drill with diamond core bits

2.8 FABRICATION - STEEL

A. General


B. Stainless Steel

1. Fabricated bent plates by cold-formed bending: Maximum inside bend radius of two times the nominal thickness of the material.
2. Cutting of stainless steel plate: Use reciprocating saw cutting or shear. Do not use saw blades or cutting tools causing rust and stain to the stainless steel surface. Holes may be drilled or punched. Flame cutting of the stainless steel plate, or other methods involving high temperatures are not permitted.
3. Inspect final plate bends using dye-penetrant to ensure that no cracking has occurred from the cold bending process.

C. Welding Stainless Steel

1. Perform welding in accordance with the general provisions of ANSI/AWS D1.1, "Structural Welding Code - Steel", except that the material to be welded shall be stainless steel.
2. Perform all welding in the shop.
3. Field welding is not permitted.
4. Use only AWS qualified welds for stainless steel. Qualify stainless steel welds in accordance with Chapter 2, AWS B2.1-84 procedures.
5. Welders: Qualified in accordance with Chapter 5, Part C, of the ANSI/AWS D1.1 code for welding stainless steel in all positions and for each type of welds to be used on the job.
6. Select welding filler metal in accordance with AWS practices for weld rod selection.
7. Welding type: Gas Metal Arc Welding using spray or short circuit transfer. Use welding chill bars if required to further reduce heat.
8. Perform welding in a manner to prevent distortion of welded pieces.
9. Remove dirt, grease, oil and foreign matter by pickling, degreasing, machining, or grinding, prior to welding. To, avoid contamination, use only stainless steel tools or wire brushes made of series 300 stainless steel.
10. Store and handle low-hydrogen electrodes before use in accordance with the requirements of ANSI/SWS D1.1., Paragraph 4.5.
11. Do no preheat base metal. Do not exceed interpass temperatures of 600 degrees F.
12. Make stainless steel deposits in such a way that the welding shall preserve corrosion resistance in the weld and in the heat-affected-zone (HAZ).
13. Maintain optimum mechanical properties in the welded joint.
14. Fill craters at the beginning and end of the weld beads.
15. Clean thoroughly the welds with stainless steel brushes made of series 300 stainless steel to prevent iron pick-up on the stainless surfaces. Do not use carbons steel cleaning tools.
16. Inspect completed fillets welds by D.C. magnetic particle (MT) examination in accordance with the requirements of ASTM E709-91. Nondestructive testing of welds shall be performed by inspector qualified in accordance with the American Society of Nondestructive Testing Recommended Practice No. SNT-TC-1A, who meet the requirements for Level II.

PART 3 EXECUTION

3.1 PRECONSTRUCTION ARCHITECT/ENGINEER SURVEY

A. Provide close up access to Architect/Engineer for inspection of each area of the stone units prior to performing the work

B. Architect/Engineer shall confirm and/or update repair types and locations at each survey location.

C. Maintain a field set of drawings describing the types and locations of all stone repairs.

3.2 GENERAL

A. Install stone plumb, square and true to line.

B. Install stone free of dust and debris [Refer to cleaning spec, if special cleaning is required]

C. Clean existing mortar from salvaged stone panels to be reinstalled.

D. Isolate dissimilar metals

E. Drill holes in stone without spalling backside of unit at hole, {using only rotary percussion drill. Add if needed}

3.3 SETTING TOLERANCES

A. Industry Standard
   1. Construction Tolerances (from MIA): Set stone to comply with the following tolerances:
      a. Variation from Plumb: Do not exceed 1/8 in. in 10 ft.
      b. Variation from Level: Do not exceed 1/8 in. in 10 ft.
      c. Joint Tolerance: +25/-25 percent
      d. Tolerances shall not be accumulative
   2. Construction Tolerances (from ILI)
      a. Set accurately in strict accordance with the contract and shop drawings.

B. Match Existing Conditions
   1. Construct and install all new stone panels to maintain the following, in descending order of preference.
      a. Alignment of vertical joints
      b. Specified horizontal joint dimensions
      c. Specified vertical joint dimensions
d. Alignment of stone wall panels with window panels to maintain existing joint dimensions and in/out alignment.

2. Notify Architect/Engineer prior to deviating from vertical and horizontal dimensions.

3.4 INSTALLATION OF ANCHORS AND HARDWARE

A. Install supports, anchors, fasteners and other attachments indicated or necessary to secure stonework in place.

B. Adjust anchors, supports and accessories to set stone in accordance with drawings and specifications.

C. Install expansion anchor bolts to the manufacturer's required torque.

D. Thread Locking Compound
   1. Coat threaded fasteners on male and female threads with thread locking compound prior to installation.
   2. Apply coating in accordance with the manufacturer’s recommendations.

E. Shims
   1. Only install shims where indicated on the Drawings.
   2. Use single shims of the required thickness where possible.
   3. If a multiple shim stack is required, use shim thickness combination resulting in the fewest shims.
   4. Limit the number of shims in a shim stack to three.
   5. Limit the maximum thickness of shim / shim stack to 1/2 inch.
   6. Shims in stacks are to be adhered or pinned together.

3.5 STONE REPAIR

A. Through-Face Anchors
   1. Install anchors at locations indicated on the Drawings
   2. Do not place holes for anchors at or within 2 inches of existing voids, heavy veins, cracks, panel edges in panels. Take necessary precautions to ensure that spalls or other distress do not occur during stone drilling or anchor installation operations. Report such occurrences to Architect/Engineer.
   3. Notify Architect/Engineer if distress occurs during drilling.

B. Dutchman Repair
   a. At each anchor location, carefully drill a pilot hole through stone and into backup wall at angle and embedment depth specified in Drawings. When drilling pilot holes, a rotary, non-impact type drill, core drill, should be used to reduce risk of stone spalling during drilling operations.
   b. Diameter of pilot hole, as recommended by manufacturer, to be determined during pre-construction testing.
   c. Insert helical anchor using manufacturer’s setting tool.
   d. Countersink anchor to 1/8 inch beyond surface of stone, unless indicated otherwise in Drawings.
   e. Install grout in hole over anchor with specified grout material and in accordance with material manufacturer’s instructions and recommendations.

B. Dutchman Repair
1. At locations designated for repair, cut out immediate area of spall and adjacent unsound stone to form a rectangular opening, to a minimum depth of 2 inches.

2. Prepare Dutchman unit to match color and texture of adjacent stone.

3. Fabricate Dutchman to maintain following tolerances unless otherwise indicated on Drawings:
   a. Joints between Dutchman and parent stone of 1/32 in. min. and 1/16 in. max.

4. Circular Dutchman plug covers: Diameter not more than 1/16 to 1/8 inch smaller than mortise, and maintain a 1/32 inch joint around repair hole.

5. Set Dutchman units in specified setting mortar or adhesive.

6. At projected and/or ornamentally carved locations and subject to Architect/Engineer’s case by case approval, collar (back) joint may be bedded with epoxy mortar. No epoxy mortars are permitted in head or bed joints of Dutchman units or anywhere within two (2) inches of exposed face of stone.

7. Anchoring Dutchman repair
   a. Spring / Drop Pins for Dutchman 2 in. or greater in thickness
      1) Provide holes 1/16 inch diameter larger than diameter of stainless steel pin, providing minimum engagement of 1-1/2 inches into stone and Dutchman on either side. Set pins in sealant; do not permit sealant to drip onto exterior face of stone.
      2) Install pins as indicated on Drawings. Unless otherwise indicated, install a minimum of two pins per Dutchman repair.
   b. Threaded Rod Blind Anchors
      1) Allow repair to set prior to proceeding with installation.
      2) If wall cavity exists, provide shims at anchor locations to allow for proper positioning of Dutchman.
      3) At each anchor location, carefully drill a pilot hole into the new stone panel leaving 3/4” distance from face of the stone and into backup at embedment depth specified in Drawings. When drilling pilot hole, a rotary, non-impact type drill, core drill, other provisions should be used to reduce risk of stone spalling during drilling operations.
      4) Diameter of pilot hole as recommended by manufacturer, to be determined during pre-construction testing
      5) Insert approved adhesive and anchor per manufacturer’s instructions.

C. Crack Repair - A criteria to determine which repair will be used at unique locations shall be established by the Architect/Engineer.

1. Grout: Mix grout as follows:
   a. Thoroughly mix diluted DHL-IM Injection grout by mixing liquid to a flowable consistency.
   b. If above grout mix results in a grout that is difficult to place, do not proceed with grouting work. Notify Owner and Architect immediately.
   c. Do not retemper grout.
   d. Discard grout that is no longer flowable.

2. Grout Injection
   a. Remove existing crack fillers (if any) taking care not to damage remaining adjacent stonework.
   b. Rout or grind out crack to a square cross sectional profile as indicated on drawings. A ‘V’ shaped profile is not acceptable.
c. Remove loose material by blowing out routed crack and crevice beyond with oil-free compressed air.
d. Wash surface and interior of crack using clean water to remove dust, loose or deleterious material which could prevent proper flow or adhesion of lime grout.
e. Routed crack should be sealed with removable, non-staining clay or patching mortar as required to create pumping ports.
f. Moisten interior of crack immediately before pumping by flushing with clean water. If surface is allowed to dry out before grout is injected, this step must be repeated.
g. Using a clean hypodermic syringe or pumping system, float specified grout into top portion of crack and allow a continuous flow into crack crevice. Verify that clay remains intact and repeat this process until crack is filled. Clean up grout overflow immediately.
h. Remove clay filler after 48 hours.
i. Fill routed crack area in lifts with specified stone patching mortar following preparation, cleaning and installation procedures as specified herein.

D. Removal of Ferrous Anchors
1. Remove existing abandoned ferrous from stone panels.
2. Identify and bring to Architect/Engineer’s attention existing ferrous anchors still in service. Do not remove anchors unless directed to do so.
3. Remove anchors by core drilling a small plug if direct removal is not successful.
   a. Holes less than 1 inch diameter: Use specified patching mortar.
   b. Holes 1 in diameter and greater: Install stone plug cover Dutchman repair.

E. Blending small snips
1. At location of minor snips, designated for repair, carefully remove loose stone to sound stone.
2. Refinish stone at edges of spall location to blend with adjacent stone surface.
3. Use hand tools or small, hand-held pneumatic chisels only.

F. Redressing
1. At location of existing or incipient snips or at locations of exfoliating stonework, carefully remove loose and/or delaminating layers of stone to reach sound material
2. Retool stone within spall area and at edges of exfoliated location to feather out and blend with adjacent stone surface.
3. Use hand tools or small, hand-held pneumatic chisels only.

G. Patching
1. Patch the following stone units:
   a. Units indicated to be patched on drawings and confirmed in field by Architect.
   b. Remove and replace existing patches, unless otherwise indicated or approved by Architect.
2. Cut out deteriorated stone and adjacent stone that has begun to deteriorate. Remove additional material so patch will not have feathered edges and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
   a. Remove loose particles, soil, debris, oil, and other contaminants from existing stone units at locations to be patched by cleaning with stiff-fiber brush.
3. Surface Preparation
a. Surfaces to receive mortar patches must be sound and free of dust, dirt, grease, laitance and/or other coating or foreign substance, which may prevent proper adhesion.

b. Remove loose and deteriorated stone from patch area plus an additional 1/2 in. of what appears to be sound material or maximum total depth 3 in. using manual or pneumatic cutting techniques. The void created should have edges, which are square cut, maintaining 90° angles or undercut for larger patches (see limits on drawings.).

c. Complete preparation by washing surface with clean water and a bristle brush.

d. At areas to receive repair mortar patches, prepare spalled out or missing area by removal of distressed stone and/or rusted metal within spalled area. Cut away an additional 1/16 inch of substrate using hand tools to ensure surface of stone to be patched is solid and stable. Do not damage adjacent stone. “Sound” stone masonry with an acrylic hammer to verify stone integrity.

e. Do not use a saw to prepare surfaces to receive patches. Surfaces must be clean but rough cut and tooled to assure optimum bonding of mortar patching material.

4. Installing Patching Material

a. Pre-wet stone area to receive patch. Apply repair mortar before stone is fully dry. Do not apply repair mortar to surfaces that are over saturated or have standing water.

b. Mix patching compound in individual batches to match each stone unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.

c. Apply stone repair mortar mix using a trowel in a series of lifts with no waiting period or scratch coat necessary between layers, up to a total maximum thickness of 3 in. For patches thicker than 3 in., apply mortar in two layers, allowing first layer to cure for a while before applying second layer. If a skin forms, scrape approximately 1/16 in. of mortar off, dampen first layer before applying second layer. Use light pressure during applications. Work mortar firmly into surface of stone, including corners and under and around mechanical anchors.

d. Build up patching material so that it is slightly above adjacent stone surface. Allow 15 to 30 minutes to set slightly, (this will vary depending on weather - much longer in cool weather) then scrape off excess material using a straight edge (a plasterer's miter rod is good for this). Do not press down or "float" the patch. Where patches occur at panel edges or corners, form mortar to match profile of surrounding stone. Finish patch so that it is as indistinguishable as possible from adjacent stone.

e. As shown on Drawings, anchor stone repair mortar patches using threaded stainless steel dowels (or other acceptable anchors).

f. Remove uncured mortar from perimeter of patch before it dries using clean potable water and a rubber sponge. Wipe several times with clean water to prevent a halo effect or staining of adjacent stone.

5. Limitations

a. Never apply stone repair mortar to a frosted or exceedingly hot substrate. Protect applied mortar from extreme heat, freezing, excessive wind, direct sunlight, and rain. Ambient temperature range should be 40° F to 90° F with low to average humidity. Use special precautions as recommended by manufacturer when ambient temperatures exceed 90° F.

b. Bonding agents on surfaces to receive stone repair mortar are not allowed.

c. Minimum thickness of mortar application is ¾ in.

6. Curing

a. Mist new mortar repairs with water for a duration of at least 3 minutes at end of the day of initial installation.
b. During hot weather (greater than 70 degrees Fahrenheit) protect freshly repaired areas with burlap or plastic sheeting for the first 24 hours after installation. If plastic sheeting is used, it should never come into direct contact with mortar during initial curing and until fully set. It can be hung 3-4” clear of work.

c. Protect newly repaired areas from direct sun and winds for the first 3 days after installation.

d. During hot weather (greater than 70 degrees Fahrenheit) thoroughly dampen repair area with water mist a minimum of two or three times per day for the first 3 days following installation. Care should be exercised on stone surfaces to avoid water run off from face of stone over-saturating mortar joints.

7. Finishing
a. Fine single profile finishes can be achieved either by troweling at time of initial setting or by fine caborundum paper after material is sufficiently hard (usually 7 days).

b. Simulation of stone or rough finishes can be made approximately 5 hours from time of application. If shaping, forming of details, or tooling is required, scraping to profile or level with metal tools, and finishing work can be done within 24 hours up to a period of 2 to 3 days.

8. Cleaning
a. Clean mortar residue from stone area surrounding patch by sponging as many times as necessary with clean water. This should be done before patching material sets.

3.6 CLEAN UP

A. Remove stains from exterior stone in accordance with Section 04940.

B. At conclusion of stone work, remove (Contractor provided) scaffolding and equipment used in work, clean up debris, refuse and surplus material and remove same from premises.

C. After stone repair Work is completed and joints are sealed, stone work shall be washed with fiber brushes, and clean water (washed with water and brushed with fiber brushes to remove construction debris). (Windows shall be cleaned by a window washing company at completion of repair Work).

3.7 FIELD QUALITY CONTROL

A. Architect/Engineer’s Project Representatives: Architect/Engineer will assign Project representatives to help carry out Architect’s responsibilities at site, including observing progress and quality of portion of Work completed. Allow Architect/Engineer’s Project representatives use of scaffolding, as needed, to observe progress and quality of portion of Work completed.

B. Notify Architect/Engineer’s Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect/Engineer’s Project representatives have had reasonable opportunity to make observations of work areas at lift device or scaffold location.

END OF SECTION
SECTION 05 31 00
STEEL DECKING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Roof deck at skylight infill areas.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Coordinate with structural steel shop drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product certificates.

C. Evaluation reports.

1.4 QUALITY ASSURANCE


1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI’s “North American Specification for the Design of Cold-Formed Steel Structural Members.”

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. ASC Profiles, Inc.; a Blue Scope Steel company.
2. Canam United States; Canam Group Inc.
3. CMC Joist & Deck.
5. Cordeck.
6. DACS, Inc.
8. Marlyn Steel Decks, Inc.
9. New Millennium Building Systems, LLC.
11. Roof Deck, Inc.
12. Valley Joist; Subsidiary of EBSCO Industries, Inc.
14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with “SDI Specifications and Commentary for Steel Roof Deck,” in SDI Publication No. 31, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, shop primed with manufacturer’s standard baked-on, rust-inhibitive primer.
   a. Color: To Match Existing.
2. Deck Profile: Type “B” (Wide Rib).
3. Profile Depth: 1-1/2 inches (38 mm).
4. Design Uncoated-Steel Thickness: 18 gauge (.0474 in.)

2.3 ACCESSORIES

A. General: Provide manufacturer’s standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck.
G. Galvanizing Repair Paint: [ASTM A 780] [SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight].

H. Repair Paint: Manufacturer’s standard rust-inhibitive primer of same color as primer.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer’s written instructions, and requirements in this Section.

B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer’s written instructions.

H. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer’s written instructions. Mechanically fasten to substrate to provide a complete deck installation.
   1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

I. Pour Stops and Girder Fillers: Weld steel-sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

J. Floor-Deck Closures: Weld steel-sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor’s expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer’s written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION
SECTION 06114
WOOD BLOCKING, CURBING AND SHEATHING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK
A. Furnish necessary labor, materials and equipment to install new treated wood consisting of blocking, curbing and sheathing as indicated on the construction documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
B. Related Sections include the following:
   1. Division 7 Specification Sections
   2. Division 5 Specification Sections

1.3 REFERENCES
A. ALSC - American Lumber Standard Committee: Softwood Lumber Standards
B. APA - Engineered Wood Association: Grades and Standards
C. FS TT-W-571 - Wood Preservation: Treating Practices
D. NFPA - National Forest Products Association
E. AWPA - American Wood Preservers' Association: Book of Standards
F. SFPA - Southern Forest Products Association

1.4 QUALITY ASSURANCE
A. Lumber Grading Agency: Certified by ALSC
B. Plywood Grading Agency: Certified by APA

1.5 SUBMITTALS
A. Provide technical data on wood preservative materials and application instructions.
B. Submit technical data sheet on all lumber materials proposed for use.
PART 2 PRODUCTS

2.1 MATERIALS

A. Lumber Grading Rules: APA, NFPA, SFPA

B. Softwood Lumber: Southern Yellow Pine species, two grade, 19% maximum moisture content.

C. Plywood: APA Grade C-C, with waterproof glue, sanded

D. Nailable Insulation Board: Polyisocyanurate insulation board bonded to plywood on top face. Provide insulation thickness as required per drawings. Provide 3/4 inch thick plywood top face.

2.2 WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): CCA treatment only.

B. All wood specified in this section shall be pressure treated.

2.3 FASTENERS

A. For securing wood blocking to wood blocking, use rough hardware sized as required to allow penetration of one-half the dimension of the member being fastened into or 1-1/2 inches, which ever is less. Use hot-dipped galvanized steel or cement coated common nails.

B. For securing wood nailers, sheathing or blocking to masonry or concrete, use:
   1. Fastener type: Tapcon
   2. Head type: Flat head
   3. Diameter: 1/4 inch
   4. Embedment into substrate: 1-1/2 inches
   5. Material and Finish: fluropolymer
   6. Manufacturer: ITW Buildex
   7. Confirm anchorage into concrete by conducting pull out tests in the presence of the Architect/Engineer.

PART 3 EXECUTION

3.1 WOOD BLOCKING AND CURBING

A. Curb areas as shown on the drawings. Form corners by lapping side members alternatively.

B. Provide blocking and nailers where indicated or otherwise required to attach roofing membrane where indicated.

C. Install all wood blocking and curbing to resist a minimum lateral force of 200 lb per LF or greater if required by the roof membrane manufacturer.
3.2 CLEANING

A. Clean up debris promptly so that other operations may be performed in the work area.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY
A. Section includes the furnishing and installation of tapered roofing insulation and crickets associated with a new modified bitumen roofing membrane, work called for on the Drawings, and other work necessitated by these operations.

B. Related Sections:
   1. Section 07 50 30 - Modified Bitumen Roofing

1.2 SUBMITTALS
A. Product Data: Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each material used.

B. Shop Drawings: Tapered insulation and cricket layout.

1.3 QUALITY ASSURANCE
A. All insulation shall be manufactured or provided by the roofing manufacturer and shall be included in the roofing warranty specified in Section 07 50 30.

B. All insulation, fasteners and adhesives shall be approved by FM Global.

C. Negative pressure wind uplift tests on the roof assembly as specified in FM Global Property Loss Prevention Data Sheet 1-52 to be performed if elected by Owner (not included in base bid).
   1. Testing contractor must be approved by FM Global.
   2. Testing to be witnessed by FM Global and Architect/Engineer.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer’s written instructions for handling, storing, and protecting during installation.

B. Protect foam board insulation as follows:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam board materials to Project site before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.
1.5 INSURANCE REQUIREMENTS

A. Roofing assembly shall be installed to meet the requirements of an FM Global minimum 1-90 uplift rating at field of roof with perimeter and corner enhancements.

PART 2 PRODUCTS

2.1 FOAM BOARD INSULATION

A. Polyisocyanurate Board Tapered Insulation: ASTM C 1289, Type II, Class 2, minimum compressive strength of 20 psi, approved for use in UL Class A fire ratings, complies with EPA requirements, meets the Clean Air Act Amendments of 1990, is Energy Star approved and meets U.S. Green Building Council requirements.
   1. Manufacturers must be approved by the roof membrane covering manufacturer and FM for incorporation within the FM approved assembly and the manufacturer’s single source roofing warranty. Manufacturers may include:
      a. Soprema
      b. Johns Manville
      c. Firestone
      d. Atlas
      e. Hunter
      f. Approved Others
   2. Maximum board size - Tapered or Adhered (1/4-inch per foot slope): 4 feet x 4 feet
   3. Maximum board size - Flat: 4 feet x 8 feet

2.2 CRICKETS

A. Cricket material shall be polyisocyanurate insulation manufactured by the manufacturer of the foam board insulation.
   1. Slope: 1/2-inch per foot

2.3 HARDBOARD

A. Dens Deck Prime manufactured by Georgia-Pacific Building Products.
   1. Vapor Retarder substrate - Thickness - 5/8”
   2. Roof membrane substrate - Thickness - 1/4”

2.4 ADHESIVE

A. Adhesive to secure the insulation to the concrete roof deck each succeeding layer shall be a VOC compliant, adhesive recommended for use by the roofing membrane and insulation manufacturer and approved by FM Global:
   1. Type III Asphalt
   2. Manufacturer specific Bonding Adhesive described in the FM approved assembly.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.
1. Remove projections on the substrate that would cause the insulation boards to be out of plane by 1/8-inch or more.
2. Refasten metal decking as required to satisfy FM requirements.

B. Examine the areas and conditions under which the Work of this Section will be performed. Report to the Construction Administrator conditions detrimental to the proper and timely execution of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer’s written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer’s standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION

A. Starting at drain lay the insulation working toward the perimeter or ridge.

B. Lay insulation boards in parallel courses with all joints staggered between courses.

C. Apply tapered crickets under top layer of 1/4” roof membrane substrate.

D. Butt insulation boards against neighboring board; do not permit more than a 1/8-inch gap.

E. Apply sealant as required by the manufactured to obtain a minimum 1-90 uplift rating from FM Global. Apply adhesive in beads or fully adhered as recommended by the manufacturer. Reduce spacing at perimeters and corners if required by FM Global.
   1. Designate one person to walk and roll boards into place using a 150 lb. weighted roller adding constant weight or slitting the boards where necessary until adhesive sets-up.

F. Joints of tapered insulation shall be staggered with relation to the layer beneath.

G. At all roof drains install tapered edge insulation to create a sump sloping toward the drain.
   1. Taper shall not be steeper than a 1-in-2 slope.
   2. Shaving of the insulation will not be allowed.

3.4 CLEANING

A. Perform daily cleanup of all waste and debris resulting from these operations.

END OF SECTION
PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Work of this section includes, but is not limited to, 100% replacement of all slate roofing. Including the following:
   1. Slate shingles.
   2. Vapor permeable synthetic underlayment.
   4. Snow guards.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Sections include the following:
   1. Section 06 11 40 Wood Blocking, Curbing and Sheathing
   2. Section 07 60 00 Sheet Metal Flashing and Trim

1.3 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each material used.

B. Samples: For the following products, of sizes indicated, to verify color selected.
   1. Slate Shingle: Full size, of each color, size, texture, and shape.
   2. Ridge Slate: 12 inches long.
   3. Fasteners: Three fasteners of each type, length, and finish.
   4. Self-Adhering Underlayment: 12 square inches.
   5. Roofshield Underlayment: 12 square inches.
   6. Snow Fence: Full-size bracket and 1’-0” pipe section.
   7. Snow Pad: One pad in color to be used for the work.

C. Material Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each slate variety.
1. ASTM C120: Test Method for Flexural Testing of Slate.

D. Shop Drawings

1. Submit shop drawings of snow guard layout. Layout to indicate load capacity of each rail section.
2. Submit shop drawings of roof edges, valleys and ridges.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each color of slate from a single quarry capable of producing slate of consistent quality in appearance and physical properties. wording if only one mockup is required.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approval of mockups is also for other material and construction qualities specifically approved by Architect/Engineer in writing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect/Engineer in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 20 00 Project Meetings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store underlayment rolls on pallets or other raised surfaces. Do not double-stack rolls.

1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Proceed with installation of self-adhering sheet underlayment only in fair dry weather and when surface and ambient temperatures are between 40 deg. F and 90 deg. F.

1.8 WARRANTY

Olin Library - Wesleyan University 07 31 50 - 2 Slate Shingles
WJE No. 2015.1483.1 March 10, 2017
A. Special Roofing Installer's Warranty: Warranty, on warranty form at end of this Section, signed by roofing Installer and covering Work of this Section, in which roofing Installer agrees to repair or replace slate roofing that fails in materials or workmanship including, but not limited to cracked, slipped, or missing slates, within the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SLATE

A. Manufacturers:

1. Greenstone Slate Company, Inc.
4. Structural Slate Company (The).
5. Vermont Structural Slate Company, Inc.

B. Slate Shingles: ASTM C 406, Grade S1; hard, dense, and sound; chamfered edges, with nail holes machine punched or drilled and countersunk. No broken or cracked slates, no broken exposed corners, and no broken corners on covered ends that could sacrifice nailing strength or laying of a watertight roof.

1. Thickness: Nominal 1/4 to 3/8 inch to match existing.
2. Surface Texture: Smooth.
3. Size: 9” to 14” wide and 18” long to match existing.
4. Nail Holes: Two per shingle.
5. Butt Shape: Standard square cut.
6. Color(s): To match existing slate shingles.

C. Starter Slate: Slate shingles, with chamfered nail holes front-side punched.

1. Length: Exposure of slate shingle plus head lap.

D. Ridge Slate: Slate shingles, fabricated with horizontal grain orientation.

2.2 UNDERLAYMENT MATERIALS

A. Felt Underlayment: SlopeShield® spun-bonded polypropylene breathable underlayment, by VaproShield.

1. Underlayment shall be furnished in standard rolls of 59 inches high by 164 feet long.
2. Thickness and Weight: 0.020 inches thick and 5.01 oz / sq yd.
3. Water Vapor Transmission: 59 perms per ASTM E96, Method B.
4. Water Penetration Resistance: AC 48 Section 4.4 (Ponding), Pass, no leakage
5. Surface Burning Characteristics: ASTM E 84, Flame Spread Class A, Smoke Developed Class A.
B. Felt underlayment accessories:

1. Single sided tape: 3" VaproTape (Single-Sided) 20 mil, for use to secure SlopeShield to itself and to substrates


1. Products:
   b. Owens Corning; WeatherLock M.

2.3 SNOW GUARDS

A. Snow fence shall be three pipe style snow guards equal to Alpine Snow Guards #503 brass pipe and base plate snow guard. Provide with locking collars and end caps.

1. Size base plate to match shingle size.
2. Fasteners for snow guards at wood decks shall be 1/4-inch diameter with 1-1/4" minimum embedment, 18-8 stainless steel flat head wood screws, as approved by the snow guard manufacturer.
3. Provide 4 fasteners minimum per base plate.

B. Snow pads shall be equal to Alpine Snow Guard #10 Metal Pad Style.

1. Material and Finish: Copper.
2. Fasteners: Stainless Steel Slating Nail.

2.4 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in slate-shingle roofing and remain watertight.

D. Slating Nails:

1. At wood roof decks: Annular ring copper wire nails, 11 gauge minimum thick, sharp pointed with 3/8-inch minimum diameter flat head, minimum length 1 3/4-inches.
2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

E. Underlayment Nails: Stainless-steel, or galvanized steel wire nails with low-profile capped heads or disc caps, 1-inch minimum diameter.
F. Wood: Comply with requirements in Division 6 Section 06 11 40 Wood Blocking, Curbing and Sheathing.

G. Ventilation Shim: Provide the following or approved equal:
   1. Purlin Vent by Cora-A-Vent, Inc.
      a. 1 inch high with 10 sq. in. net-free ventilation area per linear foot

2.5 METAL FLASHING AND TRIM

A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section 07 60 00 Sheet Metal Flashing and Trim.

   1. Sheet Metal: Copper and Lead-coated copper.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.

   1. Apron Flashings: Fabricate with lower flange extending under each of the down slope slate shingles with a hook to retain the slate in place. Vertical leg against building shall be 4 inches min. up the vertical surface.
   2. Step Flashings: Fabricate with a 3-inch head lap extending a minimum of 4 inches over the underlying slate shingles and up the vertical surface.
   3. Hip Flashings: Fabricate to length of slate shingle and to extend 3 inches beyond joint of hip shingle with adjoining roof shingle.
   4. Drip Edges: Fabricate in lengths not exceeding 10 feet with 6-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.

C. Vent-Pipe Flashings: Lead flashing, ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

   1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through roofing.
   3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 ROOF UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install wrinkle free, complying with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches, staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

B. Felt Underlayment: Install perpendicular to roof slope in parallel courses. Lap sides a minimum of 4 inches over underlying course. Lap ends a minimum of 6 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with underlayment nails.

1. Install underlayment on 100% of roof deck, including that area covered by self-adhering sheet underlayment.

3.3 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section 07600 "Sheet Metal Flashing and Trim."

1. Install metal flashings according to recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual." and the recommendations printed in the “Copper and Common Sense” manual issued by Revere Copper.

B. Apron Flashings: Extend lower flange over and beyond each side of down slope slate shingles and up the vertical surface.

C. Step Flashings: Install with a 3-inch head lap extending over the underlying slate shingles and up the vertical surface. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying slate shingle. Fasten to roof deck only.

D. Hip and Ridge Flashings: Install centrally over hip with lower edge of flashing concealed by butt of overlying slate shingle. Fasten to roof deck.

E. Open Valley Flashings: Install by laying strips of sheet metal in the valley angle and lapping the slate over the sheet metal on either side, leaving space between the edges of each slate to channel water down the valley angle.

1. Install slate at 2 inches from each side of the valley center at the top of the valley and taper slate away from the center of the valley at a rate of 1/2 –inch per 8 feet down the length of the valley.

2. Flashing shall extend under the slate a minimum of 6 inches.

3. Do not puncture flashing with slating nails.

F. Rake Drip Edges: Install over underlayment and fasten to roof deck.

G. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.

H. Pipe Flashings: Form flashing around pipe penetrations and slate shingles. Fasten and seal to slate shingles.
3.4 SLATE-SHINGLE INSTALLATION

A. Installation, General: Beginning at eaves, install slate shingles according to written recommendations of manufacturer and details and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

1. Install cant at eave edges.
2. Install shingle starter course chamfered face down.
3. Install clip attachment system according to manufacturer's written instructions.

B. Install first and remaining shingle courses with chamfered face up. Install full-width first course at rake edge.

1. Offset joints of uniform width slate shingles by half the shingle width in succeeding courses.
2. Offset joints of random width slate shingles a minimum of 3 inches in succeeding courses.

C. Maintain a 3-inch minimum head lap between succeeding shingle courses.

D. Maintain uniform exposure of shingle courses between eaves and ridge except as required to align courses at dormer intersections with field of roof.

E. Extend shingle starter course and first course 1 inch over fasciae at gutters and eaves.

F. Extend shingle starter course and succeeding courses 1 inch over fasciae at rakes.

G. Cut and fit slate neatly around roof vents, pipes, ventilators, and other projections through roof.

H. Hang slate with two slating nails for each shingle with nail heads lightly touching slate. Do not drive nails home drawing slates downward or leave nail head protruding enough to interfere with overlapping shingle above.

I. Ridges: Install ridge slate with a saddle ridge configuration.

1. Install and anchor wood nailer strip of thickness to match abutting courses of slate shingles, terminating nailer strip 3 to 4 inches from the ridge. Install and anchor a second wood nailer strip of thickness twice abutting courses of slate shingles, terminating nailer strip at the ridge.
2. Install field slates up to the ridge.
3. Install copper flashing placed between each ridge slate.
4. Install ridge slate perpendicular to the field slate. As slate is run across the ridge and nailed, they overlap and cover the nailers.
5. Apply sealant to bed along the ridge joint.

J. Hips: Install and anchor slate hips in saddle configuration.

1. Install and anchor wood nailer strips of thickness to match abutting courses of slate shingles. Cover nailer strip with felt underlayment strip, extending on to underlying slate but concealed by hip slate. Anchor hip slate to nailer strip with two nails located in upper third of hip-slate length.
2. Notch starter shingle and first shingle course at hip to fit around nailer strips so no wood is exposed at ridge eave.
3. Lay hip slate in bed of asphalt roofing cement.
4. Seal hip centerline joint with elastomeric sealant.

K. Opened Valleys: Taper width of valley 1/8-inch per foot.
   1. Do not nail shingles to valley metal flashings.
   2. Trim upper corner of each slate adjacent to the valley.
   3. No points allowed in valley. All slates must have a minimum of 2-inch butt face.

3.5 SNOW-GUARD INSTALLATION

A. Install fence style snow guards at eaves where indicated on Drawings following the manufacturer’s instructions and using the specified fasteners.
   1. Install snow guards above the outermost wall or support of the building.
   2. Maximum spacing of base plates: 36 inches

B. Install pad style snow guards where indicated on Drawings following the manufacture’s instructions and using the specified fasteners.
   1. Use 2 fasteners per snow pad.

3.6 ADJUSTING AND CLEANING

A. Remove and replace damaged or broken slates.
B. Remove excess slate and debris from Project site.
C. Return to site 2 years after date of substantial completion and replace all broken and missing slates.

3.7 ATTIC STOCK

A. Provide slate shingle attic stock of 2% of total roof area.

3.8 SPECIAL ROOFING INSTALLER’S WARRANTY

A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
   1. Owner: Wesleyan University
   2. Address: 45 Wylys Ave, Middletown, CT 06459
   3. Building Name/Type: Olin Library
   4. Address: 252 Church Street, Middletown, CT 06459
   5. Area of Work: Olin Library slate roof
   6. Acceptance Date: <Insert date.>
   7. Warranty Period: Two years.
8. Expiration Date: <Insert date.>

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding 115 mph;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. During Warranty Period, if original use of roof is changed, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully
available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. Two years after substantial completion the Roofing Installer shall return to the site and replace all broken and missing slates at no cost to the owner.

F. IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.

1. Authorized Signature: <Insert signature.>
2. Name: <Insert name.>
3. Title: <Insert title.>

END OF SECTION
SECTION 07 50 30
MODIFIED BITUMEN ROOFING AND FLASHINGS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish all labor, materials and equipment to install torch-applied, multi-layer SBS modified bitumen membranes, hardboard, insulation board, walkways, and sheet metal flashings.

B. Description of Systems: Roofing shall consist of two (2) plies of prefabricated non-woven polyester reinforced SBS modified bitumen membrane (top ply granule surfaced, bottom ply smooth surfaced) over a prepared substrate. Vapor retarder shall consist of one ply fiberglass reinforced smooth surfaced modified bitumen membrane. The basis of design is the Soprema assembly depicted in RoofNav Assembly #240832-50589-0.

1.2 REFERENCES

A. Membrane: Membrane manufacturer and specific products referenced shall be the only approved products for use.

1.3 SUBMITTALS

A. Specimen copy of Manufacturer’s roofing and waterproofing system warranty proposed for the Work. Submit prior to commencement of the Work.
   1. Fully executed warranty, which shall be issued upon Manufacturer’s approval of the installation. In no event shall the effective date of the warranty predate the completion and acceptance by Owner of the roof membrane system and all associated work.

B. Product Data: Submit product data and general recommendations from roofing and waterproofing materials manufacturer, for types of roofing required. Submit manufacturers' instructions for use of all materials including sheet roofing, flashing material, and accessories. Provide for membrane materials, base flashings, and associated adhesives, cements, primers, sealants, water cut-off mastics, prefabricated accessories; cover strips, fasteners, anchor bars, and other related items.

C. For details not addressed by the project drawings, submit shop drawings for approval by the Owner prior to start of work. Shop drawings shall include: Outline of roof and roof size, location and type of penetrations, perimeter and penetration details, special details and list of materials.

D. A letter from the material manufacturer specifically referencing this project and stating their intention to provide the specified warranty.

E. The current published product and installation literature of the materials manufacturer shall be considered part of this specification. Any revisions to the published literature, prior to the date of installation of the product shall also be considered part of this specification.

F. Samples (minimum 6 inch by 6 inch) of each type of sheet roofing shall be submitted.
G. Prior to start of work, submit proposed detail for temporary watertight night cutoffs for review and approval, clearly indicating tie-in of new modified roofing to existing substrates at temporary daily terminations during the progress of the work.

1.4 QUALITY ASSURANCE

A. Contractor Requirements
1. Contractor shall be approved by the manufacturer of the roofing materials and authorized to install the specified warranty system.
2. Portions of these specifications may exceed the minimum requirements of the membrane material manufacturer. In no event shall less quality, less weight or a lesser number of plies or any other lesser requirements be acceptable than at least the minimum of such required by this Specification Section and those of the manufacturer.
3. Maintain one copy of project documents on site at all times during work activities.
4. Membrane Manufacturer: Soprema or Siplast
5. Acceptable Applicator: Contractor shall be approved by the roofing materials manufacturer with a minimum of three (3) years experience installing the specified product. The Contractor shall submit written evidence, from the membrane manufacturer that they are an Approved Applicator and have been for three (3) years (minimum) and that they are eligible to install the specified system as necessary to qualify for the specified warranty. A copy of the guarantee proposal shall be submitted with the Bid.
6. Technical Assistance: The contractor shall arrange for all required manufacturer support required to maintain eligibility for specified manufacturer’s warranty.

B. Regulatory Requirements:
1. Materials and application shall be such that the finished assembly, insulation and roofing membrane shall meet the requirements for FM Class I.
2. Anchorage of roofing insulation and membrane system shall meet FM 1-90 wind uplift requirements.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original unopened containers.

B. Inspect materials delivered to the site for evidence of contact with moisture. Reject delivery of materials with stained or wet wrappers, or torn covers. Packaging labels must be readable, identify the material, and indicate conformance with the reference standard applicable to the material. Additionally, for roofing membrane sheet, adhesives/cements and sealant materials, labels shall indicate the date of manufacture and lot number.

C. Store all materials, including membrane, between 40 degrees F, and 80 degrees F. If exposed to lower temperature, restore to proper temperature before using. No roofing membrane or flashing membrane shall be installed unless the outdoor temperature is 40 degrees F and rising.

D. Store all materials in dry area and protect from moisture and physical damage. Damaged materials shall be removed from site and replaced at no additional cost to the Owner.

E. Materials shall be handled, transported and stored in a manner enabling undamaged material to be installed. Rolls or material displaying a flattened appearance shall be considered damaged and shall not be installed.
F. Materials requiring fire resistance classification shall be delivered to the job with labels from an appropriate independent laboratory attached and packaged as required by the labeling service.

G. Deliver materials in sufficient quantity to assure continuity of work. Handle rolled goods in a manner to prevent damage to edges or ends. Select and utilize handling equipment so as to avoid damage to materials handled, to applied roofing or to other construction.

H. Store rolled goods on ends. Protect materials from damage by construction traffic or other work. Roll goods which have been damaged by dropping, flattening or other mishandling, or have ends with embedded, foreign material shall not be incorporated into the work. Any such installations shall be removed and replaced at no additional cost to the Owner.

I. Do not overload the roof beyond the design loads with products or equipment.

J. Protect the existing roofing from damage due to traffic and material loading.

K. Use all materials within the time limits prescribed by the manufacturers.

1.6 PROJECT/SITE CONDITIONS

A. Do not install roofing during inclement weather, below the minimum ambient or surface temperatures recommended by the membrane manufacturer, or when relative humidity or wind speed is not within the range acceptable to the membrane manufacturer.

B. Contractor shall not proceed with or install roofing during inclement weather, except for temporary work necessary during inclement weather to protect materials that are already installed. Remove all temporary work before installing permanent materials.

C. Surfaces on which the insulation or membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper installation.

D. Waste products (petroleum, grease, oil and solvents - vegetable or mineral oil and animal fat - direct contact with steam venting) shall not be allowed to come in contact with the roof membrane system.

E. All membrane and substrate surfaces must be clean and dry.

F. Daily Seal: Care shall be exercised to ensure that moisture does not penetrate beneath any completed sections of the roofing by temporarily sealing the loose edge of the membrane at the end of each work day and prior to the arrival of inclement weather. The manufacturer's requirements shall be followed closely. Contractor shall inspect existing components for moisture intrusion along the tie-in after opening the daily seal on the next work day.

1.7 WARRANTY

A. Manufacturer's Warranty: The Contractor shall provide a twenty (20) year No Dollar Limit System Written Transferable Warranty from the date of acceptance of this work for the new low slope roof and waterproofing systems from the membrane manufacturer, or other approved entity as approved by the Owner, agreeing to replace/repair defective materials and workmanship at no additional cost to the Owner. Warranty shall include responsibility for removal and replacement of other work which conceals defective work or materials. Warranty shall cover Workmanship for the full twenty (20) years and all membrane materials also for the full twenty (20) years.
Included in the 20 year warranty shall be the roofing membrane, flashing and insulation. Should the membrane manufacturer require materials not shown on the drawings or included in the specifications or flashing details that differ from those shown on the drawings to qualify for the specified warranty, the contractor shall comply with the requirements of the manufacturer at no additional cost to the owner.

B. Contractor Guarantee: Provide written (notarized) guarantee agreeing to replace/repair defective materials and workmanship at no additional cost to the Owner for a period of two (2) years after substantial completion. The guarantee includes responsibility for removal and replacement of other work which conceals roofing membranes. This guarantee shall include all work installed under this contract including membranes, flashings, drainage systems, metal work, insulation, fasteners and miscellaneous items.

C. Special Roofing Installer's Warranty: Warranty, on warranty form at end of this Section, signed by roofing Installer and covering Work of this Section, in which roofing Installer agrees to repair or replace thermoplastic roofing that fails in materials or workmanship including, but not limited to, punctures, tears, holes, failed welds, etc. within the following warranty period:
   1. Warranty Period: One year from date of Substantial Completion.

PART 2 PRODUCTS

2.1 GENERAL

A. If insulation is provided by other than the membrane manufacturer, Contractor shall submit a letter of acceptance from the membrane manufacturer for approval of insulation proposed for use and verification that insulation shall be included in the system warranty.

B. All materials to be used in the work, including temporary cut-offs and tie-ins, shall be certified by the manufacturer to be free of asbestos.

C. Any asbestos containing material inadvertently installed under this contract by the Contractor, or their subcontractors, shall be removed and replaced with asbestos-free products at no additional cost to the Owner.

D. Top ply of modified bitumen roofing membrane shall be coated with ceramic granules. Granule color shall be white. Consult owner concerning preferred color prior to ordering.

E. Approved flashing system shall also be utilized for stripping over of sheet metal flanges except as may be otherwise noted on the drawings.

2.2 APPROVED ROOF MEMBRANE ASSEMBLY

A. For all low slope roof areas:
   1. Manufacturer: Soprema
   2. Bottom Ply: Sopralene Flam 180
      a. Description: Flashing membrane shall have a non-woven polyester reinforcement and thermofusible elastomeric asphalt. Both sides shall have a thermofusible plastic film. This membrane is to be applied by torching only.
      b. Components: Reinforcement shall be 3.68 lbs/sq. non-woven polyester. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer.
      c. Physical Properties:
1) Tensile strength:
   a) Longitudinal - 119 lbs./in.
   b) Transversal - 88 lbs./in.

2) Ultimate elongation,
   a) Longitudinal, 58%
   b) Transversal, 64%

3) Static puncture strength - 67 lbs.

4) Low temperature flexibility, no cracking at -22 degrees F.

5) SBS elongation - 1500%

6) Load strain product:
   a) Longitudinal - 6902
   b) Transversal - 5632

7) Approximate roll weight - 79 lbs (35.8 kgs)

8) Approximate thickness - 120 mils (3 mm)

3. Top Ply: Sopralene Flam 250 granule
   a. Description: Waterproofing membrane shall have a non-woven polyester
      reinforcement and thermofusible elastomeric asphalt, with a fire retardant agent
      added. The top side shall be self-protected with colored granules. The underside
      shall be protected by a thermofusible plastic film. This membrane is to be applied
      by torching only.
      1) Color to be white.
   b. Components: Reinforcement shall be 5.12 lbs/sq non-woven polyester. Elastomeric
      asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer.
   c. Physical properties:
      1) Tensile strength:
         a) Longitudinal - 163 lbs./in.
         b) Transversal - 122 lbs./in.
      2) Ultimate elongation:
         a) Longitudinal - 60%
         b) Transversal - 69%
      3) Static puncture strength - 55 lbs.
      4) Low temperature flexibility, no cracking at -22 degrees F.
      5) SBS elongation - 1500%
      6) Load strain product:
         a) Longitudinal - 9780
         b) Transversal - 8418
      7) Approximate roll weight - 84 lbs (38.1 kgs)
      8) Approximate thickness - 160 mils (4 mm)

4. Vapor Retarder: Sopralene Stick
   a. Description: Waterproofing membrane shall have a non-woven polyester
      reinforcement and self-adhesive bitumen on the underside and a sanded topside
      surface.
   b. Components: Reinforcement shall be non-woven polyester. Elastomeric asphalt
      shall be a mix of selected bitumen and SBS thermoplastic polymer.
   c. Physical properties:
      1) Tensile strength:
         a) Longitudinal - 117 lbs./in.
         b) Transversal - 82 lbs./in.
      2) Elongation @ 0°F:
         a) Longitudinal - 29%
         b) Transversal - 22%
d. Low temperature flexibility, no cracking at -15 degrees F.
e. SBS elongation - 1500%
f. Approximate roll weight - 92 lbs
g. Approximate thickness - 108 mils

5. Alsan RS 230 Flashing:
   a. Description: Two-component PMMA fluid applied waterproofing system with polyfleece reinforcement. Provide all accessory products as recommended by manufacturer.

2.3 BASE PLY
   A. Modified bitumen cements, adhesives, mastics, primers, ceramic granules, sealants, prefabricated accessories, fasteners, anchor bars, and other related items are to be furnished or recommended by the membrane material manufacturer unless otherwise indicated.

2.4 CAP PLY
   A. Modified bitumen cements, adhesives, mastics, primers, ceramic granules, sealants, prefabricated accessories, fasteners, anchor bars, and other related items are to be furnished or recommended by the membrane material manufacturer unless otherwise indicated.

2.5 RELATED MODIFIED BITUMEN MATERIALS
   A. Modified bitumen cements, adhesives, mastics, primers, ceramic granules, sealants, prefabricated accessories, fasteners, anchor bars, and other related items are to be furnished or recommended by the membrane material manufacturer unless otherwise indicated.

2.6 INSULATION, TAPERED EDGE STRIPS, AND CANTS
   A. Insulation for roof areas:
      1. See Section 07 21 00 - Roof Insulation
   B. Tapered Edge strips and cants for roofing system:
      1. Perlite cants with 4 inch face.
      2. Wood fiber tapered edge strip where required to provide flush transitions and as noted on drawings.

2.7 SHEET METAL
   A. See Section 07 60 00 Sheet Metal and Flashing

2.8 SEALANTS
   A. See Section 07 92 00 Joint Sealants

2.9 FASTENERS AND ACCESSORIES
   A. Termination bar - Tru-Fast TB-100 aluminum termination bar (0.1 inch thick by 1 inch wide with pre drilled holes 8 inches on center), 800-443-9602.
C. Masonry fasteners - 410 Stainless Steel Tapcon with hex washer head by ITW Buildex or Type 304 Stainless Steel Tapper by Powers Fasteners, 1/4 inch diameter with hex washer head and length as noted on details (2-3/4 inches minimum).

2.10 LUMBER

A. All wood nailers, blocking and cants:
   1. Species and Grade for nailers and blocking: Douglas Fir or Southern Yellow Pine; WWPA Structural Joist and Plank Class, No. 2 Grade.
   2. Preservative treatment: Treatment conforming with AWPB (American Wood Preservers Bureau) Specification LP-2 Standard for lumber and timber. This treatment is commonly referred to as pressure treated or “Wolmanized”.
   3. Each piece of treated lumber delivered to the site must bear the stamp of the AWPI (American Wood Preservers Institute), Quality Mark, indicating compliance with the requirements of the AWPI Quality Control Program.
   4. Each piece of treated lumber must bear a stamp that it is kiln dried before the delivery of product, and indicating conformance with AWPB Specifications, Section 3.1.2.
   5. Treated lumber shall be dried by supplier after treatment. Provide documentation from treatment supplier that the lumber has been air dried after treatment, back to 19% or less moisture content by weight.
   6. Dimensions: As required by conditions encountered and as shown on project details.

B. Plywood
   1. Standards: Comply with PS 1/ANSI A199.1 for plywood panels. All panels shall be 5-ply (min). For products not manufactured under PS 1 provisions, comply with American Plywood Association “Performance Standard and Policies for Structural-Use Panels”, Form E445.
   2. Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements and AWPI trademark evidencing compliance with treatment requirements.
   3. Preservative treated with waterborne preservative with minimum 0.25 lb/ft.³ retention. Treated plywood shall be air dried by supplier after treatment. Provide documentation by treated plywood supplier that plywood dried back to 18% or less moisture content by weight.
   4. Grades:
      a. Plywood shall be thickness as noted on the drawings for any parapet wall sheathing, and for installation on top of any indicated parapet walls and APA (American Plywood Association) Rated Sheathing Exterior Exposure (C-C Exterior). Note: “CDX” and Exposure 1 plywood do not comply with this specification and are not approved for use on low slope roofing details where treated plywood noted. For steep sloped roof sheathing, Exposure 1 plywood shall be used. Additional plywood thicknesses as may be noted on the drawings.

PART 3 EXECUTION

3.1 INSPECTION

A. The installer shall examine the areas and conditions under which the roofing is to be installed, and notify the Owner, in writing, of conditions detrimental to the proper and timely completion of this phase of the work. Contractor shall not begin work until the substrates have been prepared.
as specified and as necessary, and are ready and acceptable to have materials installed. By beginning work, the Contractor acknowledges that the substrates are satisfactory.

B. Prior to the start of work, the substrate shall be relatively smooth and free of debris, sharp edges and other surface irregularities, as determined by Architect/Engineer that will be detrimental to or prevent the proper installation of the system.

C. All codes having jurisdiction shall be observed strictly in the construction of the project, including all applicable state, city, and county building, zoning, electrical, mechanical, plumbing and fire codes. Contractor shall verify all code requirements before commencement of construction and bring any noted discrepancies between code requirements and the construction documents to the attention of the Architect/Engineer in writing.

D. Details and sections on the drawings are shown at specific locations and are intended to show general requirements throughout. Details noted “typical” imply all conditions treated similarly. Modifications shall be made by Contractor to accommodate minor variations.

E. All areas, dimensions, and conditions shown and indicated are approximate. Contractor shall verify existing conditions prior to the start of work. Additional compensation shall not be granted for conditions encountered after the start of work that are different from those listed.

F. All drawings and conditions shall be fully coordinated by Contractor to verify all dimensions, conditions, slopes, drains, outlets, recesses, reglets, bolt settings, sleeves, etc.

G. Contractor shall bring errors and omissions noted by the Contractor which may occur in Contract Documents to the attention of the Architect/Engineer in writing and written instructions shall be obtained before proceeding with the affected work.

H. Verify that all drains, sleeves, curbs or other roof penetrations are rigidly secured.

I. The Contractor shall verify all dimensions and job conditions at the job site sufficiently in advance of work to be performed to assure the orderly progress of the work.

### 3.2 PREPARATION OF SUBSTRATE

A. Protect adjacent surfaces not designated to receive roofing.

B. The Contractor shall provide and install all curbing, expansion joints, and wood nailers at all edges, projections and openings, as indicated on the Drawings, and where metal flanges or flashing are to be installed.

C. Before installation of roofing or insulation materials, all deck surfaces shall be dry, sound, clean (broom swept), smooth, primed, and free of debris, loose material or defects which would have an adverse affect on the roofing or insulation or their performance, and provide substrate acceptable to the roof membrane manufacturer.

D. Adjust accessory items to proper height to be compatible with finished height of new insulation and roofing system.

E. Apply primer over all concrete, masonry, and sheet metal substrates to receive new membrane materials in accordance with the recommendations of the membrane manufacturer.
3.3 INSTALLATION

A. General:
   1. Comply with manufacturer's instructions for handling and installation of roofing materials except where more stringent requirements are indicated in the specifications and drawings. Any changes to these specifications, based on recommendations by the material manufacturer, shall be approved in writing by the Architect/Engineer prior to the start of work.
   2. Schedule installation to minimize period of exposure of substrates.
   3. The Contractor shall not phase in the installation of the base ply and top ply roof membranes.
   4. Contractor shall not use the existing or new roofs as work or storage platforms, without adequate protection.
   5. Daily Seal: Provide temporary watertight cut-offs and tie-ins prior to arrival of inclement weather and at the end of each work day, as necessary to prevent moisture intrusion below the new and existing membrane and into the new roof and/or building. Remove all temporary work at the beginning of the next work day and verify that water has not breached the permanent work.
   6. Should conditions be uncovered or created which would be detrimental to the proper conduct of specified work, immediately notify the Owner Representative of these conditions for resolution.
   7. Extend roofing membranes and flashings as shown to provide complete membrane over area(s) indicated to be roofed. Seal to all equipment projections through membrane and seal all membrane and flashing seams. Ensure complete bonding to vertical surfaces and, where shown or recommended by material manufacturer, to horizontal surfaces.
      a. Contractor shall perform all testing and other examination of deck surface as recommended by the roofing materials manufacturer and as recommended by manufacturer of the roof deck materials. Responsibility for determination of moisture content of deck being suitable for application of roofing materials shall be the sole responsibility of the Contractor. The proposed roof membrane manufacturer shall inspect the concrete deck condition and water content and state in writing it is acceptable to install new roof membrane materials.
      b. Contractor shall follow manufacturer's recommendations for unrolling the membrane to allow to “relax” and flatten at application temperatures to assure that the top and bottom plies have stabilized and are ready for incorporation into the roof.
      c. Except as otherwise required by unusual circumstances or as otherwise may be indicated in these specifications, begin installation of the roof membrane system at the low point of the roof and proceed upslope. Install membrane plies shingle style, perpendicular to the slope.

3.4 ROOFING MEMBRANE

A. General:
   1. Install the roofing membrane in accordance with the latest printed application requirements of the roofing membrane manufacturer except where the requirements of these project specifications are more stringent as determined by the Architect/Engineer. In such instances, the more-stringent requirement shall apply.
   2. Traffic: Keep foot traffic and equipment movement to the absolute minimum during application of the roof membrane while the bitumen is hot and fluid. In addition, minimize traffic over new roofing prior to application of the final top ply.
3. At locations where drawings indicate that membrane or flashings shall be turned down the outside face of walls, the portion turned down the walls shall be installed “dry” (without asphalt, mastic, or adhesive).

B. Roofing Construction Safety Precautions
1. Torch Safety Precautions
   a. General: All torch-applied membranes shall be installed in accordance with recommendations provided in Factory Mutual Property Loss Prevention Data Sheet 1-33, "Safeguarding Torch Applied Roof Installations" and shall comply with all Federal, State, and Local Fire Prevention Codes.
   b. Installation Safeguards
      1) Torches used to secure membranes should be used in accordance with manufacturer's recommendations. The flame from a hand-held torch should be constantly moved from side to side. To prevent smoldering or ignition of membranes, they should not be overheated.
      2) Caution should be used when working around openings, penetrations or flashings. Wood nailers, cant strips and metal flashing should not come in direct contact with the flame of the torch. Small torches should be used to heat the underside of the membrane away from these areas before securement. The torch should not be used in areas where the flame impingement cannot be fully viewed. Open flames should not be left unattended. Roof openings/vents should be covered with a stable noncombustible cover to prevent ignition of building components or contents.
         a) Extreme caution should be used near penetrations such as exhaust vents to prevent ignition of accumulated flammable discharges. Such accumulations should be cleaned/removed before roofing work begins.
         b) Air conditioning units and ventilating fans should be shut down before torch work is done in surrounding areas.
         c) Expansion joints should be filled with mineral wool or ceramic fiber with a steel cover plate below.
      3) Torch stand should be used to direct the flame upward when momentarily not in use. The cylinder valve should be closed to burn off propane in the line before shutting off the torch head. The gas supply should be shut off whenever a propane odor is detected.
      4) Installations should be coordinated with concerned parties, and close supervision should be provided.
      5) Torches should not be used near gas lines, electrical wires or flammable liquids during roof construction.
      6) The torch flame should not be applied to a combustible substrate when installing the membrane. All combustible substrates and materials in the vicinity of heat welded membranes shall be covered with a glass fiber base sheet before the torch applied membrane is installed. Torch flames should not come in contact with exposed plastic roofing cement or other combustible materials.
      7) The operator of the torch shall remain on the premises to perform a fire watch for a minimum of one (1) hour after the torch is utilized. All roof areas worked on should be checked for "hot spots" and signs of smoldering. The inside of the building should also be inspected for signs of fire or smoke. All "hot spots" or fires shall be extinguished and reported to the Architect/Engineer.
   c. Equipment Safeguards
1) Proper equipment should be used to heat roofing membranes. Torches should be equipped with a pilot adjustment, flame height adjustment, 25 to 50 feet of approved or listed hose, pressure gauge and regulator. A spark ignitor should be used.
   a) Safety caps should be tied to all propane cylinders and installed on the valve whenever cylinders are not in use. Carts used to transport propane cylinders should be stable. Tall, narrow, standing cylinders should be chained against walls or in proper carts.

2) The propane cylinder should be adequately sized for the torch used. If frost buildup occurs on the propane cylinders and the rate of vapor withdrawal is no longer adequate for operating conditions, the cylinder should not be placed on its side or heated with the torch flame. The hose should be disconnected and a larger cylinder used. Liquid propane cylinders may be of either the vapor withdrawal or liquid withdrawal type.
   a) Liquid withdrawal cylinders are preferred due to frost buildup associated with vapor withdrawal cylinders. However, when vapor withdrawal cylinders are used, or if temperatures are below 20 degrees F, 40 or 100 lb. Cylinders should be used with larger torches (such as those used on the field of the roof).

3) Equipment should be thoroughly inspected and repaired as needed. Propane cylinders should be inspected for dents. If dents larger than 1" in diameter are found, the cylinder should be replaced. Torch and cylinder connectors should be visually inspected and checked for leaks with a soap and water solution. An open flame should not be used to test for leaks.
   a) Leaky equipment should not be used. Regulator adjustments and pressure gauges should be checked to assure they are operable. The vent on the regulator should be checked to ensure it is not blocked. If an unstable flame occurs (one which roars loudly and tends to blow itself out), the equipment should be repaired or replaced immediately.

4) A fire watch of all equipment utilized for the torching application should be conducted for at least one (1) hour after torch work has been completed.

d. Fire Extinguishing Equipment
1) The Contractor shall provide, on the roof, at least one (1) portable fire extinguisher with a minimum 4-A rating, two (2) portable fire extinguishers with a minimum 2-A rating each, or a water hose connected to a water supply at the building where the torching is being done. In addition, there should be at least one 10-lb. multipurpose dry chemical portable extinguisher within 20 feet horizontal travel distance of torch-applied roofing equipment.

e. Fuel Handling Safeguards
1) Fuel containers, burners and related appurtenances of roofing equipment in which liquefied petroleum gas is used for heating should comply with Factory Mutual Data Sheet 7-50; "Compressed Gases in Cylinders" and NFPA 58; "Standard for the Storage and Handling of Liquefied Petroleum Gases".
   a) All fuel containers should be located at least 10 feet from the burner flame or at least 2 feet away when properly insulated from heat or flame.
   b) Storage of LPG cylinders or containers on rooftops is prohibited. All LPG cylinders or containers shall be removed from the rooftop and placed in a secure area, protected against tampering, at the end of each work shift.
c) Propane cylinders shall not be hoisted by their valves. Straps placed around the cylinders should be utilized.

C. Safety Considerations
1. The Contractor shall follow all established safety procedures as defined by OSHA or other governing agencies.
2. It is the Contractor's responsibility to insure safety at the project work area at all times.

3.5 APPLICATION OF MODIFIED BITUMEN ROOFING MEMBRANE – HEAT WELDING

A. Bottom Ply
1. Starting at the low point of the roof, install 2 plies of approved bottom ply membrane perpendicular (at right angle) to the slope.
2. Fully bond the bottom plies to the prepared substrate, applying each sheet directly behind the heat applicator.
3. Provide 3 inch minimum side and end laps and stagger end laps a minimum of 3 feet.
4. At end laps, cut “dog ear” angles from underlying sheet at the finish edge and the overlapping selvage edges. Using a clean trowel, apply top pressure to top seal t-laps immediately following sheet application.
5. Do not apply heat directly to deck.

B. Top Ply
1. Fully bond top ply parallel to the base ply, applying sheet directly behind the heat applicator.
2. Provide 3 inch minimum side and end laps and stagger end laps a minimum of 3 feet.
3. At end laps, cut “dog ear” angles from underlying sheet at the finish edge and the overlapping selvage edges. Using a clean trowel, apply top pressure to top seal t-laps immediately following sheet application.
4. Stagger side lap seams between top ply 12 to 18 inches from the side lap seams of the bottom ply.

3.6 ROOFING FLASHINGS

A. Walls and Curbs:
1. Neatly flash vertical walls and curbs in strict compliance with the roofing membrane manufacturer's specifications and as noted in the project details and these specifications. The wall and curb flashings shall extend a minimum of 8-inches above the roof surface and 4-inches out onto the field of the roof past the base of cants and tapered edge strips.
2. Existing vertical EPDM base flashings shall be left in place if they are fully bonded to the substrate. If de-bonded, they are to be removed. All remaining EPDM flashings are to be cleaned and primed in accordance with the manufacturer’s requirements prior to the installation of the new base flashings.
3. Begin all wall and curb flashing installations at the low point of the wall or curb and proceed up slope to avoid back water seams which buck water.
4. Extend flashing to the top of all curbs and to within one inch of reglets where existing reglet secured counterflashing are indicated as remaining or new for incorporation into new roof system. Unless otherwise indicated or not possible due to existing conditions encountered, flashing height shall be 8 inches (minimum) above the finished roofing surface.
5. Secure upper edges of all wall and curb base flashings at 6 to 8-inches (max) on center and within 2-inches of the end of each section of base flashing. Extruded termination bar with
bent edges shall be installed at the top of all base flashings to mechanically attach the new and underlying existing base flashings in place. Refer to project details and approved manufacturer’s requirements. In no instance, even if approved by membrane manufacturer, shall base flashing attachment exceed 8-inches on-center.

B. Equipment Penetrations
1. Flash all penetrations (pipes, conduits, etc.) passing through the membrane as detailed. Where not detailed, install in strict accordance with the manufacturer's ALSAN details and recommendations.
2. Where recommended by roof membrane manufacturer, apply approved sealant along base of equipment penetration to seal equipment to edge of flashing membrane.

3.7 WALKWAYS
A. Install walkways in the areas indicated on the roof plans. Walkways are to consist of Sopralene Flam 350 adhered to the roof membrane.

3.8 QUALITY CONTROL
A. The roof membrane and flashing systems after installation shall be free of the following defects:
1. Factory splices in the top ply shall be cut out before the roll is applied. As an alternate, the splice may be covered with a full width section of top ply membrane which extends a minimum of 6-inches beyond both sides of the splice.
2. Contractor shall ensure that the top ply is continuously welded and fully bonded to the bottom ply without air pockets, wrinkles, fishmouths or tears.
3. Contractor shall evaluate all lap seams in the top and bottom plies to identify any deficient conditions which require repair to ensure continuous bonding of the laps.
4. Contractor shall keep foot traffic and equipment movement over newly installed roof membrane top and bottom plies to the absolute minimum during application of the roof membrane while the bitumen is hot and fluid.
5. All vertical end terminations in wall base flashings shall be covered with metal flashing or counterflashing and secured in accordance with the project documents.
6. All roof drains shall be cleaned out and free of roofing debris and tested for watertightness and free flowing operation prior to acceptance of roof.
7. Owner shall reject any work not found to be in conformance with good roofing practice or these specifications.
8. Roof cement, unless specifically approved by the roof membrane manufacturer, shall not be incorporated into the roof membrane or flashing. Use of roof cement will not be permitted at the following conditions:
   a. Sealing of laps in membrane or flashing.
   b. Surface or stripping flashing at equipment penetrations or drains.
   c. Repairs of the membrane or flashing.
9. All roof cement found on the exposed roof shall be removed and area repaired at no additional cost to the Owner.
10. Loose granules shall be embedded in asphalt bleed out at side and end laps which exceeds one quarter (1/4) inch in width and at asphalt spillage, drippage, marring, etc. on finished membrane surfaces.

B. Electronic Leak Detection (ELD) shall be completed at the entire roof area after completion of all work and removal of all materials and equipment. Methods of ELD shall include high voltage...
spark testing or low voltage electric gradient methods. Testing shall be completed by an independent firm and a report of the test results provided to the Engineer and Owner.

3.9 SHEET METAL - GENERAL

A. The Contractor shall examine the areas and conditions under which the flashing and sheet metal is to be installed, and notify the Owner in writing of conditions detrimental to the proper and timely completion of this phase of the work. Do not proceed with this phase until the unsatisfactory conditions have been corrected. Commencement of work shall be construed as acceptance of the conditions.

B. Workmanship shall conform to the best trade standards. Soldering shall be performed slowly with heavy well heated soldering coppers of blunt design, properly tinned before use. Tin edges of each item to be soldered, 1-1/2 inches on both sides, with rosin as flux.

C. Extend counterflashings 4 inches (minimum) over base flashings or as noted on drawings if more stringent requirements noted.

D. Installation of items not shown in detail or not covered by specifications shall meet the applicable requirements of the latest edition of the Architectural Sheet Metal Manual of the Sheet Metal and Air Conditioning Contractors National Association, Inc. and/or the requirements of the material or equipment manufacturer.

E. Apply modified plastic cement compound, approved for use by roof membrane manufacturer, between embedded metal flashings and bituminous membrane flashings.

F. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. Surfaces of new metal flashing which will come into contact with dissimilar metal shall receive a heavy protective coating per the metal producer's or supplier's recommendations to provide protection against galvanic corrosion.

3.10 SHEET METAL INSTALLATION

A. General:
   1. Installation shall comply with the drawings.
   2. Where not specifically indicated on the drawings, installation shall comply with the recommendations of the SMACNA Manual or with the manufacturer's requirements for premanufactured flashings.
   3. The flashing and sheet metal work shall be permanently watertight and shall not deteriorate in excess of published limitations of the manufacturer.

B. Thermal expansion shall be provided for in all exposed sheet metal work exceeding 15 feet in running length, except where otherwise indicated:
   1. On flashing and trim, expansion capability shall be provided every 10 feet maximum and located 18 inches from corners and intersections.

C. Fasteners and expansion provisions shall be concealed wherever possible.

D. Provide continuous weathertight sheet metal closures and/or end dams at all end terminations, end joints and corners in wall and curb sheet metal counterflashings.
E. The following shall apply to all termination bar installations:
   1. In addition to fastener pattern noted on drawings, secure bar within 2 inches of each end of
      the bars.
   2. Provide 1/8 to 1/4 inch gap between adjacent sections of the bar.
   3. Use only continuous straight sections of bar – do not wrap around corners.

3.11 SHEET METAL CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or
deterioration of finishes.

B. Protection: Contractor shall protect flashings and sheet metal work during construction, to ensure
that work will be without damage or deterioration, other than natural weathering, at time of
substantial completion.

C. Neutralize corrosive soldered joint flux materials immediately upon completion of the work at
each soldered joint or seam.

3.12 CLEANING AND PROTECTION

A. Daily clean up, and removal from the site, of all wrapping, empty containers, loose particles and
other debris resulting from these operations is required. Remove any loose pieces from the drain
areas and protect the drains from blockage by debris. Remove drain protection at the end of each
work day and prior to arrival of inclement weather to ensure that all drain lines are open.

B. Schedule sequence of work so that traffic over new membrane is minimized. Institute required
procedures for protection of completed membrane during installation of work over membrane and
throughout remainder of construction period. Contractor shall not allow excessive or
concentrated traffic over unprotected membrane.

3.13 SPECIAL ROOFING INSTALLER'S WARRANTY

A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has
performed roofing and associated work ("work") on the following project:
   1. Owner: Wesleyan University
   2. Address: 45 Wyllys Ave, Middletown, CT 06459
   3. Building Name/Type: Olin Library
   4. Address: 252 Church Street, Middletown, CT 06459
   5. Area of Work: Olin Library slate roof
   6. Acceptance Date: <Insert date.>
   7. Warranty Period: Two years.
   8. Expiration Date: <Insert date.>

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a
subcontractor) to warrant said work against leaks and faulty or defective materials and
workmanship for designated Warranty Period,
C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding 115 mph;
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. Two years after substantial completion the Roofing Installer shall return to the site and replace all broken and missing slates at no cost to the owner.
F. IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.
   1. Authorized Signature: <Insert signature.>
   2. Name: <Insert name.>
   3. Title: <Insert title.>

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Supply, fabrication, and installation of flashings as shown in the drawings, including but not limited to:
   1. Vent Stack Flashing
   2. Chimney Caps
   3. Step Flashings and Counter Flashings for Slate Roofing
   4. Valley Flashings for Slate Roofing
   5. Ridge Flashings for Slate Roofing
   6. Rake Flashings and Eave Flashings for Slate Roofing
   7. Hip Flashing for Slate Roofing
   8. Metal Aprons and Crickets
   9. Flashing at Roof Transitions
   10. Gutters
   11. Flat Seam Roofing

B. Related Sections:
   1. Division 4 Sections
   2. Division 7 Sections

1.2 REFERENCES

   1. ASTM International:
      c. B601: Classification for Temper Designations for Copper and Copper Alloys-Wrought and Cast.
   2. Sheet Metal and Air Conditioning Contractors’ National Association (SMACNA).
   3. Copper and Common Sense by Revere Copper Products, Inc.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
   1. With Owner’s Representative.
   2. With other trades:
      a. To ensure that work done by other trades is complete and ready for sheet-metal Work.
      b. To avoid or minimize work on, or in immediate vicinity of, sheet-metal Work in progress.
      c. To ensure that subsequent work will not adversely affect completed sheet-metal Work.
3. With interfacing and adjoining construction to provide leakproof, secure, and non-
corrosive installation. Coordinate:
   a. Installation of roof drainage system with installation of roof perimeter flashing.
   b. Counterflashing installation with base flashing installation.
   c. Installation of roof-penetration flashing with installation of roofing and other items
      penetrating roof.

B. Samples: For each type of sheet-metal flashing and trim. Construct typical lap splice or seam
   for mechanically-jointed systems, and solder lap or seam for field-solderable systems.

C. Installer Qualifications: If requested, evidence that Installer’s existing company has minimum
   five years of continuous experience in similar sheet-metal Work; list of at least five
   representative, successfully-completed projects of similar scope and size, including:
   1. Project name.
   2. Owner’s name.
   3. Owner’s Representative name, address, and telephone number.
   4. Description of work.
   5. Sheet-metal members installed.
   6. Project supervisor.
   7. Total cost of sheet-metal work and total cost of project.
   8. Completion date.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Experienced firm that has successfully completed sheet-metal work
   similar in material, design, and extent to that indicated for Project. Must have successful
   installations of specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects,
      who is fluent in English, to be on Site at all times during Work. Do not change foremen
      during the course of the Project except for reasons beyond the control of the Installer;
      inform Architect/Engineer in advance of any changes.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Sheet-Metal Members: Deliver, store, and handle materials in such a manner as to prevent
   damage to materials or structure.

B. Sealants, Coatings, and Miscellaneous Materials:
   1. Deliver materials to Site in original containers and packaging with seals unbroken, labeled
      with manufacturer’s name, product brand name and type, date of manufacture, lot number,
      and directions for storing.
   2. Keep materials dry and do not allow materials to be exposed to moisture during
      transportation, storage, handling, and installation. Reject and remove from Site new
      materials which exhibit evidence of moisture during application, or have been exposed to
      moisture.
   3. Store materials in original, undamaged containers in clean, dry, protected location on raised
      platforms with weather-protective coverings, within temperature range required by
      manufacturer. Protect stored materials from direct sunlight. Manufacturer’s standard
      packaging and covering is not considered adequate weather protection.
   4. Handle materials to avoid damage.
   5. Conspicuously mark damaged or opened containers or containers with contaminated
      materials, and remove from Site as soon as possible.
6. Remove and replace materials that cannot be applied within stated shelf life.

C. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.

1.6 PROJECT CONDITIONS

A. Verify existing dimensions and details prior to start of sheet-metal Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.

B. Comply with Owner’s limitations and restrictions for Site use and accessibility.

C. Environmental Limitations: Install sheet-metal members when existing and forecast weather conditions permit sealants, coatings, and miscellaneous materials to be installed according to sealant, coating, or miscellaneous material manufacturer’s written instructions and warranty requirements.

D. Handle and install materials in strict accordance with safety requirements required by sheet-metal manufacturer; GHS or Material Safety Data Sheets; and local, state, and federal rules and regulations. Maintain GHS or Material Safety Data Sheets with materials in storage area and available for ready reference on Site.

1.7 CHANGES IN WORK

A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.

1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.8 SUBMITALS

A. Required prior to the commencement of work:

1. Detailed shop drawings or full-sized mockups, 12 in. wide minimum, of all new sheet metal. Shop drawings shall include details of all erection and connection methods, expansion joint location and detail, and accessories for all new items required under this Specification.

2. 6” x 6” samples of all materials specified in this section shall be provided for approval.

3. Approval of shop drawings will be for details, and arrangements of the various parts. Verification of job dimensions shall be the sole responsibility of the Contractor.

B. Required after the completion of work:

1. Contractor’s warranty per paragraph 1.9.
1.9 WARRANTY

A. Contractor’s Warranty:
   1. Written warranty, signed by Contractor, including:
      1) Replace sheet-metal Work that does not comply with requirements; that has corroded
         surface, coating that fails cohesively or adhesively, or other surface defects or
         imperfections; or that deteriorates in a manner not clearly specified by material
         supplier’s data as an inherent quality of the material for the application indicated.
         Warranty includes all materials, labor, tools and equipment necessary for repair,
         restoration, or replacement of all new work damaged as a result of defects,
         imperfections, or faults in materials and workmanship.
      2) Corrections of defects, imperfections, and faults shall not relieve the Contractor from
         his/her responsibility for additional corrective work during the remaining time period.
   2. Remove and replace sealant that has failed cohesively or adhesively; or that  deteriorates in
      a manner not clearly specified by sealant manufacturer’s data as an inherent quality of the
      material for the application indicated.
   3. Repair or replacement, to satisfaction of Owner, of other work or items which may have
      been displaced or damaged as consequence of defective Work.
   4. Warranty does not include deterioration or damage from changes in sheet-metal
      environment from that reasonably anticipated at Substantial Completion, or physical
      damage from adjacent activities.
   5. Warranty Period: Two years after Substantial Completion date.

B. Warranty on Aluminum Finish
   1. Kynar finish on aluminum shall be guaranteed against fading, cracking and peeling for a
      period of five years.

PART 2 PRODUCTS

2.1 SHEET METAL

A. Copper
   1. Copper shall be cold rolled temper in conformance with ASTM B370.
      b. Step Flashings for Slate Roofing: 20 oz.

B. Lead Coated Copper:
   1. Lead coated copper shall be Type I, Class A, conforming to ASTM B101.
      b. Counter Flashing at Roofing: 16 oz.
      c. Metal Aprons and Crickets: 20 oz.
      d. Chimney Cap: 20 oz.
      e. Gutters: 20 oz.
      g. Flat Seam Roofing and Wall Panels: 20 oz.
      h. Flashing at Slate Ridge: 16 oz.
      i. Flashing at Slate Hips: 16 oz.

C. Aluminum
1. Kynar-coated aluminum Baked on fluoropolymer coating system based on Kynar 500 resin. Color to be non-standard custom color, as selected by the Owner and Architect/Engineer.
   a. Cap flashings at existing curbs: 0.050 inch.
   b. Gravel stop and fascia: 0.050 inch.
   c. Cleats: 0.063 inch

D. LEAD
1. Lead alloy shall contain 4-6 percent Antimony.
   a. Vent Stack Flashing: 4 lb.
   b. Wedges for use in counter flashing shall be formed of 2.5 lb. sheet lead, specifically for the application intended.

2.2 AUXILIARY MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items required for installation.

B. Underlayment Materials:

C. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Size fasteners to provide penetration into substrate of at least 1 1/4 inches for nails and 3/4 inches for wood screws.
   1. Use stainless-steel fasteners, except that copper or hardware bronze fasteners may be used with copper sheet metal.
   2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
   3. Blind Fasteners: High-strength, closed end, stainless-steel rivets. Rivets to receive a dab of solder to insure water tight installation.

D. Butyl Sealant: ASTM C1311, single-component, solvent-release, butyl-rubber sealant; polyisobutylene-plasticized; heavy-bodied for hooked-type expansion joints with limited movement.

E. Solder: Solder for use with copper and lead coated copper: 50/50 tin and lead. ASTM B32.
   1. Flux for copper and lead coated copper: LA-CO MA Stainless Steel Flux.

F. Solder for use with stainless steel: 60/40 tin and lead.
   1. Flux for stainless steel: LA-CO MA Stainless Steel Flux.

2.3 SHEET METAL FABRICATION

A. Custom fabricate to comply with recommendations in SMACNA’s Architectural Sheet Metal Manual, that apply to design, dimensions, metal, and other characteristics of item indicated. Conform to dimensions and profiles shown in SMACNA’s Architectural Sheet Metal Manual, unless requirements that are more stringent are indicated.
   1. Obtain field measurements for accurate fit before fabrication.
   2. Shop fabricate items where practicable.
B. Fabricate without excessive oil canning, buckling, or tool marks that are visually objectionable in opinion of Architect/Engineer, and true to line and levels indicated, with exposed edges folded back to form hems.
   1. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

C. Expansion Provisions: Use lapped or bayonet-type expansion provisions where possible; otherwise, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Conceal fasteners and expansion provisions, where possible, on exposed-to-view sheet-metal flashing and trim, unless otherwise indicated.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal, and in thickness not less than that of metal being secured.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer for compliance with requirements and other conditions affecting performance of sheet-metal flashings and trim.
   1. Ensure that work done by other trades is complete and ready for sheet-metal Work.
   2. Verify that areas and conditions under which sheet-metal Work is to be performed permit proper and timely completion of Work.
   3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of sheet-metal Work and recommend corrections.
   4. Do not proceed with installation of sheet-metal flashings and trim until adverse conditions have been corrected and reviewed by Architect/Engineer.
   5. Commencing sheet-metal Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.

B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

D. Limit access to Work areas.

E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.

F. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.
3.3 SHEET METAL INSTALLATION

A. General: Install sheet-metal flashings and trim according to recommendations in SMACNA’s Architectural Sheet Metal Manual and as indicated.

B. Install sheet-metal flashing and trim to fit substrates and to result in watertight performance.
   1. Install true to line and levels indicated.
   2. Where exposed, install without excessive oil canning, buckling, or tool marks.
   3. Provide uniform, neat seams with minimum exposure of solder, welds, or sealant.
   4. Do not torch cut sheet metal.

C. Provide for thermal expansion of exposed flashing and trim.
   1. Space movement joints no more than 10 feet apart, with no joint within 24 inches of corner or intersection.
   2. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

E. Anchor sheet-metal flashing and trim and other components of Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required.
   1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners

F. Soldered Joints: All seams of copper and lead coated copper materials shall be soldered. Soldering shall be done in accordance with the recommendations in ‘Copper and Common Sense’. All soldered seams must be soldered with an iron. The use of torches without an iron is reason for immediate rejection of all soldering work. All soldered seams on inclined surfaces shall be laced after seam is fully sweated.

G. Seal all cut edges of self-adhered membrane underlayment with manufacturer’s recommended compatible sealant or mastic.

3.4 CLEANING

A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.

B. After completing sheet-metal Work:
   1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
   2. Repair surfaces stained, marred, or otherwise damaged during roofing Work.
   3. Clean up debris and surplus materials and remove from Site.
3.5 PROTECTION

A. Protect sheet-metal flashings and trim from damage and wear during remainder of construction period.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. This Section includes joint sealants for following applications, including those specified by
reference to this Section:
   1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:
      a. Perimeter joints between masonry and louvers.
      b. Sealant joint at steel window sills.
      c. Lead Weathercaps set in sealant.
      d. Pounded lead wool reglet joints.
      e. Other joints as indicated on drawings.

B. Related Sections include the following:
   1. Division 4 Sections
   2. Division 7 Sections

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product and related products indicated. Product data
should include material descriptions, installation instructions, and manufacturer’s
recommendations and specifications.

B. Samples for Initial Selection: Manufacturer’s color charts consisting of strips of cured sealants
showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples
with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material
matching the appearance of exposed surfaces adjacent to joint sealants.

D. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made
under sample submittals and to demonstrate aesthetic effects and set quality standards for
materials and execution:
   1. Joints in mockups of assemblies specified in other Sections that are indicated to receive
      elastomeric joint sealants, which are specified by reference to this Section.
   2. Contractor shall install each type of backing material, sealant, primer and other related
      products including lead weathercaps and pounded lead wool at the building for
evaluation. The sample shall be accessible or located as indicated by the Owner or
      Owner’s Representative. The mock-up(s), when approved by the Owner or Owner’s
      Representative, shall become the standard for the duration of the contract.
   3. No joint-sealant installation shall be performed on the building (structure), until the
      above specified mock-up is accepted by the Owner’s Representative.

1.3 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

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1. When ambient and substrate temperature conditions are outside below 40 degrees F (5 degrees C), or expected to be below 40 degrees F within 12 hours.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
5. When joint preparation, which may include cleaning substrate surfaces, removing inclusions, and repairing substrate surfaces have not been performed or performed adequately.

PART 2 PRODUCTS

2.1 MANUFACTURERS
   A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL
   A. Compatibility: Provide joint sealants, backings, primers 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 on similar projects, preconstruction testing for this project and field experience.

2.3 ELASTOMERIC JOINT SEALANTS
   A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each cured single- or multicomponent cold applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
   B. Joint Sealant in Contact with Masonry: Single-component, Non-sag, Non-staining Silicone Sealant to be used at non-paintable surfaces. Provide the following or approved equal.
      1. 756 Silicone Building Sealant, manufactured by Dow Corning Corporation. Color selected by Owner or A/E.
   C. Metal/Glass Joint Sealant: Silicone, Grade NS, Type S, Class 50 conforming to ASTM C920. Provide the following or approved equal.
      1. 795 Silicone Building Sealant, manufactured by Dow Corning Corporation. Color selected by Owner or A/E.

2.4 JOINT-SEALANT BACKING
   A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.


D. Bond-Breaker Tape: Polyethylene tape or other plastic tape 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 three-sided adhesion. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

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 joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.


D. Lead Wool: Long Island Tinsmith Supply Corp. (LITSCO) 76-11 88th Street, Glendale, New York 11385 Contact: Alan Most tel: (800) 221-0101

E. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

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 affecting joint-sealant performance. Installation of sealant materials constitutes the Installer’s acceptance of the joint conditions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer’s written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including 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, moisture, surface dirt, and frost.
Verify that substrates are dry. Provide measures to prevent the wetting of the joint substrates prior to the installation of the sealant.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
   a. Concrete.
   b. Masonry.
   c. Wood products.

3. Remove laitance and form-release agents from concrete.

4. Clean 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. Nonporous joint substrates include the following:
   a. Metal.
   b. Glass.

B. Joint Priming: Prime joint substrates based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer’s written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces. Substrates should be primed prior to the installation of the backer rod.

C. Masking Tape: Use masking tape where required 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 written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Use the proper size backer rod. Do not braid multiple back rods together to form a larger diameter backer rod.
   4. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
   5. Install backer rod with a device that will provide a consistent depth between the face of the substrate and the outer surface of the backer rod. Adjustable tools are available for installing backer rod to various depths.
   6. Use the appropriate sized backer rod for each joint width. Do not place multiple backer rods; or braided backer rods into joints to accommodate joints that are wider than the backer rod on hand.

C. Install bond-breaker tape at back of joints where sealant backings are not used between sealants and backs of joints.
D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Joints should be tooled with a concave surface, compressing the sealant into the joint.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3.4 INSTALLATION OF LEAD WEATHERCAPS

A. Install lead T Caps in full compliance with manufacturer’s printed instructions. Select type and size according to manufacturer’s recommendations.
   1. Rake back and cut out joint to a depth to accommodate backer rod and T cap + 1/4 inch.
   2. The raked joint and adjacent stonework shall be clean, dry and free of all mortar, dust and old caulking or sealant. Prepare as per normal sealant joint as specified above.
   3. Mark off width of selected T cap on stone and apply masking tape prior to installation.
   4. Notch, pre-fit, and contour T cap in stone. Lift out and prime same as required.
   5. Seat backer rod at specified depth. Prime stone as required.
   6. Fill joint solidly to an excess of 1/8 inch above adjacent masonry surface. Seat pre-contoured T cap and press down to a firm bed so that bonding grooves on the underside are solidly filled and no voids exist.
   7. Strip off excess sealant and, when set, remove masking tape.

B. Install type ‘A’ lead T caps at all cross joints on horizontal ledge, cornice, and parapet locations indicated on the Drawings. Carry T caps down at least one inch onto vertical front faces or to first change in contour if within three inches.

C. Install type ‘B’ lead T caps at joints between horizontal and vertical masonry surfaces where indicated on the Drawings.

3.5 INSTALLATION OF POUNDED LEAD WOOL REGLET FILLER

A. Install pounded lead wool filler at upward facing reglets where indicated on Drawings.
   1. Cut out reglet to depth and width indicated and install metal flashing with lead wedges.
   2. Pound in lead wool rope, one strand at a time. Use heavy mallet and steel wedge to pound lead wool until it melds into solid joint fill.
   3. Repeat, fully pounding and melding each strand before starting on another.
   4. Fill joint solidly to an excess of 1/8 inch above adjacent masonry surface.

3.6 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
3.7 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION
SECTION 08 63 00

ALUMINUM-FRAMED SKYLIGHTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes the removal of the existing skylight and the furnishing and installation of a new, hurricane resistant, hip end skylight; with a double faced, insulated sill.

B. Related Sections:
   1. Section 07 31 50 - Slate Shingles
   2. Section 07 52 20 - Sheet Metal and Flashings
   3. Section 07 92 00 - Joint Sealants

1.2 REFERENCES


B. American Architectural Manufacturers Association (AAMA):
   1. ANSI/AAMA 101-03: Architectural Aluminum Manufacturers Association, 2700 River Road, Des Plaines, Illinois 60018
   3. AAMA 501.2-03, “Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems”.
   7. AAMA 612 - Voluntary Specifications and Performance Requirements and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Coatings on Architectural Aluminum, for Finishes such as Anodized Plus.


D. American Society for Testing and Materials (ASTM):
   1. ASTM C1036 - Flat Glass.
   2. ASTM C1048 - Standard specification for Heat -Treated Flat Glass Kind HS, Kind FT Coated and Uncoated Glass.
   4. ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors.
   6. ASTM E331 - Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
7. ASTM E783 - Field Measurement of Air Leakage through Installed Exterior Windows and Doors.
8. ASTM E1105 - Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
10. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.


G. Insulating Glass Certification Council (IGCC): Classification of Insulating Glass Units.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
   1. Deflection exceeding specified limits.
   2. Thermal stresses transferred to the building structure.
   3. Skylight framing members transferring stresses, including those caused by thermal and structural movement, to glazing.
   4. Noise or vibration created by thermal and structural movement and wind.
   5. Weakening of fasteners, attachments, and other components.

B. Deflection Limits: As follows:
   1. Deflection of the entire length of framing members in direction normal to glazing plane is limited to 1/175 of clear span, up to 1 inch maximum.
   2. The deflection of a framing member in a direction parallel to the plane of glass, when carrying its full dead load, shall not exceed an amount which will reduce the glass or panel bite below 75% of the design dimension and the member shall have a 1/8-in. minimum clearance between itself and the edge of the fixed panel, glass, or component immediately adjacent, nor shall it impair the function of or damage any joint seals.

C. Lateral Support: Compression flanges 75% of flexural members requiring lateral be laterally braced by cross members with minimum depths equal to flexural member depth and by anchors to the building structure. Glazing material does not provide lateral support.

D. Structural Loads: Provide metal-framed skylights, including anchorage, capable of withstanding the effects of the following design loads when supporting full dead loads:
   1. Roof Loads
      a. Concentrated Load: 250 lb applied to framing members at location that produces the most severe stress or deflection.
      b. Snow Loads: 30 psf.
d. Wind Loads: -65 psf


E. Thermal Movement: Provide metal-framed skylights that allow for thermal movements resulting from the following maximum change (range) in ambient temperatures by preventing buckling, sealant failure, and other detrimental effects.
1. Temperature Change (Range): 100 deg F ambient; 150 deg F material surfaces

F. Air Infiltration: Provide metal-framed skylights with maximum air leakage of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of surface when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24lb/sq. ft. (300 Pa).

G. Water Penetration: Provide metal-framed skylights that do not evidence water penetration when tested according to ASTM E 331 at a minimum differential static pressure of 20 percent of positive design wind pressure, but not less than 12 lb/sq. ft. (584 Pa).

H. Energy Performance:
1. Average U-factor of the skylight shall not exceed 0.50 BTU/sf x hr x °F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient of the skylight shall not exceed 0.40 as determined according to NFRC 200.
3. The skylight shall have certified and labeled performance ratings according to NFRC.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal-framed skylights.

B. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, flashing and drainage provisions, expansion provisions, and attachments to other work.
1. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.
2. Include structural analysis data signed and sealed by the qualified professional engineer, licensed in the State of Connecticut, responsible for their preparation.
3. Include flashings, insulation, etc. that may not be provided by skylight installer but is in contact with or in close proximity to the skylight.

C. Samples for Initial Selection: Manufacturer's color charts consisting of sections of units showing the full range of colors available for factory-finished aluminum.

D. Submit samples of selected aluminum finish on minimum 4 inch by 3 inch sheet of aluminum.

E. Submit 12 inch by 12 inch samples of insulated glass.

F. Submit sealant color chart and product data.

G. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

H. Product Test Reports: From a qualified testing agency indicating skylights comply with requirements, based on comprehensive testing of current products.
I. Submit as-built drawings, cleaning and maintenance manual upon completion of skylight installation.

1.5 QUALITY ASSURANCE

A. Work of this Section, including design, engineering, fabrication, finishing, preparation at the job site, erection and glazing of the skylight system shall be the responsibility of the skylight manufacturer. The manufacturer shall be regularly engaged in the preceding phases of construction of skylights and able to demonstrate that he has performed successfully on comparably sized projects and of comparable design complexity over at least the previous ten (10) years.

B. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of metal-framed skylights required for this Project.

1.6 DELIVERY, STORAGE AND HANDLING

A. Package and store materials in a manner that shall prevent damage, contamination, distortion, breakage or structural weakening.

B. Units and related components shall not be staged more than one week in advance of installation in order to avoid damage by other trades. Units shall not be uncrated more than one day in advance of installation.

C. Replace any material damaged during manufacture, shipping, storage or erection.

D. Protect the installed skylight from damage by other trades.

E. Protection materials, such as plastic membrane tapes and adhesive sheeting, shall be suitable for the intended protection application and protection period.

F. Protection materials shall be installed in a manner that will not trap harmful moisture or otherwise contaminate the Work in any way.

1.7 WARRANTY

A. The system shall be warranted for a period of ten years from the date of substantial completion against leakage, defective design and defective materials.

B. Manufacturer’s Special Warranty for Fully Tempered Glass:
   1. Written warranty in which fully tempered glass manufacturer agrees to furnish replacements for glass units that do not meet the requirements of ASTM C1048 or that break as a result of nickel-sulfide inclusions within the specified warranty period.
   2. Warranty Period: 10 years from date of Substantial Completion

C. Manufacturer’s Special Warranty for Laminated Glass:
   1. Written warranty in which laminated glass manufacturer agrees to furnish replacements for laminated glass units that develop edge separation, delamination materially obstructing vision through the glass, and blemishes exceeding those allowed by the referenced laminated glass standard within the specified warranty period. Evidence of failure is the obstruction of vision by dust, moisture, or film-formation on the internal surfaces of the laminated assembly.
2. Warranty Period: 10 years from date of Substantial Completion

D. Manufacturer’s Special Warranty for Insulating Glass:
   1. Written warranty in which insulating glass manufacturer agrees to furnish replacements for
      insulating glass units whose hermetic seal has failed within the specified warranty period.
      Evidence of failure is the obstruction of vision by dust, moisture, or film on interior
      surfaces of glass.
   2. Warranty Period: 10 years from date of Substantial Completion

E. Special Finish Warranty: Manufacturer’s standard form in which manufacturer agrees to repair
   or replace components on which finishes fail within specified warranty period. Warranty does not
   include normal weathering.
   1. Warrant that the finish coating shall not peel, check, chip, crack, chalk or change color.
   2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the
   following:
   1. Kawneer North America; an Alcoa company.
   2. Linel Architectural Glass and Metal Solutions.
   4. Wasco Products, Inc.

2.2 FRAMING SYSTEMS

A. Framing Members: Extruded aluminum alloy 6063-T6, ASTM B221 with minimum effective
   thickness of 0.100 inches.

B. Exterior Pressure Caps: Extruded aluminum alloy 6063-T6, ASTM B221 with minimum
   effective thickness of 0.090 inches. In addition, provide custom copper cap to match existing
   skylight.

C. Concealed Flashing: Manufacturer’s standard corrosion-resistant, non-staining, non-bleeding
   flashing; compatible with adjacent materials.

D. Exposed Flashing and Closures: Aluminum sheet alloy and temper of 1100-H14, thickness as
   require for proper performance.
   1. Minimum Thickness: 0.032 inch Flashings.
   2. Minimum Thickness: 0.090 inch Closures.

E. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with
   nonstaining, nonferrous shims for aligning skylight components.

F. Fasteners and Accessories: Manufacturer’s standard, corrosion-resistant, nonstaining,
   nonbleeding fasteners and accessories compatible with adjacent materials.
   1. At pressure caps, use ASTM A 193/A 193M stainless-steel screws.
   2. Use self-locking devices where fasteners are subject to loosening or turning out from
      thermal and structural movements, wind loads, or vibration.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

G. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

H. Glazing Gaskets: Manufacturer’s standard.

I. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neutral-curing silicone formulation compatible with structural sealant and other components with which it comes in contact; and recommended in writing by weatherseal-sealant and metal-framed skylight manufacturers for this use.

2.3 GLAZING

A. Glazing: Insulating Glass: 1-5/16 inch consisting of 1/4 inch clear tempered exterior lite with low-e coating on no. 2 surface, 1/2 inch sealed air space and 9/16 inch clear heat strengthened laminated safety glass interior lite with .060 PVB interlayer.

B. Spacers, Setting Blocks, and Gaskets: Manufacturer’s standard elastomeric types.

C. Bond-Breaker Tape: Manufacturer’s standard tetrafluoroethylene-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

D. Glazing Sealants: As recommended in writing by manufacturer.

2.4 INSULATION:

A. Rigid Insulation:
   1. Rigid extruded polystyrene insulation board meeting ASTM C578, 25 psi minimum compressive strength. Provide 2 inches minimum thickness unless indicated otherwise. Provide sizes to fit specific panel applications.

B. Batt Insulation:
   1. Provide fiberglass batt insulation meeting ASTM E84 with a maximum flame spread index of 25 and smoke developed index of 50. Size to fill areas as shown on drawings.

2.5 FABRICATION

A. Where practical, fit and assemble metal-framed skylights in manufacturer’s plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Fabricate aluminum components before finishing.

C. Fabricate aluminum components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
D. Fabricate aluminum sill closures with weep holes and for installation as continuous component.
E. Reinforce aluminum components as required to receive fastener threads.
F. Weld aluminum components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

2.6 ALUMINUM FINISHES

A. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.
   1. Color and Gloss: As selected by Architect from manufacturer’s full range.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect building interior from falling debris, dust and weather at all times during removal of the existing and installation of the new skylight.

3.2 EXAMINATION

A. Prior to starting installation, the skylight erector shall inspect related construction to verify that they are properly prepared in accordance with the approved shop drawings.
B. Should any conditions be found that may prohibit proper execution of the Work, immediately notify the Architect in writing of these conditions. Installation shall not proceed until remedial action, acceptable to the Architect, has been executed.

3.3 INSTALLATION

A. General:
   1. Comply with manufacturer’s written instructions.
   2. Do not install damaged components.
   3. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
   4. Rigidly secure non-movement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
   7. Seal joints watertight unless otherwise indicated.
B. Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with protective coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
C. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.
D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.

E. Install components plumb and true in alignment with established lines and elevations.

F. Erection Tolerances: Install metal-framed skylights to comply with the following maximum tolerances:
   1. Alignment: Limit offset from true alignment to 1/32 inch (0.8 mm) where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches (76 mm); otherwise, limit offset to 1/8 inch (3.2 mm).
   2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3.2 mm in 3.7 m) but no greater than 1/2 inch (13 mm) over total length.

G. Field Glazing: Locate and size extruded elastomeric setting blocks and spacers in accordance with the glazing manufacturer’s recommendations. At no point shall the glazing come in contact with the skylight frame or fasteners.

H. Install secondary-sealant weather seal according to sealant manufacturer’s written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Provide up close interior and exterior access to permit a qualified testing agency to perform tests and inspections.
   1. Water-Spray Test: Before installation of interior finishes has begun, skylights shall be tested according to AAMA 501.2 and shall not evidence water penetration.

B. Replace materials that do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor’s expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.5 PROTECTION, CLEANING, AND ACCEPTANCE

A. Protect the skylight from any material, equipment or practices that may impair the functioning, appearance or durability of the skylight or other construction.

B. Remove and replace any portion of the skylight that has been damaged by other trades. All rejected or damaged material shall be promptly removed from the site.

C. Acceptance of the completed installation of the skylight requires the installation be sound, watertight and free from defects of materials and workmanship.

D. Immediately prior to completion of the Work, completely clean the entire skylight as follows:
   1. Clean all components of the Work as per the recommendations of the specific product manufacturer.
   2. Clean the skylight from the top most levels down in order to avoid staining of cleaned surfaces from cleaning solution residue and run-off.
E. Clean glass with approved glass cleaning solutions only and ensure that cleaning solution is completely removed from the surface after cleaning. Do not clean glass when it is exposed to direct sunlight.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. This section includes:
   1. Preparation and painting of existing steel railings and security grates.

1.2 REFERENCES

   1. The Society for Protective Coatings (SSPC)
      b. SP 1: Solvent Cleaning.
      c. SP 2 Hand Tool Cleaning
      d. SP 3 Power Tool Cleaning
      e. Vis 1: Standard Pictorial Surface Preparation Standards for Painting Steel Surfaces.

1.3 SUBMITTALS

A. Product Data: Coating manufacturer’s literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; mixing and application instructions; safety precautions for handling, storing, applying, and disposing of materials; and instructions for protecting surrounding areas from overspray. Include:
   1. Surfaces to which materials will be applied.
   2. Certification by coating manufacturer that products supplied comply with local VOC regulations.
   3. Coating manufacturer’s color chart showing full range of colors available.
   4. Decoding information to verify shelf life of materials.
   5. Material Safety Data Sheets for information only.

B. Sample Warranty: Copy of Contractor’s warranty, stating obligations, remedies, limitations, and exclusions.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Experienced firm that has successfully completed coating work similar in material, design, and extent to that indicated for Project; and that is approved by coating manufacturer to apply coating. Must have successful applications of specified materials in local area in use for minimum of 5 years.
   1. Employ foreman trained with minimum 5 years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during course of Project except for reasons beyond control of Applicator; inform Architect/Engineer in advance of any changes.
   2. Painters Qualifications: A minimum of 5 years’ experience in the preparation and coating of steel.
B. Architect/Engineer will periodically observe progress, evaluate quality, and perform tests of the coating.

C. General
1. Review specifications for requirements affecting Work of this trade. Conflict between these specifications and coating manufacturer’s requirements or specifications, or other pertinent specifications, shall be immediately brought to the attention of the Architect/Engineer in writing. The more stringent requirement shall govern the work unless approved by the Architect/Engineer.
2. Do not apply materials from different manufacturers to the same component unless approved by all of the different manufacturers. Provide materials that are not available from the manufacturers from sources recommended and approved in writing by the manufacturers.
3. Work in-place may be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work.
4. Only prepare enough surface area that can meet the surface preparation requirements and be coated in the same day.

D. Field Quality Control
1. Do not apply any coatings when measurements, observations, readings, etc. are not in conformance to manufacturer’s written instructions.
2. Measure and record on daily inspection reports:
   a. Pre-surface preparation for obvious defects and contamination to be removed in accordance with the specified preparation.
   b. Measure surface temperature using a surface thermometer prior to the application of any coating and at least once every 2 hours during application. No coating shall be conducted if temperature is outside the range provided in the manufacturer’s written instructions.
   c. Air temp, relative humidity and dew point recorded before application of any coating and at least once every 2 hours during application if readings are not in conformance to manufacturer’s written instruction, no coating shall be conducted.
   d. Painter shall confirm wet film thickness of intermediate and finish coats taken randomly using a notched gauge at least once every element or at least 20 linear feet in accordance with ASTM D1212.

E. Use SSPC-Vis 1 - “Standard Pictorial Surface Preparation Standards for Painting Steel Surfaces” to evaluate surface preparation.

F. Adhesion - Architect/Engineer may measure coating adhesion as deemed necessary throughout the project.

G. Repair any areas damages as a result of testing of the coating by Architect/Engineer.

H. Mockups: Prepare surface and apply coating system to representative member designated by Architect/Engineer to demonstrate surface preparation, aesthetic affects, and quality of materials and execution.
   1. Size and location of the mock-ups shall be determined by the Architect/Engineer.
   2. Owner may, at its expense, verify coating thickness and perform adhesion and pull-off tests. Contractor shall, at no cost to Owner, repair coating and substrate damaged by testing.
3. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Pay for additional testing requested by Owner. Do not proceed with coating Work until mockup is approved.
4. Approved mockup will be acceptance standard for remainder of coating Work.
5. Approved mockup may become part of completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading: Deliver materials to job site in original, new, and unopened packages and containers bearing the manufacturer’s name and label and batch numbers.

B. Acceptance at Site: Damaged or deteriorated materials shall be clearly identified and not used on this Project. Promptly remove rejected and non-complying materials from the premises.

C. Storage and Protection: Store materials in tightly closed containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 40 degrees Fahrenheit and not more than 95 degrees Fahrenheit, unless required otherwise by manufacturer’s instructions. Storage area shall be protected from exposure to direct sunlight, heat, sparks, flames, and weather.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Store containers so manufacturer’s labels are clearly displayed.
   3. Remove rags and waste from storage areas daily.

D. Waste Management and Disposal: Comply with applicable safety codes and regulations that govern the work, including Occupational Safety and Health Administration (OSHA), State OSHL (Occupational Safety and Health Law), and Environmental Protection Agency (EPA) regulations covering waste and wastewater disposal and VOC content.

1.6 PROJECT CONDITIONS

A. Equipment, material, and appliances required for completion of Work, shall be so located and operated as to provide for maximum efficiency, public safety, persons employed at the site, and to prevent damage to new and existing construction, in accordance with the Contractor’s safety plan, OSHA, and applicable safety codes and regulations.

B. Confine operations at Project site to areas permitted by laws, permits, contract, the Owner, and Contractor’s safety plan.

C. Assume full responsibility for protection and safekeeping of products stored on premises, and for their proper use.

D. Provide Architect/Engineer with access to the Work.

E. Where conditions are uncovered that is not anticipated by the specifications, notify Architect/Engineer in writing immediately, before work is initiated.

1.7 JOB SITE REFERENCES

A. Maintain at least one copy of each referenced standard and this Specification at the job site.
B. Maintain on site MSDS and manufacturer’s product and application data sheets for each coating material, thinner, cleaner, and solvent intended for use.

1.8 SEQUENCING AND SCHEDULING

A. Schedule application of coatings so that Work performed by other trades or on surfaces adjacent to area of Work of this Section is complete. Assure that this Work does not affect the performance or final appearance of Work in this Section.

B. Protect areas not to be coated.

C. Remove sealant.

D. Prepare surface to be painted

E. Apply coating

F. Install sealant after coating has cured 24 hours, or cure time recommended by manufacturer prior to recoating.

1.9 WARRANTY

A. Contractor Warranty:
   1. Written warranty, signed by Contractor, including:
      a. Repair or remove and replace coating that does not comply with requirements; that fails in adhesion, cohesion, or general durability; that cracks, checks, fades, or chalks; where visible rust occurs; or that deteriorates in manner not clearly specified by submitted coating manufacturer’s data as inherent quality of material for application indicated.
      2. New coating shall closely match color of existing coating. Extend new coating to reveals, surface edges, or other natural termination points to minimize differences in appearance between new and existing coating.
      3. Warranty includes:
         a. Adhesive or cohesive failure of existing coating that remains in place.
         b. Providing access to warranty work.
         c. Necessary surface preparation work.
      4. Warranty Period: 2 years after Substantial Completion date.

PART 2 PRODUCTS

2.1 COATINGS

A. Material Compatibility:
   1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. Provide products of same manufacturer for each product in coating system or provide written approval by all manufacturers for the system.

B. Colors: As selected by Owner.

C. Gloss: As selected by Owner.
D. Use contrasting colors for each coating.

2.2 COATINGS

A. Provide one of the following systems, or approved equal:
   1. Tnemec Company, Inc.
      a. Primer: Series 135 Hi-Build Epoxoline II, 7.0 - 9.0 mils DFT
      b. Intermediate Coat: Series 73, 2.0 - 3.0 mils DFT
      c. Finish Coat: Series 73, 2.0 - 3.0 mils DFT
   2. Sherwin Williams:
      a. Primer: Macropoxy 646 Fast Cure Epoxy (5 to 8 mils DFT).
      c. Finish Coat: DTM Acrylic (4 mils DFT).

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Inspector for compliance with requirements and conditions affecting performance of work.
   1. Atmospheric Conditions: Follow manufacturer’s directions for allowable atmospheric conditions. Do not apply coatings if the following variables are likely to exceed or fall short of manufacturer’s parameters.
      a. Measure dew point with a psychrometer or other suitable instrument prior to application.
      b. Perform surface temperature readings on substrate to receive coating prior to application. Do not apply if surface temperature is outside specification requirements.
      c. Measure ambient air temperature and relative humidity in area of work prior to coating application. Do not apply if ambient air temperature and relative humidity is outside manufacturer’s parameters.
   2. Verify compatibility with and suitability of substrates, including compatibility with and durability of existing finishes or primers.
   3. Do not proceed with work prior to written approval of test samples.
   4. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   5. Coating application indicates acceptance of surfaces and conditions by the contractor.

3.2 PREPARATION

A. Protection
   1. Protect existing construction and work in place from damage resulting from operations related to the Work including removals, reinstallation, and the storage, preparation, handling, and application of coating materials.
   2. Exercise caution in performing Work so as not to damage other building and site elements. Protect the building and site elements from damage.
   3. In areas where coating systems are to be applied, protect surrounding construction, including existing windows, facade, and sidewalks, from drippage or other effects of coatings.
   4. Materials damaged by coating process shall be repaired to the satisfaction of the Owner without additional cost to the Owner.
5. Protection materials shall be carefully and thoroughly removed upon completion of Work.

6. Workers, pedestrians, animals, plants, vehicles, other property, etc.
   a. Work required in this Section includes use of chemicals that can harm workers, pedestrians and other persons, animals, plants, and damage vehicles, other property, street furniture, and other persons and objects that are vulnerable to damage by coating operations.

7. Damage to adjacent property, buildings, vehicles, site features, etc., caused by coating operations shall result in no additional cost to the Owner.

B. General:
1. Remove items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before proceeding with surface preparation and coating.
2. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
3. Protect the existing coating systems applied to components that are not to be abrasive blasted. Use suitable rigid materials adequate to tightly cover existing coatings and resist the effects of abrasive blasting without damage to the existing coatings.
4. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and coatings.
5. Prior to painting remove all abrasive, dust, and paint residue from surfaces with commercial grade vacuum cleaner with a brush-type cleaning tool.
6. Clean using methods recommended in writing by coating manufacturer.
7. Coating damaged during transportation or handling shall be touched up and restored.

C. Surface Preparation
1. Remove grease, oil, dirt, and other surface contaminants from areas to be painted, in accordance with SSPC-SP 1.
2. Prepare areas of flaking paint and corrosion in accordance with SSPC SP2 and SSPC SP3 at a minimum.
3. Remove all dust, and paint residue from surfaces to be painted.

3.3 APPLICATION
A. Apply coatings according to manufacturer’s written instructions.
B. Spot prime areas of bare metal.
C. If undercoats or other conditions are visible through final coat, apply additional touch-ups until cured film has a uniform coating finish, color, and appearance.
D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, bubbles, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL
A. Allow Architect/Engineer access to observe progress and quality of portion of completed Work.
B. Permit Architect/Engineer to conduct tests on coated surfaces. Tests will be performed to
determine if coatings are being applied according to manufacturer’s instructions and approved
field samples.
1. Recoat rejected area without additional cost to Owner if Architect/Engineer determines
that coated surfaces are noncompliant to manufacturer’s instructions and approved field
samples.
2. Repair areas tested by Architect/Engineer.

3.5 CLEANING

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from
Project site.

B. Immediately clean up spatter, spillage, and misplaced paint to restore affected area to its
original condition. Do not scratch, damage, or deface adjacent finished surfaces.

C. At completion of Work, promptly remove from Project site materials, supplies, equipment,
debris, and rubbish from Work performed under this Section. Leave area of work in a clean
condition acceptable to Owner.

D. At completion of construction activities of other trades, touch up and restore damaged or
defaced coated surfaces.

E. Clean equipment according to manufacturer’s instructions at the end of a painting application
shift.

3.6 PROTECTION

A. Protect Work of other trades against damage from coating operation. Correct damage by
cleaning, repairing, replacing, and recoating, as approved by the Owner, and leave the site in an
undamaged condition.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY
A. The principal items of work are related to removal and replacement of existing roof drains, installation of new drains at new locations, work called for by the Drawings, and performing other work necessitated by these operations, including roof deck cutting and patching resulting from these operations.

1.2 RELATED WORK
A. Section 07 50 30 - Modified Bitumen Roofing
B. Section 07 21 00 - Roof Insulation
C. Section 02 42 00 - Selective Demolition

1.3 SUBMITTALS
A. Submit list of all materials proposed for use. Submit technical data sheet for each manufactured product.

1.4 QUALITY ASSURANCE
A. All work shall be performed by journeymen skilled in the particular task being performed. Where licensing is required such journeymen shall hold valid licenses.

1.5 REFERENCE STANDARDS
B. Cast Iron Soil Pipe Institute:
C. American National Standards Institute:
1.6 DELIVERY, HANDLING AND STORAGE

A. Handle products carefully to avoid damage to hubs, ends or roof drain components.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Pipe and fittings shall be Service Class, gray cast iron.
   1. Pipe for replacement of existing pipe shall match size of existing.
   2. Pipe ends shall be hubless.

B. Jointings:
   1. Lead/Oakum caulked joints at drain bowl connection shall comply with governing regulations for use in the service required.
   2. Hubless jointings, complying with CISPI 310-90: No-Hub Coupling Assembly, manufactured by Tyler Pipe/Soil Pipe Division, sized to fit the application.

2.2 ROOF DRAINS

A. Drains:
   1. Zurn Z100 15 inch diameter roof drain
   2. Approved Equal

B. Diameter of drain outlet: Match diameter of existing leaders.

C. Drain components and accessories:
   2. Flashing Clamp.
   3. Under-Deck Clamp
   4. Sump Receiver Pan

D. Outlet shall be Inside Caulk using lead and oakum.
   1. Inside rubber gasket connections for hub and spigot pipe ends are not permitted.

2.3 ACCESSORY MATERIALS

A. Pipe insulation: Match existing on adjacent similar pipe.

PART 3 EXECUTION

3.1 GENERAL

A. Perform removal of existing and installation of new drains from above and below the deck to complete the required operations.

B. Coordinate with the Owner when interior access for drain work is necessary. Notify the Owner 48 hours prior to such work.
C. Extreme care shall be taken not to damage interior finishes in any way. If damaged, the Contractor shall make all repairs required to the acceptance of the Owner at no expense to the Owner.

3.2 ROOF DRAIN INSTALLATION

A. Remove existing roof drains and receiver pans.
   1. Remove vertical leader to next connection only if necessary.

B. Fasten new receiver pan in place.
   1. Set new drain in place level with the metal deck using a new sump receiver and secure in place with underdeck clamp.

C. Furnish and install the flashing clamp and dome of the drain.

3.3 PIPING OF ROOF DRAIN - LEAD JOINTS

A. For connection between drain bowl and outlet pipe.

B. Tightly pack the joint with Oakum. Do not permit packing to enter bore of the finished joint. Clean joint after packing.

C. Fill remaining joint space with one pouring of lead to a minimum one-inch depth measured from face of bell. Surface shall not be depressed more than 1/8-inch below the rim of the hub. After lead has cooled, caulk joint tightly with hammer and caulking iron.

3.4 PIPING OF ROOF DRAIN - NO-HUB COUPLING

A. For connection between outlet pipe and existing drain line.

B. Clean the external surface of the ends of the pipe and/or fitting to be joined so they are free of foreign material.

C. Install the no-hub coupling in accordance with manufacturer's instructions, summarized below.
   1. Place the gasket on the end of one pipe or fitting and the stainless steel clamp assembly on the end of the other pipe or fitting.
   2. Firmly seat the pipe or fitting ends against the integrally molded shoulder inside the rubber gasket.
   3. Slide the clamp assembly into position over the gasket and tighten the bands as described below.
   4. Torquing Bands: Use a properly calibrated torque wrench, set at the torque recommended by the coupling manufacturer.

3.5 PIPING OF ROOF DRAIN - PIPE INSTALLATION

A. Remove vertical leader to next connection and install new pipe section to connect drain to drainage piping.
3.6 CLEANING DRAIN LEADERS
A. Upon completion of drain replacement and tie-in to the roofing system, conduct cleaning of drain lines to ensure any blockages or narrowing of the drain leaders have been cleared.
B. Cleaning shall be done by a professional plumbing contractor using specialized equipment specifically designed for drain cleaning by hydro jetting and/or rooting.
C. Upon completion of cleaning, contractor shall certify that drains have been cleaned. The contractor shall report to the Owner/Architect/Engineer any deficiencies with the roof leader plumbing system that might affect drainage or flow of water through the drainage system.

3.7 WATER TEST
A. Water test new piping and joints upon completion of drain installation.
   1. Plug drain line at nearest location in existing pipe that was unaffected by drain replacement.
   2. Fill pipe with water and let stand for minimum two hours.
   3. Check for leaks.
   4. If leaks occur, disassemble and form new joint prior to retesting. Repeat steps 1-3 above until the installation is leak free.

3.8 CLEANING
A. Keep the roof clean of rubbish and unused materials. At the end of each day's work remove all rubbish, debris and surplus materials caused by the work of this Section.

END OF SECTION