

**PROJECT MANUAL
ROOF REPLACEMENT
PROJECT NO: DEN.2019.001093**

at

**POUDRE SCHOOL DISTRICT'S:
CACHE LA POUDRE MIDDLE SCHOOL**

Prepared for:

**Poudre School District R-1
2445 LaPorte Avenue
Fort Collins, Colorado 80521**



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Denver, Colorado 80222
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**Publication Date: March 2020
100% Construction Documents**

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PART 1 - GENERAL

1.1 DOCUMENTS UNDER ENGINEERING SEAL.

- A. The documents listed within Section 000010 – Table of Contents are covered under seal of the Engineer of Record.

Number Title

INTRODUCTORY INFORMATION

00 0001 PROJECT MANUAL COVER PAGE
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DIVISION 01 – GENERAL REQUIREMENTS

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LIST OF DRAWINGS – “POUDRE SCHOOL DISTRICT R-1 ROOF RECOATING PROJECT”

DRAWING NUMBER	TITLE	DATE
R-100	COVER SHEET	03/2020
R-101	KEY NOTES	03/2020
R-300	ROOF PLAN	03/2020
R-500	ROOF DETAILS	03/2020
R-501	ROOF DETAILS	03/2020
R-502	ROOF DETAILS	03/2020
R-503	ROOF DETAILS	03/2020

1.2 Architect of Record:

1. Robert Kit Piane, AIA, NCARB, LEED Green Associate, Amtech Solutions, Inc., 1720 South Bellaire Street, Suite 1200, Denver, Colorado 80222 – (303) 738-0823

1.3 Engineer of Record:

1. Sara Johnson, P.E., Amtech Solutions, Inc., 1720 South Bellaire Street, Suite 1200, Denver, Colorado 80222 – (303) 738-0823



END OF SECTION 00 0010

SECTION 01 1000
STATEMENT OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Project Contacts.
 - 2. Work covered by the Contract Documents.
 - 3. Work under other contracts.
 - 4. Use of premises.
 - 5. Owner's/Tenant's occupancy requirements.
 - 6. Work restrictions.

1.3 PROJECT CONTACTS

- A. Project Identification:
 - B. **Poudre School District R-1 – Roof Recoating Project**
Amtech Project Number: DEN.2019.001093
2445 La Porte Avenue
Fort Collins, Colorado 80521
- C. Owner's Representative:
 - To Be Determined
 - Poudre School District R-1**
2445 La Porte Avenue
Fort Collins, Colorado 80521
Office Phone: (970) 490-3545
- D. Design Professional:
 - Robert Kit Piane, AIA, NCARB, LEED Green Associate
Denver Branch General Manager
 - Amtech Solutions, Inc.**
1720 South Bellaire Street, Suite 1200
Denver, Colorado 80222
Office Phone: (303) 738-0823

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work generally consists of the following at the subject school:
 - 1. This project is for a sprayed polyurethane foam roof repair and urethane coating application over the four above mentioned schools. Refer to the Roof Plans and Detail Drawings, as well as Divisions 06 and 07 within the Specifications for roof assembly installation.
- B. Work Generally Consists of the Following:
 - 1. Removal and replacement of existing granulated coating blisters.
 - 2. Removal and replacement of existing “popcorn/ treebark” textured coating.

3. Removal and replacement debonded flashings at clearstory monitors.
4. Installation of a new two-coat granulated urethane coating application.
5. Removal and disposal of unused items as noted by the Owner and where shown on the drawings.

1.5 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 USE OF PREMISES

- A. General: Each Contractor shall have limited use of premises for construction operations, including use of Project site, during construction period. Each Contractor's use of premises is limited only by Owner's/Tenant's occupancy and right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits: Confine constructions operations to building areas where work is indicated and immediately surrounding site areas, as agreed upon by Owner/Tenant.
- C. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.7 OWNER'S/TENANT'S OCCUPANCY REQUIREMENTS

- A. The site and building will be occupied during entire construction period. Cooperate with Owner/Tenants during construction operations to minimize conflicts and facilitate usage. Perform the Work so as not to interfere with users' day-to-day operations. Maintain existing exits, unless otherwise indicated.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner.
 2. Provide not less than 72 hours' notice to Owner of activities that will affect users' operations.

1.8 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed outside the existing building during normal business working hours of:
 1. 7:00 a.m. to 7:00 p.m., Monday through Friday, except otherwise indicated.
 2. Weekend Hours: 8:00 a.m. to 5:00 p.m. Contractor must coordinate with Owner and given approval for both weekend work and interior access if required.
 3. Early Morning Hours: Comply with City Ordinances.
 4. Hours for Utility Shutdowns: Only with Owner's written permission.
 5. Interior Work: As scheduled with Owner and Tenant.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by users or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Consultant and Owner not less than four (4) days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 Design notes

- A. This project is for a recoating over the existing spray polyurethane foam roof system roof assembly, consisting of:
 - 1. A granulated silicone coating, 2-inches of sprayed polyurethane foam insulation, 1/2-inch gypsum hardboard, 2-inches of expanded polystyrene insulation, all over a structurally sloped metal roof deck.
- B. All existing roof layers are to remain in place. The existing surface coating is to be cleaned and prepared for the application of a new 2-coat granulated urethane roof coating. Several roof areas have been observed to have severe blistering and popcorn/trebark texturing within the coating that will need to be repaired. Repairs consist of:
 - 1. Blistering:
 - a. Cut out/remove blisters within the existing coating, prior to new coating application, per design document requirements. Refer to keynote repairs, roof plans, and Detail 3 on sheet R-500.
 - 2. Popcorn/trebark texturing:
 - a. Existing texturing to be scarified prior to new coating application, per design document requirements. Refer to keynote repairs, roof plans, and Detail 2 on sheet R-500.

END OF SECTION 01 1000

SECTION 01 3100**PROJECT MANAGEMENT AND COORDINATION****PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Administrative and supervisory personnel.
 - 2. Project meetings.
 - 3. Requests for Information (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
- B. Prepare memoranda for distribution to all parties involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1.4 SUBMITTALS

- A. Key Personnel Names: Within 7 days of Notice from Owner of Intent to Award Contract, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities and office and cell telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Designer of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Designer, within three work days of the meeting.
- B. Project Kickoff Conference: Schedule a Project Kickoff Conference before starting construction, at a time convenient to Owner and Designer, but no later than 7 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Designer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing and long-lead items.
 - c. Designation of key personnel and their duties.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for RFIs.
 - f. Procedures for testing and inspecting.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Preparation of Record Documents.
 - k. Use of the premises and existing building.
 - l. Work restrictions.
 - m. Owner's occupancy requirements.
 - n. Responsibility for temporary facilities and controls.
 - o. Construction waste management and recycling.
 - p. Parking availability.
 - q. Office, work, and storage areas.
 - r. Equipment deliveries and priorities.
 - s. First aid.
 - t. Security.
 - u. Progress cleaning.
 - v. Working hours.
 3. Minutes: Contractor will record and distribute meeting minutes.
- C. Construction Start Conferences: Conduct a Construction Start Conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Related RFIs.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.

- g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Acceptability of substrates.
 - o. Temporary facilities and controls.
 - p. Space and access limitations.
 - q. Regulations of authorities having jurisdiction.
 - r. Testing and inspecting requirements.
 - s. Installation procedures.
 - t. Coordination with other work.
 - u. Required performance results.
 - v. Protection of adjacent work.
 - w. Protection of construction and personnel.
- 3. Contractor will record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Contractor will distribute minutes of the meeting to all parties of the project.
- 1.6 REQUESTS FOR INFORMATION (RFIs)
- A. Procedure: Immediately on discovery of the need for information/interpretation of the Contract Documents, and if not possible to request information/interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - 1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
 - B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Contractor.
 - 4. Name of Designer.
 - 5. RFI number, numbered sequentially.
 - 6. Specification Section number and title and related paragraphs, as appropriate.
 - 7. Drawing number and detail references, as appropriate.
 - 8. Field dimensions and conditions, as appropriate.
 - 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 10. Contractor's signature.
 - 11. Attachments:

- a. Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - b. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Designer's Action: Designer will review each RFI, determine action required, and return it. Allow three working days for Designer's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Incomplete RFIs or RFIs with numerous errors.
 2. Designer's action may include a request for additional information, in which case Designer's time for response will start again.
 3. Designer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Designer in writing within 5 days of receipt of the RFI response.
- D. On receipt of Designer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Designer within three days if Contractor disagrees with response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Use log with not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Designer.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Designer's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 3100

SECTION 01 3233

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction progress photographs.

1.3 SUBMITTALS

- A. Key Plan:
 - 1. Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and videotape. Indicate elevation or story of construction. Include same label information as corresponding set of photographs and videotape.
- B. Construction Photographs:
 - 1. Submit one PDF format file of each photographic view within seven days of taking photographs. The file name will start with the following:
 - 2. YYYYMMDD-Contractor Name
 - 3. Identification: On each PDF file, provide the following information:
 - a. Name of Project.
 - b. Name of Designer.
 - c. Name of Contractor.
 - d. Date photograph was taken if not date stamped by camera.
 - e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - f. Unique sequential identifier.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images:
 - 1. Provide images in uncompressed JPG format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General:
 - 1. Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted. The lead in picture for a series of pictures shall provide the location and direction of pictures being taken within the building envelope.
- B. Digital Images:

1. Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 2. Date and Time: Include date and time in filename for each image.
- C. Preconstruction Photographs:
1. Before starting construction, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Designer.
 2. Take photographs to show existing conditions adjacent to property before starting the Work.
 3. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs:
1. Take digital photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

END OF SECTION 01 3233

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, Manufacturers' Instructions, and other submittals.

1.3 SUBMITTAL PROCEDURES

A. General:

- 1. Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Designer for Contractor's use in preparing submittals.

B. Coordination:

- 1. Coordinate preparation and processing of submittals with performance of construction activities.
- 2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
- 3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
- 4. Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals:

- 1. All submittals, except samples, will be submitted electronically using a PDF file format. Each submittal will be broken apart by the Division number at a file level. For example: all Division 05 will be one file and Division 07 will be a different file.

D. Processing Time:

- 1. Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Designer's receipt of submittal on the following work day. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
- 2. Initial Review:
 - a. Allow 5 work days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Designer will advise Contractor when a submittal being processed must be delayed for coordination.
- 3. Intermediate Review:
 - a. If intermediate submittal is necessary, process it in same manner as initial submittal.
- 4. Resubmittal Review:
 - a. Allow 7 work days for review of each resubmittal.

E. Identification:

1. Place a permanent label or title block on each submittal for identification.
 2. Indicate name of firm or entity that prepared each submittal on label or title block.
 3. Provide a space approximately on label or beside title block to record Contractor's review and approval markings and action taken by Designer.
 4. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Designer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 1000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 1000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- F. Deviations:
1. Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Transmittal:
1. Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Designer will discard submittals received from sources other than Contractor.
 2. Transmittal Form:
 - a. Use AIA Document G810 or CSI Form 12.1A.
 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Designer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- H. Resubmittals:
1. Make resubmittals in same form and number of copies as initial submittal.
 2. Note date and content of previous submittal.
 3. Note date and content of revision in label or title block and clearly indicate extent of revision.
 4. Resubmit submittals until they are marked "Approved" or "Approved as Corrected."
- I. Distribution:

1. Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction:
 1. Use only final submittals with mark indicating "Approved" or "Approved as Corrected" taken by Designer.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General:
 1. Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product List:
 1. Prepare list of products that Contractor intends to utilize for Project, based on Part 2 for each Specification Section. List by paragraph and subparagraph number every Product included in Part 2 of each Section. For Product not required for the Work, indicate "Not Applicable" or "N/A" to indicate Contractor believes Product is not required to comply with Contract Documents and manufacturer's written installation instructions.
- C. Product Data:
 1. Collect information into a single submittal for each element of construction and type of product or equipment.
 2. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 3. Mark each copy of each submittal to show which products and options are applicable.
 4. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Mill reports.
 - g. Standard product operation and maintenance manuals.
 - h. Compliance with specified referenced standards.
 - i. Testing by recognized testing agency.
 - j. Application of testing agency labels and seals.
 - k. Notation of coordination requirements.
 5. Submit Product Data before or concurrent with Samples.
- D. Shop Drawings:
 1. Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 2. Preparation:
 - a. Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - 1) Dimensions.
 - 2) Identification of products.

- 3) Fabrication and installation drawings.
 - 4) Roughing-in and setting diagrams.
 - 5) Shop work manufacturing instructions.
 - 6) Templates and patterns.
 - 7) Schedules.
 - 8) Design calculations.
 - 9) Compliance with specified standards.
 - 10) Notation of coordination requirements.
 - 11) Notation of dimensions established by field measurement.
 - 12) Relationship to adjoining construction clearly indicated.
 - 13) Seal and signature of professional engineer if specified.
3. Sheet Size:
- a. Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.
- E. Samples:
1. Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 2. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 3. Identification:
 - a. Attach label on unexposed side of Samples that includes the following:
 - 1) Generic description of Sample.
 - 2) Product name and name of manufacturer.
 - 3) Sample source.
 - 4) Number and title of appropriate Specification Section.
 4. Disposition:
 - a. Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection:
 - a. Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - b. Number of Samples:
 - 1) Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Designer will return submittal with options selected.
 6. Samples for Verification:
 - a. Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and

physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- b. Number of Samples:
 - 1) Submit three sets of Samples. Designer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - 2) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 3) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

F. Subcontract List:

- 1. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - a. Name, address, and telephone number of entities performing subcontract or supplying products.
 - b. Number and title of related Specification Section(s) covered by subcontract.
 - c. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General:

- 1. Prepare and submit Informational Submittals required by other Specification Sections.

B. Certificates and Certifications:

- 1. Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

C. Test and Inspection Reports:

- 1. Comply with requirements specified in Division 01 Section "Quality Requirements."

D. Qualification Data:

- 1. Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Designers and owners, and other information specified.

E. Welding Certificates:

- 1. Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates:

1. Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates:
 1. Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates:
 1. Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates:
 1. Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports:
 1. Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports:
 1. Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Research/Evaluation Reports:
 1. Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.
- M. Field Test Reports:
 1. Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data:
 1. Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- O. Design Data:
 1. Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include

list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

P. Manufacturer's Instructions:

1. Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of the manufacturer. Include the following, as applicable:
 - a. Preparation of substrates.
 - b. Required substrate tolerances.
 - c. Sequence of installation or erection.
 - d. Required installation tolerances.
 - e. Required adjustments.
 - f. Recommendations for cleaning and protection.

Q. Manufacturer's Field Reports:

1. Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - a. Name, address, and telephone number of factory-authorized service representative making report.
 - b. Statement on condition of substrates and their acceptability for installation of product.
 - c. Statement that products at Project site comply with requirements.
 - d. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - e. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - f. Statement whether conditions, products, and installation will affect warranty.
 - g. Other required items indicated in individual Specification Sections.

R. Insurance Certificates:

1. Prepare written information indicating current status of insurance coverage. Include name of entity covered by insurance, limits of coverage, and term of the coverage.

S. Construction Photographs and Videotapes:

1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

T. Material Safety Data Sheets (MSDSs):

1. Submit information directly to Owner; do not submit to Designer.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria:

1. Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Designer.

B. Delegated-Design Submittal:

1. In addition to Shop Drawings, Product Data, and other required submittals, submit five copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Designer.
- B. Approval Stamp:
 1. Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 DESIGNER'S / ACTION

- A. General:
 1. Designer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals:
 1. Designer will review each submittal, make marks to indicate corrections or modifications required, and return it. Designer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - a. "Approved": Fabrication / installation may be undertaken. Approval does not authorize changes to Contract Sum or Contract Time.
 - b. "Approved as Corrected": Fabrication / installation may be undertaken by including notations and corrections indicated. Approval does not authorize changes to Contract Sum or Contract Time.
 - c. "Revise and Resubmit": Fabrication and / or installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.
 - d. "Rejected": Fabrication and / or installation MAY NOT be undertaken. In resubmitting, limit corrections to items marked.
- C. Informational Submittals:
 1. Designer will review each submittal and will not return it, or will return it if it does not comply with requirements. Designer will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 3300

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 3. Requirements for Contractor to provide quality-assurance and -control services required by Designer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Designer.
- C. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- D. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

- H. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Designer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Designer for a decision before proceeding.

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and re-inspecting.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

- A. Contractor Responsibilities: When specified in individual sections, restrict execution of specified Work to Applicators and Personnel meeting indicated qualifications.
 - 1. Install all roofing materials using personnel directly employed by Roofing Contractor with NDL certification from roofing material manufacturer - no Sub-Contracting permitted.
 - 2. Assign a qualified, full time, non-working supervisor to be on Project site at all times during installation of Work. This supervisor to have good communication skills and be able to communicate with Owner and Applicator's workers.
 - 3. Designate a responsible Project Manager or Superintendent to inspect all installed Work, particularly tie-ins and temporary flashings, at end of each working day and as otherwise required to ensure water-tightness. Inspection to be verified by signature on a Form signifying installation is in accordance with specified requirements.
- B. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- C. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required

by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Designer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Designer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Designer.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Designer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
1. General installation of products.
 2. Progress cleaning.
 3. Protection of installed construction.
 4. Correction of the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
1. Before construction, verify the location and points of connection of utility services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Designer. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Designer.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.6 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 7300

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Final Observation Procedures.
2. Warranties.
3. Final cleaning.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before determining date of Substantial Completion, confirm the following tasks below are complete. List all items that are incomplete in complete when defining the Substantial Completion Date.

1. Prepare a list of items in process, to be completed, and/or need to be corrected, the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit for specific warranties, workmanship warranties, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Terminate and schedule for removal temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects. This includes:
 - a. Areas where interior protection product and securement accessories are located and/or marred during installation and removal.
 - 1) The installation and removal of 01 5600-Sealed Dust and Debris Controls shall include repairing any holes and cleaning the surrounding surfaces. It excludes painting any patches to match the surrounding wall surfaces.
 - b. Fireproofing that has been dislodged from its original location due to roof demolition and installation.

- B. Final Substantial: Submit a written request for Substantial Observations for Substantial Completion. On receipt of request, Consultant will either proceed with Final Observations or notify Contractor of unfulfilled requirements. Consultant will prepare the Certificate of Substantial Completion after Substantial Observations or will notify Contractor of items,

either on Contractor's list or additional items identified by Consultant, that must be completed or corrected before Final Certificate will be issued. Results of completed Substantial Observations will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting Final Observations for determining date of Final Completion, complete the following:
 1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 2. Submit certified copy of Consultant's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Consultant. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for Final Observation for acceptance. On receipt of request, Consultant will either proceed with Final Observation or notify Contractor of unfulfilled requirements. Consultant will prepare a final Certificate for Payment after Final Observation or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Re-Final Observation: Request Re-Final Observation when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE/OPEN ITEMS (PUNCH LIST)

- A. Preparation: Submit one PDF file format of the Punch List. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Consultant.
 - d. Name of Contractor.
 - e. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit written request for warranties or actual warranties on request of Consultant for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Include Warranties in "PROJECT CLOSEOUT DOCUMENTS" binder.

4. Identify each binder on the front and spine with the typed or printed title "PROJECT CLOSEOUT DOUUMENTS," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

2.2 CLOSEOUT DOCUMENTS

- A. Prepare all data in the form of an informational manual.
- B. Submittal Time: Submit Closeout Documents for all portions of the Work with Final Completion documentation.
- C. Organize Closeout Documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Binders: Bind documents in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Dividers: Provide heavy paper dividers with plastic-covered tabs for each separate Part. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Covers: Identify each binder with typed or printed titles, "PROJECT CLOSEOUT DOCUMENTS", list title of Project; identify subject matter of contents.
 4. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified.
 5. Arrangement: Internally subdivide binder contents into logically organized parts as described below.
 - a. Part 1: Directory, listing names, addresses, and telephone numbers of Consultant, Contractor, Subcontractors, and major equipment suppliers.
 - b. Part 2: Items Required by Document 00 0700 "General Conditions" including:
 - 1) Certificate of Substantial Completion.
 - 2) Contractor's Affidavit of Payment of Debts and Claims (ref. *AIA Document G706*).
 - 3) Contractor's Affidavit of Release of Liens (ref. *AIA Document G706A*).
 - 4) Release of Lien from all Subcontractors.
 - 5) Release of Lien from all Suppliers.
 - 6) Certificate of Liability Insurance (ACORD 25-S 1/95).
 - c. Part 3: Project documents and certificates, including the following:
 - 1) Declaration, Certificates and other submittals listed above.
 - 2) Original and photocopies of Contractor's and Manufacturers' warranties.
 - 3) Shop drawings and product data.
 - d. Part 4 (if required): Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify

names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

- 1) Significant design criteria.
 - 2) List of equipment.
 - 3) Parts list for each component.
 - 4) Operating instructions.
 - 5) Maintenance instructions for equipment and systems.
 - 6) Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
6. Text: Manufacturer's printed data or typewritten data on 20-pound white paper.
 7. Drawings: Provide with reinforced punched binder tab. Bind in with text; folded to size of text.
 8. Submit one copies of preliminary draft or proposed formats and outlines of contents before start of manual assembly. Consultant will review draft and return one copy with comments.

2.3 OPERATION AND MAINTENANCE DATA

- A. Prepare data in the form of an instructional manual. Include in "PROJECT CLOSEOUT DOCUMENTS" binder if possible.
- B. Submit two copies of completed volumes in final form 10 days prior to final inspection. This copy will be returned after final inspection, with Owner comments. Revise content of documents as required prior to final submittal.
- C. Submit two final volumes revised, within ten days after final inspection.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Remove labels that are not permanent.

- g. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - h. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
- 3.2 POST CONSTRUCTION INSPECTION
- A. Inspection: Contractor will schedule a warranty inspection at 18 months after completion. Contractor may inspect separately and remedy any deficiencies not acceptable to manufacturer's Warranty requirements and terms. The Contractor will produce a Warranty Punchlist which the Owner and/or Consultant can add to that must be completed or corrected before release from Contractor Warranty will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis for release from Contractor Warranty.

END OF SECTION 01 7700

SECTION 06 1000

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Model code ICC-Evaluation Service Evaluation Service Report (ESR) for treated wood and wood structural panels.

1.2 SUBSTITUTION REQUIREMENTS

- A. OSB and Plywood structural panels are NOT interchangeable. Switching to OSB panels from the design requirement of plywood panels is not allowed within this project.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, 19 percent maximum moisture content for 2-inch nominal thickness or less, marked with grade stamp of inspection agency.
- B. Wood Structural Panels shall meet the following standards:
 1. NIST Department of Commerce (DOC) Voluntary Product Standard PS 1.
 2. NIST Department of Commerce (DOC) Voluntary Product Standard PS 2.
 3. Engineered Wood Association "Engineered Wood Construction Guide" APA Form No. E30W (2016).

2.2 TREATED MATERIALS

- A. Preservative-Treated Materials shall follow the American Wood Protection Association (AWPA) standards defined in the "Use Category System: User Specification for Treated Wood" U1 (2018). Wood products shall be treated for the following Use Codes:
 1. Organism Protection:
 - a. UC3A – Protected environment, no direct exposure to weather.
 - b. UC3B – Direct exposure to weather.
 2. Fire Protection:
 - a. UCFA – Protected environment, no direct exposure to weather.
 - b. UCFB - Direct exposure to weather.
- B. All wood products will be labeled by an inspection agency approved by American Lumber Standard Committee (ALSC) Board of Review.
- C. Preservatives used shall contain no compounds containing no arsenic or chromium unless approved in writing by the Owner and Engineer in writing or defined on the drawings as a specifically defined compound.
- D. All wood after preservative treatment shall have the following properties:
 1. Moisture content after treatment,
 - a. Kiln-dry lumber 19 %.
 - b. OSB & Plywood 15 %
 2. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- E. Provide organism preservative-treated materials for all rough carpentry, unless otherwise indicated, and the following:
 1. Wood members, in connection, with roofing, flashing, vapor barriers, and waterproofing.

2. Concealed members in contact with masonry or concrete.
 3. Wood framing members that are less than 18 inches above the ground.
 4. Wood floor plates that are installed over concrete slabs-on-grade.
- F. Provide fire-retardant-treated materials for all rough carpentry, unless otherwise indicated, and the following:
1. All framing as defined by the applicable IBC based on the use and classification of the structures and the exemptions defined in the code for roofing and re-roof applications.
 2. The following building uses, and types require all wood in roof structures to meet this sub-section:
 - a. School projects
 - b. Government projects
 - c. Residential of two or more units under one roof.

2.3 LUMBER

- A. Dimension Lumber:
1. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal.
 2. Non-Load-Bearing Interior Partitions:
 - a. S-P-F Grade No. 2 or Construction.
 3. Framing Other Than Non-Load-Bearing Partitions:
 - a. Hem-Fir Grade No. 2 or Construction.
 4. Exposed Framing:
 - a. Hem-Fir Grade Hand Select, No. 1, or No. 2.
 - 1) Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
- B. Exposed Boards: Idaho White Pine, Lodgepole Pine, or Ponderosa Pine Grade No. 2 or Common with a moisture content of 15 %.
- C. Concealed Boards: S-P-F Western Woods Grade No. 2 with a moisture content of 15 %.
- D. Miscellaneous Lumber: S-P-F Grade No. 2 or Common with a moisture content of 15 %. Provide for nailers, blocking, and similar members.

2.4 ENGINEERED WOOD PRODUCTS

- A. Engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be demonstrated by comprehensive testing.
- B. Laminated-Veneer Lumber (LV): Manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.
- C. Rim Boards: Product designed to be used as a load-bearing member and to brace wood joists at bearing ends, complying with research/evaluation report for wood joists. Rim boards allowed to be OSB, LVL with at least 1½-inches minimum thickness.

2.5 MISCELLANEOUS PRODUCTS

- A. Fasteners:

1. Size and type indicated by building code or engineering. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153.
 2. Power-Driven Fasteners: ICC-ES-ESR-1539.
 3. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F568, Property Class 4.6); with ASTM A563 hex nuts and, where indicated, flat washers.
- B. Metal Framing Anchors: Hot-dip galvanized steel of structural capacity, type, and size indicated.
1. Use anchors made from hot-dip galvanized steel complying with ASTM F2329, G60 coating designation for interior locations where stainless steel is not indicated.
 2. Use anchors made from stainless steel complying with ASTM A666, Type 304 for exterior locations and where indicated.
- C. Building Paper:
1. Asphalt-saturated organic felt complying with ASTM D226, Type I (No. 30 asphalt felt), unperforated.
 2. Flexible weather barrier consisting of spunbonded high density polyethylene fibers complying with ASTM D779.
- D. Adhesives for Field Gluing Panels to Framing: APA AFG-01.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Securely attach rough carpentry to substrates, complying with the following:
1. ICC-Evaluation Service (ES) ESR-1539 for nail and staple fasteners driven by hand or pneumatic.
 2. ICC-Evaluation Service for power-driven fasteners:
 - a. ICC-ES ESR-1955 – ITW Ramset
 - b. ICC-ES ESR-1752 – Hilti
 - c. ICC-ES ESR-2024 – DeWalt/Powers
 - d. ICC-ES ESR-3833 – Aerosmith Fastening Systems
 3. Published requirements of metal framing anchor manufacturer.
 4. As defined by 2018 International Building Code:
 - a. Table 2304.8(1) – Roof Sheathing Spans for Lumber Floor and Roof Sheathing.
 - b. Table 2304.8(2) – Sheathing Lumber, Minimum Grade Requirements, Board Grade.
 - c. Table 2304.8(3) – Allowable Spans and Loads for Wood Structural Panel Sheathing and Single-Floor Grade Continuous Over Two or More Spans with Strength Axis Perpendicular to Supports
 - d. Table 2304.8(5) – Allowable Load (PSF) for Wood Structural Panel Roof Sheathing Continuous Over Two or More Spans and Strength Axis Parallel to Supports.
 - e. Table 2304.10.1 – Fastening Schedule.

END OF SECTION 06 1000

SECTION 06 1600

ROOF SHEATHING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Model code ICC-Evaluation Service Evaluation Service Report (ESR) for preservative-treated plywood.

1.2 SUBSTITUTION REQUIREMENTS

- A. OSB and Plywood structural panels are NOT interchangeable. Switching to OSB panels from the design requirement of plywood panels is not allowed within this project.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Wood Structural Panels shall meet the following standards:
 1. NIST Department of Commerce (DOC) Voluntary Product Standard PS 1.
 2. NIST Department of Commerce (DOC) Voluntary Product Standard PS 2.
 3. Engineered Wood Association "Engineered Wood Construction Guide" APA Form No. E30W (2016).

2.2 TREATED PLYWOOD

- A. Preservative-Treated Materials shall follow the American Wood Protection Association (AWPA) standards defined in the "Use Category System: User Specification for Treated Wood" U1 (2018). Wood products shall be treated for the following Use Codes:
 1. Organism Protection:
 - a. UC3A – Protected environment, no direct exposure to weather.
 - b. UC3B – Direct exposure to weather.
 2. Fire Protection:
 - a. UCFA – Protected environment, no direct exposure to weather.
 - b. UCFB - Direct exposure to weather.
- B. All wood products will be labeled by an inspection agency approved by American Lumber Standard Committee (ALSC) Board of Review.
- C. Preservatives used shall contain no compounds containing no arsenic or chromium unless approved in writing by the Owner and Engineer in writing or defined on the drawings as a specifically defined compound.
- D. All wood after preservative treatment shall have the following properties:
 1. Moisture content after treatment,
 - a. OSB & Plywood 15 %
 2. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 3. The following building uses, and types require all wood in roof structures to meet this sub-section:
 - a. School projects
 - b. Government projects
 - c. Residential of two or more units under one roof.
- E. Provide preservative treated plywood for items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashings, vapor barriers, and water proofing.
 1. Provide organism preservative-treated materials for all rough carpentry, unless otherwise indicated, and the following:

- a. Wood members, in connection, with roofing, flashing, vapor barriers, and waterproofing.
 - b. Concealed members in contact with masonry or concrete.
 - c. Wood framing members that are less than 18 inches above the ground.
 - d. Wood floor plates that are installed over concrete slabs-on-grade.
2. Provide fire-retardant-treated materials for all rough carpentry, unless otherwise indicated, and the following:
- a. All framing as defined by the applicable IBC based on the use and classification of the structures and the exemptions defined in the code for roofing and re-roof applications.

2.3 ROOF SHEATHING

- A. Plywood Roof Sheathing: APA Exterior Rated Structural I Sheathing.

2.4 MISCELLANEOUS PRODUCTS

- A. Fasteners:
 - 1. Size and type indicated by building code or engineering. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153.
 - 2. Power-Driven Fasteners: ICC-ES-ESR-1539.
 - 3. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F568, Property Class 4.6); with ASTM A563 hex nuts and, where indicated, flat washers.
- B. Metal Framing Anchors: Hot-dip galvanized steel of structural capacity, type, and size indicated.
 - 1. Use anchors made from hot-dip galvanized steel complying with ASTM F2329, G60 coating designation for interior locations where stainless steel is not indicated.
 - 2. Use anchors made from stainless steel complying with ASTM A666, Type 304 for exterior locations and where indicated.
- C. Building Paper:
 - 1. Asphalt-saturated organic felt complying with ASTM D226, Type I (No. 30 asphalt felt), unperforated.
 - 2. Flexible weather barrier consisting of spunbonded high density polyethylene fibers complying with ASTM D779.
- D. Adhesives for Field Gluing Panels to Framing: APA AFG-01.
- E. Flexible Flashing: Adhesive rubberized asphalt compound, bonded to polyethylene film, with an overall thickness of 0.030 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Securely attach rough carpentry to substrates, complying with the following:
 - 1. ICC-Evaluation Service (ES) ESR-1539 for nail and staple fasteners driven by hand or pneumatic.
 - 2. ICC-Evaluation Service for power-driven fasteners:
 - a. ICC-ES ESR-1955 – ITW Ramset
 - b. ICC-ES ESR-1752 – Hilti
 - c. ICC-ES ESR-2024 – DeWalt/Powers
 - d. ICC-ES ESR-3833 – Aerosmith Fastening Systems
 - 3. Published requirements of metal framing anchor manufacturer.
 - 4. As defined by 2018 International Building Code:

- a. Table 2304.8(1) – Roof Sheathing Spans for Lumber Floor and Roof Sheathing.
- b. Table 2304.8(2) – Sheathing Lumber, Minimum Grade Requirements, Board Grade.
- c. Table 2304.8(3) – Allowable Spans and Loads for Wood Structural Panel Sheathing and Single-Floor Grade Continuous Over Two or More Spans with Strength Axis Perpendicular to Supports
- d. Table 2304.8(5) – Allowable Load (PSF) for Wood Structural Panel Roof Sheathing Continuous Over Two or More Spans and Strength Axis Parallel to Supports.
- e. Table 2304.10.1 – Fastening Schedule.

B. Fastening Methods:

- 1. Wall and Roof Sheathing:
 - a. Nail or screw to wood framing.
 - b. Screw to cold-formed metal framing.

END OF SECTION 06 1600

SECTION 07 0150

MINOR DEMOLITION AND RENOVATION WORK

PART 1 - GENERAL

- 1.1 SECTION INCLUDES:
- A. Required demolition for reroofing work.
 - B. Required renovation for reroofing work.
- 1.2 RELATED SECTIONS:
- A. Section 06 1000 – Rough Carpentry.
 - B. Section 07 5400 – Sprayed Polyurethane Foam Roofing.
 - C. Section 07 6200 – Flashing and Sheet Metal.
- 1.3 SUBMITTALS:
- A. Product Data: Submit manufacturer's product data sheets for each product in accordance with General Conditions and Division Seven.
- 1.4 PROTECTIONS:
- A. Prior to starting minor demolition operations, provide necessary protections as specified in General Conditions and Division Seven.
- 1.5 COORDINATION:
- A. Sequence minor demolition and renovation with work sequence of reroofing work.
 - B. Coordinate with reroofing work so that no more existing roofing and sheet metal items are removed in one day than can be replaced along with new roofing work in same day.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- A. Wood Nailers and Blocking: Utility grade lumber, any commercial softwood species, kiln dried and preservative treated.
 - B. Fasteners:
 - 1. Screws: Fluorocarbon coated screws, i.e. Roofgrip Climaseal™.
 - 2. Nails: Nonferrous, cement-coated, or hot-dip galvanized ring-shank nails.
 - 3. Concrete and Masonry: Stainless steel or galvanized screws with lead expansion anchor, Acceptable fasteners:
 - a. Powers Fasteners' Zamac Hammer-Screw™.
 - C. Concrete Splash Blocks:
 - 1. Precast concrete, minimum 3,000 psi strength, 18-inch x 30-inch size, with water channel.
 - D. Concrete Pavers:
 - 1. 24-inch x 24-inch x 2-inch thick high density reinforced concrete Gibraltar roof paver, as manufactured by Westile.
 - E. Gas Pipe Supports:
 - 1. Furnish and install Miro Industries gas pipe supports Model Numbers 4-RAH-SS or 6-RAH-SS, size as required for gas pipe on roof.
 - F. Electrical Conduit Supports:
 - 1. Miro Industries electrical conduit supports Model Numbers 12-BASE STRUT-8 SS or 12-BASE STRUT-12 SS, size as required for electrical conduit on roof. All electrical conduits are to be clamped per National Electric Code requirements.

2. Miro Industries Pillow Block Pipe Stands Model 1.5 with 1.5 Spacer (for electrical conduits -inch or less above finished roof height).

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Verify that required barricades and other protective measures are in place.

3.2 MINOR DEMOLITION OPERATIONS:

A. GENERAL:

1. Comply with precautions and procedures specified in General Conditions and Division Seven.
2. Cut and remove materials as designated on Drawings.
3. Execute demolition in a careful and orderly manner with least possible disturbance or damage to adjoining surfaces and structure.
4. Avoid excessive vibrations in demolition procedures that would be transmitted through existing structure and finish materials.

B. ABANDONED EQUIPMENT CURBS SUPPORTS AND VENTS:

1. Completely remove abandoned curb supports.
2. Remove abandoned piping and vent penetrations, electrical conduit and switch gear. Cap-off at roof deck level.

C. PITCH PANS:

1. Remove existing pitch pans and wood blocking supporting piping.
2. Remove existing pitch pans at conduit and pipe penetrations.
3. Remove existing pitch pans and wood blocking supporting at mechanical equipment.

D. ABANDONED CURBS/EQUIPMENT DEMOLITION:

1. Completely remove existing abandoned curbs and/or equipment. Remove curbs to deck level, and patch hole in roof deck to match existing roof deck.

3.3 DISPOSAL:

- A. Unless specifically noted otherwise, materials, equipment and debris resulting from demolition operations shall become property of Contractor. Remove demolition debris in accordance with applicable City, State and Federal laws, and in accordance with requirements of the General Conditions.
- B. Dispose of demolition debris as required by applicable City, State and Federal laws, and in accordance with requirements of the General Conditions.

3.4 MINOR RENOVATION WORK:

A. Replacing wood nailers and curbs with new wood nailers and curbs:

1. Clean and prepare existing surfaces to receive wood nailers and curbs.
2. Replace designated wood blocking with new wood blocking.
3. Install wood nailers and curbs continuously without gaps and being plumb, level and true with joints flush. Securely fasten to structure with expansion fasteners and to existing wood with Fluorocarbon or epoxy coated screws, at a spacing of 12-inch O.C., maximum.

B. Equipment Reinstallation:

1. Remove and reinstall existing roof top equipment, HVAC units, and fans, as required, to facilitate installation of new roofing membrane and associated flashing.

2. Carefully disconnect equipment and move in a manner to prevent damage to equipment or service lines.
 3. Add new wood nailers at top of existing roof curbs, to ensure that the finished roof flashing height is at least 8-inch above the new surrounding finish roof membrane surface. Raise equipment as necessary to achieve minimum curb height.
 4. Coordinate reinstallation with new equipment support curbs where scheduled.
 5. Reinstall equipment on curbs and supports after new flashing is installed. Securely fasten to curbs.
 6. Extend and reconnect electrical connections, gas piping and drain lines. Disconnecting, extending, and reconnecting of services shall be performed by a mechanical, plumbing, and/or electrical company licensed to perform such work in the AHJ.
 7. Equipment shall be left in complete operating condition.
- C. Relocating and Raising Piping and Conduit:
1. Raise existing gas piping, vent pipes, conduit, and condensate drain lines where scheduled and where required for new curb heights, supports, and where needed due to new roof thickness.
 2. Disconnect gas piping and extend with new piping and fittings.
 3. Extend conduit with proper conduit connections and fittings. Extend wiring as required for additional conduit.
- D. Installation of New Gas Pipe Support Stands and Electrical Conduit Support Stands:
1. Gas Pipe Supports: Furnish and install Miro Industries gas pipe supports Model Numbers 4-RAH-SS or 6-RAH-SS (size as required for gas pipe on roof) per governing local codes and manufacturer requirements and/or spaced a minimum of 8-feet O.C. and at all corners (whichever is more stringent).
 2. Electrical Conduit Supports: Furnish and install Miro Industries electrical conduit supports Model Numbers 12-BASE STRUT-8 SS or 12-BASE STRUT-12 SS (size as required for electrical conduit on roof) per governing local codes and manufacturer requirements and/or spaced a minimum of 8 feet O.C. and at all corners (whichever is more stringent). All electrical conduits are to be clamped per NEC requirements. Furnish and install Miro Industries Pillow Block Pipe Stands Model 1.5 with 1.5 Spacer (for electrical conduits 3-inch or less above finished roof height).
- E. Installation and Replacement of Existing Concrete Pavers:
1. All existing damaged/broken concrete pavers are to be removed from the roof surface and disposed.
 2. Replace all existing damaged/broken concrete pavers with new 24-inch x 24-inch x 2-inch thick high density reinforced concrete Gibraltar roof paver, as manufactured by Westile.
 3. Set new concrete pavers on top of new manufacturer approved walkway pad material.
 4. Install new specified concrete pavers around all roof access locations and at all mechanical equipment curbs and where shown on the design drawings.
- F. Testing and inspection:
1. Test electrical circuits for proper operation.
 2. Test drain piping for leaks and proper flow.

3. Perform tests and inspections on gas piping as required by AHJ and Utility. Gas piping systems shall be left complete and operational with AHJ inspection "green tags" at completion of work.
4. Test equipment that was removed and reinstalled to ensure that equipment is operating properly.

END OF SECTION 07 0150

SECTION 07 5700

SPRAYED POLYURETHANE FOAM ROOFING

PART 1 - GENERAL

1.1 SEQUENCING AND SCHEDULING

- A. Coordinate work with owner so as to not disrupt tenants.
- B. Access to roof areas for construction, disposal, etc., will be as directed by the owner.
- C. Coordinate the work of installing associated metal flashing while roofing operations proceed.

1.2 REFERENCES

- A. ASTM - Latest Editions
 - 1. C-273 Test for Shear Properties in Flatwise Plane of Flat Sandwich Construction or Sandwich Cores.
 - 2. C-501 Test for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abrader.
 - 3. C-518 Test for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. D-412 Test for Rubber Properties in Tension.
 - 5. D-471 Test for Rubber Property - Effect of Liquids.
 - 6. D-624 Test for Rubber Property - Tear Resistance.
 - 7. D-822 Standard Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc Type) for Testing Paint and Related Coatings and Materials.
 - 8. D-903 Test for Peel or Stripping Strength of Adhesive Bonds.
 - 9. D-1621 Test for Compressive Properties of Rigid Cellular Plastics.
 - 10. D-1622 Test for Apparent Density of Rigid Cellular Plastics.
 - 11. D-1623 Test for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - 12. D-2126 Test for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
 - 13. D-2240 Test for Rubber Property - Durometer Hardness.
 - 14. D-2370 Test for Tensile Properties of Organic Coatings.
 - 15. D-2697 Test for Volume Nonvolatile Matter in Coatings.
 - 16. D-2842 Test for Water Absorption of Rigid Cellular Plastics.
 - 17. E-84 Test for Surface Burning Characteristics of Building Materials.
 - 18. E-96 Test for Water Vapor Transmission of Materials.
 - 19. E-108 Test for Fire Tests of Roof Coverings.
- B. FM Global (FMG), Norwalk, MA: Hail Test
- C. SPFA Spray Polyurethane Foam Alliance – Stafford, VA Publications, Latest Editions.
 - 1. SPFA-104 *Spray Polyurethane Foam Systems for New and Remedial Roofing*
 - 2. SPFA-102 *A Guide for Selection of Elastomeric Protective Coatings, Over Sprayed Polyurethane Foam Systems*
 - 3. AP1-1/89 *Accreditation Program Handbook and Enrollment Guide*
- D. National Roofing Contractors Association: NRCA Manual of Roofing and Waterproofing, Latest Edition

1.3 SYSTEM DESCRIPTION

- A. Repair and replacement of wet Sprayed Polyurethane Foam (SPF) insulation and restoration of a polyurethane rubber weather membrane by means of proper preparation and subsequent recoating of the existing coating system with a granulated polymer elastomer, as supplied by Neogard, a division of Hempel of Dallas, Texas.

1.4 QUALITY ASSURANCE

- A. Supplier Qualifications for coating: Permthane Aliphatic II, as supplied by NEOGARD, is approved for use on this project.
- B. Applicator Qualifications for coating: The Applicator shall be approved by NEOGARD to install the Permthane Aliphatic II fluid-applied roof coating system. Manufacturer's written verification of applicator approval is required.
- C. Regulatory Requirements:
 - 1. The fluid-applied roof coating system shall be rated Class A in accordance with the spread of flame test requirements of ASTM E108.
 - 2. Materials used in the fluid-applied roof coating system shall meet Federal, State and local VOC regulations.
- D. Work in this Section to conform to:
 - 1. Manufacturer's instructions.
 - 2. National Roofing Contractors Association (NRCA): Roofing Manual Consisting of:
 - a. NRCA Roofing Manual: Membrane Roof Systems 2015
 - b. NRCA Roofing Manual: Architectural Metal Flashing, Condensation & Air Leakage, and Reroofing 2014
 - c. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Architectural Sheet Metal Manual, 7 Edition, 2012.
- E. The acceptability of the completed roofing work will be based on its conformance to the contract requirements, determination of, which shall be made only after evaluation of the roofing samples removed from the finished installation.
- F. An inadequate or ineffective quality control program is unacceptable and shall be immediately corrected upon notification by the Owner or his designated representative.
- G. Wheeled or other traffic over the partially or fully complete roof system shall not be permitted without the use of adequate protection, as determined by the manufacturer issuing the Joint and Several warranty for the polyurethane roofing system.
- H. Roof deck surfaces shall be inspected and approved by the Quality Controller prior to initiating roof work.
- I. The roof deck and surfaces to receive primer and/or polyurethane foam materials shall be smooth and firm, and shall be free from ice, frost, surface moisture, dirt, projections, asphaltic, and other foreign materials.
- J. All required sheet metal accessories such as foam stops, scupper boxes, pitch pans, antennae anchors, drain basins, pipe flashings, etc., must be in place prior to the application of any primer or foam materials. All metal surfaces to which foam or primer materials are to be applied must be free of corrosion, loose particles, grease, oil, and moisture.

1.5 CODE REQUIREMENTS

- A. The Installer shall submit evidence that the proposed roof system meets the requirements of the local building code, project code requirements, and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and

no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

- B. The Governing Building Department is the State of Colorado and their Adopted Building Codes, meeting all applicable local, state and national building code requirements, has codified the 2018 family of "Codes" by International Code Congress (ICC) as of July 2019.
 - 1. 2018 International Existing Building Code.
 - 2. 2018 International Building Code.
 - a. Class A Exterior Fire Exposure Rating
 - b. Severe Hail (SH) exposure rating.
 - 3. 2018 International Energy Conservation Code.
- C. Underwriters Laboratories, Inc. - Class A assembly

1.6 SUBMITTALS

- A. Pre-bid Product Submittals:
 - 1. Contractors wishing to submit a product for consideration and evaluation (by the Owner/Architect) as an equal to materials called out in the contract documents must do prior to the bid date. Only approval by written addendum will be acceptable.
 - 2. Complete literature, specifications, application instructions, and warranty specimen, along with a list of ten (10) projects on which the material submitted for approval has been used, dating back over the last ten (10) years, must accompany each request for approval. This list of projects must include:
 - a. Name, address, & description of building use
 - b. Name & phone number of individual responsible for building maintenance
 - c. Date of installation
 - d. Name of Contractor who installed system
 - 3. If the Owner approves such substitution, an addendum of such approval will be provided to each bidder of record, in order that every bidder may have equal opportunity to base his bid on the approved substitution.
 - 4. Submittals for approved equal status must include, but are not limited to, one 12-inch x 12-inch sample of the proposed system. This sample will be considered to be representative of the general appearance and condition of the proposed system with regard to coating thickness, foam texture, and color.
- B. Shop Drawings:
 - 1. Submit three (3) copies of roof drawing indicating roof size, location and type of penetrations, perimeter and penetration details. Indicate complete installation details of roofing and flashing, including roof slopes, flashing details, penetration details and accessories. Reproduced copies of the consultant's drawings and details do not constitute acceptable shop drawings.
 - 2. Submit three (3) copies of MSDS data directly to the owner for their files, on all roofing, insulation and flashing materials.
- C. Product Data:
 - 1. Submit three (3) copies of latest edition of manufacturer's roofing and flashing specifications (deleting non-applicable information), including list of materials proposed for use, and manufacturer's data sheets for other products.
- D. Progress Schedule Plan:
 - 1. Submit a complete progress schedule and phasing plan indicating complete sequence of removal and replacement of roofing for each area.

2. Include roof plan with layout indicating amount of roof area included in each day's work.
 3. Indicate dates for beginning and completing each activity.
 4. Identify other related work affecting roof replacement and phasing.
- E. Warranty:
1. Submit specimen copy of contractor and/or manufacturer's roofing warranty with Product Data submittal, including evidence of application/approval for guaranty.
- F. Manufacturer's Reports:
1. Concurrent with Shop Drawing submittal; submit roof manufacturer's review of Contract Documents and acceptance of applicator.
- G. Maintenance Data:
1. Compile and submit maintenance instructions in accordance with General Provisions. Include complete manufacturer's instructions for periodic inspection and maintenance of roofing system, including precautions and warnings to prevent damage and deterioration to roofing system.
- 1.7 PRODUCT DELIVERY, STORAGE AND HANDLING
- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible, including required fire resistance classification labels.
 - B. Provide continuous protection of materials against wetting and absorption; remove wet materials and marked materials that have been wet, from project site.
 - C. Materials loaded on roof levels for immediate (same day) use shall be:
 1. Distributed to prevent concentrated loads that would impose excessive strain on deck or structural members.
 2. Positively secured to prevent displacement by excessive wind forces.
 3. Handle goods to prevent damage.
 4. Store all materials on clean, raised platforms with weather-protective covering.
 - D. Deliver materials in sufficient time and quantity to allow continuity of work.
 - E. All materials, except metal, must be stored between 60° F and 80° F. If exposed to lower temperatures, restore at 60° F minimum temperature before using.
 - F. Store all materials in a dry, protected area. Damaged materials may not be used and must be removed from the site.
 - G. Store materials to comply with all fire and other safety regulations. A fire extinguisher rated for chemical fires shall be readily available in the area where materials are being stored, opened, and applied.
 - H. Foam materials - Polyol ("B") drums shall not be agitated or moved excessively prior to opening. When opening "B" drums, loosen, but do not fully remove, cap to allow gas to escape from drum. When opening isocyanate "A" drums, personnel should wear respirator or exercise care to avoid inhalation of vapors.
 - I. Empty all drums completely and dispose of off-site in manner recommended by manufacturer.
 - J. Weather barrier coating materials - Avoid smoking, open flames, welding, or electric sparks while handling, opening, or applying any weather barrier coating materials with flammable solvents.
 - K. All material containers shall have the following information on the label attached to the container:

1. Name of contents.
 2. Storage temperature limits. Instructions for storage and handling.
 3. Special precautions about toxic effects of ingredients and remedy in the event of inhalation, ingestion, or skin contact.
- L. Gasoline or other fuels and flammable liquids shall be stored in approved containers away from other flammable materials. Do not refuel engines when running.
- 1.8 JOB CONDITIONS
- A. Consult Material Safety Data Sheets (MSDS) for applicable cautions and warnings prior to the use of materials.
1. Complete roof installation during dry weather on a roof surface that is free of ponded water, ice, or snow.
- B. Environmental Conditions:
1. Proceed with application of urethane coating materials only when substrate temperature is above 40°F (4°C) and in dry conditions. Do not apply if precipitation is imminent, or to a damp or frosty surface. Temperature should more than 5°F (3°C) above dew point and rising. If ambient and/or substrate temperatures are approaching or above 110°F (43°C), limit material application to evening hours.
 2. Do not proceed with application of urethane foam materials when ambient temperature is less than 60 degrees F or when temperature is <5 degrees F of dew point, or wind velocity is above 15 mph. NOTE: Special foams are available for temperatures below 60 degrees F and wind screens must be used when wind velocity is >15 mph. Do not apply material unless surface to receive urethane foam is clean and dry.
 3. Coordinate fluid-applied roof coating work with other trades to ensure coatings are protected from traffic and other abuse until completely cured and installation is complete
 4. Maintain work area in a neat and orderly condition, removing empty containers, rags, and trash from the site daily.
- C. Existing Conditions:
1. Examine existing building and existing roofing to determine existing physical conditions that affect removal of existing roofing and installation of new roofing.
 2. Photographically document all work areas prior to starting the work.
 3. Only as much of the new roofing/coating as can be made weathertight each day, including all flashing and detail work, shall be installed. Do not remove existing roofing and flashing in inclement weather or when rain is predicted (30% or more possibility). All seams shall be cleaned and sealed before leaving the job site that day.
 4. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
 5. All surfaces to receive new insulation, coating, and/or flashings shall be dry. Should surface moisture occur, the Installer shall provide the necessary equipment to dry the surface prior to application.
 6. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

- D. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Installer shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over tarps or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
- E. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- F. The Installer shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
- G. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.
- H. All new roofing waste material (i.e., scrap roof membrane, empty containers) shall be immediately removed from the site by the Installer and properly transported to a legal dumping area authorized to receive such material.
- I. The Installer shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
- J. Flammable materials shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.
- K. All rooftop contamination that is anticipated or that is occurring shall be reported to the manufacturer to determine the corrective steps to be taken.
- L. The Installer shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Installer shall report any such blockages in writing (letter copy to the manufacturer) to the Owner's Representative for corrective action prior to installation of the roof system.
- M. Installer shall immediately notify the owner's representative if any unusual or concealed condition is discovered that adversely affects the work, for determination of how to proceed.
- N. **Precautions shall be taken when using potent roofing materials at or near rooftop vents or air intakes. Potent roofing materials could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of potent roofing material odor while ventilating the building. Installer's crew shall always keep lids on unused containers.**
- O. Protection:
 - 1. Keep products away from heat, sparks, and flames. Do not allow use of spark producing equipment during application and until vapors are gone. Post "No Smoking" signs.
 - 2. Protect plants, vegetation, other building components (windows, trim etc.) which might be affected by foam or coating. Use drop cloths, plastic or masking as required. Vegetation damaged from covering shall be replaced at the expense of the contractor.
 - 3. Coordinate with Poudre School District on a daily basis. All advisories to staff, students, or tenants regarding the closing of vents, doors, windows and miscellaneous vehicle parking areas.
- P. Emergency Equipment:

1. Maintain on-site equipment necessary to apply emergency temporary edge seal in the event of sudden storms or inclement weather.
- Q. Restrictions: Comply with requirements of Division One on use of site.
1. Smoking is prohibited on roof areas, in existing buildings, and on property grounds.
 2. Radios, boom boxes, etc. are not allowed on the job site.
- R. Continuation of Services: Comply with requirements of Division One.
- 1.9 SAFETY:
- A. All regulations pertaining to safety as noted in OSHA Standard shall be strictly adhered to by the contractor and his subcontractors. Particular care shall be exercised in connection with operation of vehicles and other equipment on the job site. Safety barriers and equipment shall be provided by the contractor as required by the Owner.
1. Personnel:
 - a. All personnel on the project shall be familiar with the hazards involved in the use of the equipment and materials and in proper techniques and procedures required to safely handle and apply the materials.
 2. Protective clothing and gear:
 - a. Each employee shall wear appropriate clothing to protect against skin contact with potentially injurious materials. Appropriate protective creams may be used where suitable.
 - b. Eye and face protective equipment shall be used which meets ANSI Z87.1, "Practice of Occupational and Educational Eye and Face Protection".
 - c. Respiratory protective equipment shall be used which will provide for protection against particulate and organic vapors for personnel so exposed. Respiratory protection devices, when required, shall be capable of maintaining isocyanate vapor level below LTL as established by OSHA. For coatings, other solvents, or cleaning fluids, respiratory protective devices shall meet the requirement of MESA or be acceptable to the U.S. Department of Labor, according to the material involved.
 - d. In order to minimize the entry of job-related odors into buildings being treated during the course of this project, the Owner or his representative shall identify and mark each HVAC or other intake and exhaust device and its location for each respective building. Markings shall clearly identify whether each device is an intake, or an exhaust and location of unit's disconnect switch. Intakes shall be fitted with activated charcoal filtration devices or blocked off entirely to prevent exposure of building occupants to odors from repair operations.
- 1.10 EQUIPMENT
- A. All equipment used on the project shall be equipped with safety devices necessary to prevent excessive pressure or temperature build-up at any step of the application.
- B. Airless spray equipment shall be maintained in good condition and checked regularly for leaks in hoses, fittings, and connections, et cetera. Line pressures shall be relieved whenever cleaning tips or checking any system component under pressure. If gun is left unattended by operator, pressures shall be relieved, or gun secured so that accidental discharge cannot take place.
- C. Robotic application equipment shall be in good working condition, with all spray screens in place during spray operations. Clutches and brakes shall be functional and effective and shall be checked daily. At the end of daily spray operations, all robotic devices shall be fully secured on the rooftop or elsewhere to ensure that wind conditions do not permit any

unintended movement of the equipment that might result in damage to equipment or property.

1.11 WARRANTY

- A. The foam and coating manufacturers shall provide Poudre School District a ten (10) year Coating Manufacturer Warranty at the completion of this work to cover repair of leaks due to faulty workmanship and/or materials, to become effective when all of the Contractor's invoices have been paid. The warranty shall have a starting date when substantial completion was noticed by the Consultant to Poudre School District.
 - 1. Upon completion of installation of the roof system, submit executed contractor's Warranty to receive final retention funds held.
 - 2. Installation shall be guaranteed by coating manufacturer for a period of ten (10) years. Under the terms of the warranty, damage to the roof system caused by acts of God or man-made mechanical damage shall be the responsibility of the School District and repaired by the Contractor.
 - 3. During the first five (5) years of the Warranty period, the Coating Manufacturer shall be responsible to repair all blisters or delamination within the foam or coating.
 - 4. A three (3) year Contractor warranty shall be required for all areas receiving elastomeric coating. Warranty shall cover repair of leaks, blistering, splitting or delamination of the foam or elastomeric coating.
- B. Final Inspection to be by the Poudre School District's Roof Consultant and a representative of the foam and coatings manufacturer's technical department. Any deficiencies found to be corrected by applicator at no cost to the Poudre School District prior to issuance of Warranty. If re-inspection is required of the roof consultant by the Poudre School District, cost of the Consultant shall be paid by contractor.
- C. Final Inspection to be by the Owner's Consultant and a Manufacturer approved roofing testing lab or by company technical department.
- D. Testing report to confirm minimum foam and coating requirements. Any deficiencies found to be corrected by applicator at no cost to Poudre School District prior to issuance of Warranty. If re-inspection is required, cost to be paid by contractor.
- E. During term of Contractor Warranty, contractor shall inspect finished installation yearly, making note of any repairs required and informing manufacturer and Poudre School District. Records to be kept of annual roof inspections.
- F. At project completion, provide completed and fully executed and notarized copies of the following:
 - 1. ROOFING MANUFACTURER WARRANTY ADDENDUM
 - 2. ROOFING APPLICATOR GUARANTY FOR ROOFING
 - 3. CONTRACTOR'S FINAL STATEMENT OF COMPLIANCE
 - 4. MANUFACTURER'S EMERGENCY REPAIR AGREEMENT
- G. Warranty Plaques:
 - 1. Upon final acceptance of this work, the contractor shall provide and install one laser engraved, 8"x 10" anodized BLACK aluminum plaque for each roof location or building with the following text:

DO NOT MAKE
REPAIRS OR ALTERATIONS
TO THIS ROOF

WITHOUT APPROVAL FROM THE
[[Roof System Manufacturer Name]]
THIS ROOF IS UNDER WARRANTY UNTIL
[[Month Day, Year]]

by (manufacturer name & phone 800#)

[[City, State, Telephone Number]]

Roof installed by (name & phone # of contractor)

Amtech Solutions, Inc., (303) 738-0823

2. Final text size and copy shall be approved by Poudre School District.
3. Mounting location of the plaque/s shall be at the direction of Poudre School District.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Comply with Quality Control, References, Specifications, and Manufacturer's data. Where conflict may exist, more stringent requirements govern.
- B. Use of manufacturer's brand and/or trade names is done only to establish a standard by which others will be compared, and not done to restrict or limit competition.
- C. Poudre School District shall be the final authority as to acceptance of any changes in materials.
- D. All materials used shall be accepted and approved by roof membrane manufacturer.

2.2 APPROVED MANUFACTURERS

- A. Sprayed Polyurethane Foam
 1. Bayer MaterialScience, Pittsburg, PA.
 2. BASF, Florham Park, NJ.
 3. Approved equivalent.
- B. Elastomeric Coatings
 1. Bayer MaterialScience, Pittsburg, PA.
 2. Neogard, Dallas, TX.
 3. Approved equivalent.

2.3 MATERIAL PERFORMANCE CRITERIA

- A. Polyurethane foam insulation shall be a two-component, rigid-class, sprayed-in-place, polyurethane foam having a minimum core density of 3.0 lbs. per cubic foot (ASTM D-1622), as supplied by Bayer MaterialScience, or approved equal (see Warranty) and shall provide a minimum of 50 psi compressive strength (ASTM D-1621) when applied at the jobsite. The foam system shall be a 1:1 ratio polyurethane spray foam system formulated for roofing application where smooth surface profiles are desired. The polyurethane foam insulation system shall be supplied by a manufacturer accredited by the SPFA Accreditation Committee. Submittals for approved equal status must be accompanied by architectural data relative to the above characteristics. Minimum foam thickness shall be 2-inches, except where stated otherwise.

- B. Polyurethane Foam shall conform to the following physical properties when sprayed-in-place at project location:

Physical Property	Foam Insulation	ASTM Test Method
Density (core)	3.0 pcf min	D1622
Compressive Strength (core-parallel to rise)	55 psi	D1621
(core-perpendicular to rise)	35 psi	D1621
Tensile Strength	80 psi	D1623
Water Absorption	0.01-0.03 psf	D-2842
Shear Strength	30-50 psi	D273
Closed Cell Content	90% min.	D1940
Dimensional Stability - % Volume Change	+3% max	D2126
Flame Spread	55% max	E-84
Insulation Values - K Factor Initial	0.012	C-518
Insulation Values - K Factor Aged	0.158	C-518
Percent Volume Change Humid Age – 28 days (158 degF/97%RH)	-0.26%	D-2126

- C. All foam materials shall be stored according to the manufacturer’s written shelf life data requirements.
- D. Sealant:
1. Sealants to be used in conjunction with components of the roofing system shall be of the same generic type or must be compatible with and capable of bonding to the polyurethane foam and weather barrier coating and/or other hardware components of the roof system and be opaque to ultraviolet light.
- E. Weatherable Elastomeric Top Coating System:
1. The weather barrier coating shall be a fluid-applied urethane elastomer, Permthane Aliphatic II, using a two-component base coat and a single component moisture cured topcoat similar to Neogard 7442, as supplied by the Neogard Corporation, Dallas, TX. (or approved equal).
 2. The weather barrier coating system shall be supplied by a manufacturer accredited by the Spray Polyurethane Foam Alliance Accreditation Committee. The composite system shall include waterproofing of all "on roof" expansion joints, flashings, penetrations, elastomeric roofing membrane, foam insulation, and all materials and techniques required to properly adapt the roofing system to the particular substrate involved.
- F. Performance requirements of the weather coating shall conform to the following physical properties:
1. Base Coat:
 - a. Tensile Strength, ASTM D412, 1,000 psi
 - b. Elongation, ASTM D412, 375%
 - c. Permanent Set, ASTM D412, < 10%
 - d. Tear Resistance, ASTM D1004, 100 pli

- e. Water Resistance, ASTM D471, < 3%
- f. Shore A, ASTM D2240, 50-55
- 2. Topcoat:
 - a. Tensile Strength, ASTM D412, 2,300 psi
 - b. Elongation, ASTM D412, 230%
 - c. Permanent Set, ASTM D412, 10%
 - d. Tear Resistance, ASTM D1004, 200 pli
 - e. Water Resistance, ASTM D471, <2% (7 days)
 - f. Taber Abrasion, ASTM D4060, 16 mg (1,000 CS-17)
 - g. MVT (20 mils), ASTM E96, 0.9 perms
 - h. Shore A, ASTM D2240, 85
 - i. Fire Resistance, ASTM E108, Pass (as part of a tested system)
- 3. A polyurethane foam insulation and fluid applied coating system assembly is desired for this project, and, in order to avoid possible unknown and undesirable reactions, the following materials will not be acceptable for use on this project as part of the weather coating system: acrylic, butyl, synthetic rubber, neoprene, polyvinyl chloride, rubberized asphalt, asphalt emulsion, silicone, EPDM or any other sheet goods membrane, stone aggregate, bitumen modified urethane, or chloro- sulfonated polyethylene.
- 4. All coating materials shall be stored according to the manufacturer's written shelf life data requirements.
- G. Accessories:
 - 1. Fabric reinforcement and waterproofing coverings for expansion joints shall be compatible with specified fluid-applied roof coating system.
 - 2. Granules - #11 screen size, dust free, ceramic-coated roofing granule, as approved by Coating Manufacturer.
 - a. Similar to product manufactured by 3M Company, Minneapolis, MN.
 - 3. Miscellaneous materials such as adhesives, metal primers, metal vents and drains shall be a composite part of the roof system and shall be compatible with the specified fluid-applied roof coating system.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Do not install new roofing until all unsatisfactory conditions are corrected. Beginning work constitutes acceptance of all conditions.
- B. Grease, oil or other obvious contaminants must be removed as required by the foam manufacturer.
- C. Supporting members of roof-mounted equipment, such as air conditioners, evaporative coolers, fans, ducts pipes, etc. shall be examined to assure that they can be properly flashed with SPF.
- D. Manufacturer's representative, consultant, contractor and applicator shall meet at the job site for a Pre-Roofing Conference prior to commencement of work.
- E. Upon completion of the roof covering, coating manufacturer's representative, consultant, and applicator shall make a final inspection to verify the Polyurethane foam insulation/fluid applied waterproofing system meets manufacturer's requirements for warranty. Contractor shall notify all parties 48 hours in advance of such inspections.
- F. Metal surfaces to be foamed shall be free of rust, loose scale, dust, dirt, grease, oil or other contaminants.

3.2 SURFACE AND SUBSTRATE EXAMINATION

- A. Verify that deck/substrate is dry, clean, smooth and free of sharp edges, burrs, deep depressions, loose material, oil, grease or other foreign material.
- B. Verify proper placement and securement of all roof openings, pipes, curbs, sleeves, ducts, vents and drains.
- C. Beginning installation means acceptance of all existing surfaces conditions.

3.3 SURFACE PREPARATION

- A. Comply with manufacturer's instructions for preparation of surface and substrate to receive repair roofing.
- B. Inspect existing SPF surface, (that is scheduled to remain) and repair/replace all deteriorated/damaged SPF to ensure that the substrate is suitable to receive the new coating system.
- C. Remove all dirt, debris, loose granules and foreign material from the roof surface; thoroughly clean existing roof membrane assembly by means of rotary water jet scrubber (2000 psi, 4 GPM minimum); rinse thoroughly with large amounts of clean water, taking care to ensure that all detergent residue is removed from all surfaces to be recoated; repeat as necessary to provide a clean, chalk-free surface; allow roof assembly to dry for a period of not less than 24 hours prior to resumption of repair or re-coating operations. Follow roofing system manufacturer's recommendations.
- D. Beginning of installation means acceptance of conditions as satisfactory.
- E. All surfaces must be primed with appropriate primer as recommended by foam manufacturer prior to foam application.
- F. Temporary masking shall be installed to protect surfaces (such as vent stack covers, conduit, gutters, and drains) from SPF and coating. All existing HVAC and other equipment shall be protected from any damage that could be caused by the fluid-applied roof coating application. Raising, re-setting, and protection of air conditioning equipment, ventilators, and exhaust fans may be required.

3.4 DRAINS

- A. If necessary, after having removed all old foam and coating from drain hardware, and having thoroughly cleaned and prepared roof drain basins and/or scuppers, block inside of compression ring or through-wall scupper with stiff cardboard masking to prevent spray foam from entering drain opening.
- B. New foam should be sprayed to full system thickness at perimeter of masking. Immediately after spray foam has cooled to the touch, carefully cut away masking in one piece and remove from drain basin and/or scupper. Under no circumstances shall drain masking be allowed to remain in place longer than 1 hour.
- C. Spray foam at drains and/or scuppers shall be cut, planed, and filed to provide a smooth transition from the clamping ring to the surrounding roof area. Transition area shall extend a minimum of 18" from the center of the roof drain and/or scupper into the drainage area.
- D. Finished texture of transition areas shall match or exceed sample texture.

3.5 MINOR REPAIRS

- A. Prior to starting recoat operations, trim, clean, and fill with suitable caulking (Sikaflex one-part polyurethane sealant) all minor existing mechanical damage (areas of 4-inch x 4-inch or less) on all roof surfaces to be recoated.

- B. Caulking repairs shall be neatly tooled so as to provide drainage away from area of repair. Cut away or otherwise remove all coating or small foam blisters, filling voids with approved caulking material (maximum repair size to be 4-inch square).
- C. All repairs of this type shall be executed in such a way so as to provide positive drainage away from the area of repair and, under no circumstances, shall water be allowed to stand on repaired areas.

3.6 FOAM CRACK REPAIR

- A. All cracks in urethane foam substrate that are visible upon completion of washing operations shall be repaired by means of v-grooving and caulking.
- B. V-grooving shall be accomplished by means of a common utility knife or common wood working hand router. V-grooving operations must remove all rusted or deteriorated foam as required to provide a sound, clean surface to which caulking repairs will bond.
- C. Routed grooves shall be a minimum of 1/4" wide and 1/2" deep; all routed cracks shall be blown clean of all foam dust and other debris prior to installation of required caulking materials. Caulking shall be applied in such a manner so as to provide complete filling of routed voids and be tooled to promote positive drainage away from the completed caulk joint. Caulk joints shall be neatly feathered at all edges and be crowned at the center of the joint.

3.7 WET FOAM/BLISTER REPAIRS

- A. Blisters and/or wet areas in the foam insulation membrane shall be cut out and re-foamed. Foam in blistered and /or wet areas shall be removed down to the underlying substrate.
- B. All wet foam materials shall be removed and replaced by new, dry, spray foam materials. In the event that the substrate is found, upon exposure, to be wet or damp, it too shall be removed back to dry, sound, firmly adhered material. At the option of the Owner, substrate shall be repaired to match existing or replaced with spray foam materials.
- C. In those areas where foam is replaced, new foam surface height shall exceed existing height by 1/4", minimum. As a normal consequence of spray- foam repairs, a certain unevenness of foam texture may result. In order to effectively deal with this unevenness, the contractor, when directed by the Owner, shall be required to restore those areas repaired by spray foaming to a smooth and even profile by means of mechanical planing.
 - 1. Planing shall be accomplished by means of a self-propelled, mechanical scarfing device capable of making a finished cut of variable depth and capable of providing a flat, level, "boardstock smooth" finished surface.
- D. Debris generated from all planing operations shall be carried away immediately by means of an industrial roof vacuum and collected in the tank thereof. Accumulation on the roof of foam chips from planing operations shall not be permitted.
- E. Disposal of foam debris from repair operations shall be the responsibility of the roofing contractor and shall be carried out on a daily basis. Contractor shall ensure that, at the end of each days' planing operations, or if precipitation threatens, that all roof drains are open and free of planing debris.
- F. Upon completion of planing activities, planed areas shall be inspected to ensure that all areas are smooth and provide positive drainage. Re-foamed areas shall be approximately 1/4" higher than surrounding area and shall exhibit a smooth transition between repaired areas and existing roof assembly. Repaired areas shall not be permitted to hold water.
- G. Contractor shall carefully examine all roof perimeters and roof penetrations to determine that edge details are properly terminated and waterproof; all exposed foam at roof edges

and penetrations shall be planed and filed to provide an "as new" surface suitable for re-coating, or shall be removed and re-foamed.

3.8 PENETRATION REPAIRS

- A. All penetrations on the roof surface shall be inspected for any defect, including, but not limited to, rough, deteriorated, damaged, or uncoated foam.
- B. All penetrations that exhibit these or similar defects, must be treated so as to provide a smooth transition between the vertical and the horizontal.
- C. Contractor shall remove any lumps, folds, or other irregularities and restore said penetrations to a condition suitable to the owner, or his representative prior to installation of new coating system.

3.9 SPRAY POLYURETHANE FOAM APPLICATION

- A. Techniques used to apply urethane foam to roof shall be as recommended by the manufacturer of the spray urethane foam, including equipment type.
- B. Spray foam operations shall be performed only during periods of calm, open weather. All surfaces to receive spray foam shall be dry and free of dew, moisture, or frost. Primers shall be dry and free of solvent before foaming. Spraying operations shall not be conducted when wind velocity exceeds 15 MPH or if precipitation threatens. Spraying operations shall cease if substrate temperatures come within 5 degrees F of dew point.
- C. All off-ratio spray foam to be removed and refoamed immediately during foaming operations.
- D. Surface texture of the applied spray foam shall be free of excessive ridges, bumps, pinholes, etc. Acceptable foam profile shall be "smooth" or "orange peel" foam texture as defined by the SPFA Document PFC-D-GSI-1/88. All other surfaces shall be removed by means of grinding smooth or the foam shall be cut out and removed, and the area refoamed, at the option of the Poudre School District.
- E. Remove all foam over spray from electrical conduits and gas piping to allow proper coating of same. Foam shall terminate a minimum of 6" above the field of the roof at all parapet walls and roof penetrations where possible. Foam at all roof penetrations, perimeters, and deck/parapet junctures shall be applied and dressed to prevent water damming or ponding and provide a smooth transition from vertical to horizontal.
 - 1. All reglet and wall flashing shall be considered as part of the roof with regard to foam and coating thickness and texture requirements.
 - 2. Any "folds" or other irregularities at these locations shall be removed by sawing, planing and filing. Undercuts to be caulked flush with urethane caulking and allowed to cure.
 - 3. Any flashing required at gutters or expansion joints shall be protected and lined with 60 mil uncured EPDM sheet applied prior to foam coating application.
 - 4. Verge of Popcorn foam texture may be rejected at the discretion of Poudre School District and the Consultant. If rejected, the area shall be cut out and refoamed at no expense to the Owner.
 - 5. All overhanging roof perimeters shall be planed and filed to prevent damming or ponding at roof edges. In no instance shall foam be allowed to "curl" over roof edge or be visible from below. Foam shall be applied to taper to 0" between 12" to 4" of the roof edge. Flashing shall be in place to protect the outside 4" of roof edge from SPF allowing only coating to reach the edge of the roof.
 - 6. All wall flashing shall be considered as part of the field of the roof with regard to foam and coating thickness and texture requirements.

3.10 FINISHED FOAM THICKNESS

- A. Polyurethane foam shall be applied in such a manner to provide a minimum of 1.5" thickness over the entire surface. Foam passes shall be at least ½" in thickness but not more than 1½" in thickness.
- B. Finished foam thickness shall match existing, + ¼".
- C. All polyurethane foam in any area shall be applied to full finished thickness the same day. "Drying in" of the structure will not be permitted unless this requirement can be met. Foam shall be terminated neatly a minimum of 3-inches above the roof line at all penetrations (except drains, parapet walls, or building junctions).
- D. All existing and new curb caps and other sheet metal detailing that is related to equipment service shall remain exposed. Under no circumstances may conduits, gas piping, or other roof accessories that may require service by Poudre School District or other trades be covered by spray foam.
- E. Foamed-in-place cants shall be smooth and uniform to allow positive drainage.

3.11 FOAM SURFACE CONDITION

- A. The polyurethane foam surface shall be allowed to cure sufficiently according to the manufacturer's recommendation and in accordance with the ambient temperature conditions. If, due to weather conditions, more than 48 hours elapse between foam and coating application, the foam shall be inspected for degradation or contamination.

3.12 DRAINAGE

- A. Finished polyurethane foam surface shall have sufficient slope to prevent excessive ponding water. Excessive ponding is defined as "as areas of 50 square feet or more in area which holds in excess of ½" of water as measured 24 hours after a rainfall in 60 temperatures."
- B. Small areas of standing water (bird baths) are acceptable. If the substrate does not have sufficient slope, then excessive ponding of water must be eliminated, either by building in slope by the application of additional spray foam or by the installation of pre-formed crickets.
- C. All polyurethane foam installed for drainage correction ("crickets" or slope) shall be installed directly upon the existing roof surface and beneath the final foam membrane "lift".
- D. Drainage correction by means of tapering the top "lift" of foam, except for minor detailing, will not be permitted.

3.13 EQUIPMENT PENETRATIONS / VENTS

- A. Take care to prevent roofing materials or debris from entering the building below. Exposed curbing shall then be cleaned, primed, and made ready to accept spray foam materials. Once primer has dried, spray foam shall be applied to restore water tightness prior to end of daily roofing operations or immediately if precipitation is imminent.
- B. Clean and prime all vents to receive SPF.

3.14 APPLICATION OF PROTECTIVE COATING OVER SPF

- A. General Requirements: Protective coating system shall be spray-applied over all polyurethane foam surfaces in accordance with the manufacturer's printed instruction.
 1. The composite system shall include waterproofing of all "on roof" expansion joints, flashing, penetrations, elastomeric roofing membrane, foam insulation, and all materials and techniques required to properly adapt the roofing system to the particular substrate involved.

2. Polyurethane foam and adjacent surfaces to be coated shall be completely free of any degraded foam, foam over spray, grease, oil, dirt or other contaminates which will interfere with proper coating adhesion.
3. Any physical damage to the polyurethane foam shall be repaired before coating application commences. All oxidized polyurethane foam shall be repaired or replaced.
4. Verify that polyurethane roofing foam surface texture ranges from smooth orange peel to verge of popcorn and is acceptable to receive the fluid-applied roof coating system. "Popcorn" or "tree bark" surfaces are unacceptable and must be reworked or replaced prior to coating
5. Protect all property from overspray or other damage.
6. Install coating system according to manufacturer's recommendations, a copy of which shall be present on the jobsite at all times.
7. It shall be the responsibility of the operator of the application equipment and mechanic to apply the materials at the rate required by the weather barrier coating supplier to give the required dry mil thickness of the finished membrane.
8. The coating manufacturer shall provide minimum and average film thickness requirements, on a coat by coat basis, for the installed system.
9. In the case of two-part systems, the materials shall be pre-mixed. Proper ratio of the two components shall be required at all times during the application and is the responsibility of the Quality Controller.
10. Coating thickness requirements shall be tested at all areas of the roof including roof penetrations and parapet walls.
11. No uncoated foam shall be allowed at any location on the finished roof system.
12. In no case shall the installed system be applied in less than three coats.
13. The first/base coat of the protective coating shall be applied on the same day that polyurethane foam is applied, but only after the foam has sufficient time to cure. Depending upon weather conditions, this is normally achieved within four hours after application. Do not apply protective coating to the exposed leading edge of the foam at unfinished areas.
14. Protective coating shall extend up and over all polyurethane foam on vent pipes, parapets and other penetrations and terminated a minimum of 3" above the foam creating a self-terminating flashing.
15. If, due to unforeseen conditions, the polyurethane foam remains uncoated for more than 72 hours, the uncoated foam must then be inspected by the consultant prior to coating. Should oxidation occur, the foam surface shall be brushed with a stiff broom or mechanically scarfed or sanded; a minimum ½" pass of foam shall then be applied to reseal the surface.
16. Contractor shall have at all times in close proximity to the spraying operations sufficient buckets for depositing solvent when flushing catalyzed material from the gun. Exercise extreme care so as not to contaminate roof surface with solvent
17. Refer to manufacturer's printed application instructions for specific details on mixing and equipment settings.
18. All foam that has been cut or ground down removing the skin shall have the first application of coating applied by medium nap roller to fully seal the exposed foam cells.

- B. Spray Technique: Protective coating shall be spray applied in two (2) separate color coats to assure positive coverage and proper film build. Contrasting colors shall occur between base coat, second coat and first topcoat.
 - 1. Criss-cross or cross-spray technique shall be used to assure positive coverage. Aesthetics are essential to the successful completion of his project. Visible coating / granule pass lines shall not be accepted on the final surface.
 - 2. The second coat shall be applied in a direction perpendicular to the first coat at soon as the first coat has dried sufficiently to allow applicator to walk on.
 - 3. The topcoat shall be applied as soon as the second coat has dried sufficiently to allow applicator to walk on.
 - C. To prepared spray polyurethane dry foam, apply the base coat according to the procedure as prescribed by the manufacturer.
 - 1. In those areas of the roof surface where foam has been replaced and/or planed, pre-coating with an additional application of base coat membrane is required. An extra coat of not less than 18 dry mils must be applied to restore original system thickness.
 - a. This material is to be installed in addition to the specified recoating system. The material used for this restoration shall be same material to be used for the new coating system base coat.
 - D. Coating shall extend down into drains and/or scuppers far enough to thoroughly coat entire drain/scupper area with full system thickness.
 - E. Coating shall terminate a minimum of three inches beyond all spray foam perimeters.
 - F. Coating returns shall be neatly terminated and provide uniform architectural detail.
 - G. Install equipment walkways according to coating manufacturer's recommendations.
 - H. Paint all newly installed and existing sheet metal to match existing, as required by Owner.
- 3.15 PINHOLE COATING REPAIRS
- A. In dry "pinholed" areas, repairs shall be made prior to the installation of the system base coat.
 - B. New base coat material, Neogard Permthane Aliphatic II, shall be applied to all "pinholed" areas at the rate of 1 gallon per 100 ft². Immediately following coating application, broadcast a light application 20/40 mesh silica sand into wet coating at the rate of 15 lbs. per 100 ft², and allow to cure.
 - 1. Do not fill wet coating to the point of refusal with silica sand.
 - 2. Owner shall inspect repaired surface of roof membrane prior to installation of system base coat to determine, to his satisfaction, that "pinhole" repairs are complete and adequate.
- 3.16 BASE COAT
- A. Once pre-coating of repaired areas is complete, installation of the new base coat membrane shall commence. New base coat material, Neogard Permthane Aliphatic II, shall be applied to all foamed surfaces to yield a dry film thickness of 18 mils.
 - B. Prior to the installation of topcoat materials, base coat application shall be thoroughly inspected by contractor to ensure that all repairs, major or minor have been completed, and comply with specification requirements.
 - C. All caulking at drain basins, roof perimeters, roof penetrations, mechanical units, etc., shall be completed prior to installation of topcoat membrane.

3.17 TOPCOAT

- A. New topcoat material, Neogard Permthane Aliphatic II, shall be applied to yield a dry film thickness of 18 mils. Contractor shall backroll both applications of topcoat material and terminate all coating returns to provide pleasing architectural detail and a neat appearance.
- B. Coating application shall result in the restoration of the existing weather coating system to a uniform and seamless condition, free of "holidays", "skips", or pinholes.

3.18 GRANULE ROOF SURFACE

- A. After the Quality Controller has determined that the weather coating system installation has been completed to manufacturer's specifications with regard to minimum and average film thickness requirements, install additional 2/3 gallon per 100 ft² of top coat material, Neogard 7490-CA, to all previously top coated surfaces.
- B. Immediately following application of additional top coating, embed in the wet coating 3M ceramic coated roofing granules (color: white) at the rate of 50# per 100 ft². Granule application shall be made by means of a sandblast pot assembly or other device capable of maintaining production rates similar to that of the coating operation.
- C. Granule application shall be made within two minutes of coating application and shall result in even and complete coverage of all surfaces to which spray foam and top coating has been applied, including parapets and other vertical surfaces.
 - 1. Excess granules shall be removed from the roof surface after the topcoat has dried sufficiently to allow foot traffic (minimum dry time-24 hours).

3.19 SYSTEM THICKNESS

- A. Foam Thickness: Match Existing + 1/4-inch
- B. Primary repair base coat: 18 dry mils
- C. System base coat: 18 dry mils
- D. Granule coat: 8 dry mils

3.20 INSPECTIONS

- A. The cured dry film thickness of the finished membrane application shall be confirmed by the removal of slit samples from the roofing system, after which they shall be examined under magnification by means of an optical comparator. Poudre School District's Consultant may direct the Contractor to extract slit or core samples from the roof at any point to determine SPF system compliance.
- B. If finished installation is found to be specifically deficient, CONTRACTOR shall bring installation into compliance before notice of substantial completion is issued to Poudre School District. Release of job retainage funds shall be contingent on receipt by Poudre School District of duly executed MANUFACTURER'S warranty documents.
- C. During the term of the Contractor warranty, CONTRACTOR shall inspect finished installation annually, making note of any repairs required and informing Poudre School District of the same. CONTRACTOR shall maintain inspection records on file for the term of the warranty.

3.21 FIELD QUALITY CONTROL

- A. Roofing Contractor's Quality Control:
 - 1. During construction, contractor is to provide **DAILY** supervision of the project, performed by the **contractor's field superintendent** (not to be confused with the project foreperson who is to be on site at all times).
 - 2. Contractor's **project manager** is to perform regular site inspections at the minimum rate of one site visit per week.

3. Upon completion of installation, contractor is to perform their own final inspection by their quality control person to confirm that roofing system has been installed in accordance with the construction documents and manufacturer's requirements. Contractor is to produce a written punch list and roof diagram of deficiencies found during their final inspection. Correct identified defects and/or irregularities. A copy of this punch list, diagram and signed completion letter along with confirming digital photos, will be provided to the consultant prior to the owner and consultant performing their final inspection.

B. Manufacturer's Field Service:

1. Roofing system manufacturer shall provide on-site observation (a minimum of two site visits during installation) and instructions during installation, and as the manufacturer deems necessary.
2. Upon completion of installation, provide a final inspection by a technical representative of roofing manufacturer to confirm that roofing system has been installed in accordance with manufacturer's requirements. The roofing contractor, owner and roof consultant are required to be present for this inspection. The manufacturer is to produce a written punch list and roof diagram of deficiencies found during their final inspection. A copy of this punch list, diagram and signed completion letter, will be provided to the owner's roof consultant prior to the owner and consultant performing their final inspection. Consultant and owner to attend final inspection. Installer is responsible for notifying both the owner and consultant two (2) weeks in advance of the manufacturer's inspection. Failure to notify both the owner and consultant may require a reinspection of the roof by the manufacturer at no cost to the owner.
 - a. The manufacturer is to perform an 18-month inspection of the entire warrantied roof system 18-months after the guaranty issuance date. The roofing Installer, owner, and roof consultant are required to be present for this inspection.
 - b. Installer shall accompany the manufacturer's technical inspector and consultant during the final inspection and assist the inspector with equipment and workmen when necessary to provide access to the roof. Correct all defects noted during the inspection per roof manufacturer's requirements.

3.22 CLEANING AND PATCHING

- A. Remove trash and debris resulting from roofing work at end of each day's work.
- B. Remove any markings caused by roofing from building surface.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.
- D. All over spray and associated damage and clean-up to Poudre School District's, employees, public and neighbor's property shall be the entire responsibility of the Contractor.
- E. All deficiencies shall be repaired within 5 working days after final inspection.
- F. Areas of thin coating shall be cleaned of all loose granules, primed and recoated with additional topcoat.

3.23 PROTECTION

- A. Protect interior of building from water infiltration that may be caused by any work associated with this contract. Installer is responsible for insuring that the new and existing roof is kept watertight during construction.
- B. Protect newly installed roof system from damages that may be caused by any work associated with this contract. Any damages to the new roof system or the existing structure

resulting from operations associated with work of the Installer will be repaired at no cost to the owner by the roofing Installer.

- C. Repair or replace defaced or disfigured finishes caused by work in this section.
 - D. Provide adequate protection of completed work until substantial completion. Prevent traffic, storage, or movement of materials or equipment on completed roofing.
 - E. Clean up all rubbish, debris, surplus materials, tools and equipment, and remove from site.
- 3.24 COMPLETION

- A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Installer. All defects noted and non-compliance with the Specifications or the recommendations of the manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Installer to the satisfaction of the Owner's Representative and the manufacturer prior to demobilization.
- B. All punch-lists shall have been completed, and warranties referenced in this Specification shall have been delivered to the Owner's Representative prior to the Owner accepting the project for final payment.

END OF SECTION 07 5700

SECTION 07 6200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES:

- A. Shop or field-formed sheet metal work for moisture protection including:
 1. Formed sheet metal work for moisture protection.
 2. Formed roof drainage sheet metal fabrications.
 3. Formed low-slope roof sheet metal fabrications.
 4. Formed flashing and counterflashing.
 5. Reglet flashing.
 6. Formed expansion-joint cover flashings.
 7. Miscellaneous sheet metal accessories.

1.3 RELATED SECTIONS:

- A. Section 07 0150 – Minor Demolition and Renovation Work.
- B. Section 07 5400 – Sprayed Polyurethane Foam Roofing.

1.4 ALTERNATES:

- A. Work specified in this Section may be affected by Alternates. Refer to General Conditions and the bid form.

1.5 REFERENCES:

- A. American Society for Testing and Materials (ASTM):
 1. ASTM A525 – Steel Sheet, Zinc-Coated (Galvanized), General Requirements.
 2. ASTM A526 – Steel Sheet, Zinc-Coated (Galvanized), Commercial Quality.
 3. ASTM B32 – Solder Metal.
 4. ASTM D4586 –Asphalt Roof Cement.
- B. Federal Specifications (GSA):
 1. GSA A-A-1922A – Single Lead Expansion Shield Anchor
 2. GSA A-A-1923A – External Fastener Expansion Shield Anchor
 3. GSA A-A-1924A – Self Drilling Expansion Shield Anchor
 4. GSA A-A-1925A –Nail-In Shield Expansion Anchor
 5. GSA A-A-55614 – Non-Drilling Expansion Shield Anchor
 6. GSA TT-S-00230C – Sealing Compound, Elastomeric Type, Single Component (For Caulking, Sealing and Glazing in Buildings and Other Structures).
 - a. Type II Class A Joint movement 50%.
- C. National Roofing Contractors Association (NRCA): Roofing Manual Consisting of:
 1. NRCA Roofing Manual: Architectural Metal Flashing, Condensation & Air Leakage, and Reroofing 2014
- D. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Architectural Sheet Metal Manual, 7 Edition, 2012.

- E. Drawings
- 1.6 SUBMITTALS:
 - A. Product Data: Submit manufacturer's product data sheets for each product in accordance with applicable Section.
 - B. Shop Drawings:
 - 1. Submit in accordance with applicable Section.
 - 2. Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop-assembled and field-assembled work. Include the following:
 - a. Identification of material, thickness, weight, and finish for each item and location in Project.
 - b. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - c. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - d. Details of termination points and assemblies, including fixed points.
 - e. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 - f. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings as applicable.
 - g. Details of special conditions.
 - h. Details of connections to adjoining work.
 - i. Detail formed flashing and trim at a scale of not less than 3-inches per 12-inches.
 - 3. Contractor to provide their own "shop drawings" for review. Manufacturer's standard details, as well as, submission of contract documents will not be accepted as project specific shop drawings.
- 1.7 PERFORMANCE REQUIREMENTS
 - A. General: Sheet metal flashing and trim assemblies as indicated to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
 - B. Wind Design: Fabricate and install parapet Copings that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist roof edge design pressure (P) as identified in ANSI/SPRI-ES-1, as calculated according to ASCE 7-16 with a safety factor of 2.0 for Allowable Stress Design.
 - C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range):
 - a. 120 degrees Fahrenheit, ambient air temperature
 - b. 180 degrees Fahrenheit, material surface temperature
 - D. Water Infiltration: Provide sheet metal flashing and trim that will not allow water infiltration into the building interior.

1.8 WARRANTY:

- A. Provide Owner a written warranty for the sheet metal work to be free of leaks and defects in materials and workmanship for two (2) years after date of completion and acceptance of project by owner.
- B. Provide Owner with manufacturer's twenty (20) year Warranty covering wind blow off, leaking, and membrane failure, up to and including, winds of 120 miles per hour ultimate wind speed on One-Edge fascia/coping system as defined above.
- C. Special Warranty on Finishes: Provide sheet metal manufacturer's standard twenty (20) year Kynar coating warranty.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIAL:

- A. Galvanized Steel: ARMCO Zincgrip Paintgrip, ASTM A526 commercial quality, coating designation G90, ASTM A525, gauge as scheduled.
- B. Pre-Finished Metal: Kynar Coated 24-gauge (0.0276-inch) metal as scheduled. Color as selected by Owner.

2.2 FASTENERS:

- A. Nails: Galvanized steel material, 3/8-inch flathead, wire, barbed, slating type. For washers use silicone, EPDM, or neoprene.
- B. Screws: Self-tapping sheet metal type and wood screws, cadmium or zinc plated.
- C. Rivets: Stainless steel or aluminum material, type and size as recommended by sheet metal manufacturer.
- D. Concrete Fasteners: Round-head stainless steel screw and neoprene washer with "Nail-In" expansion anchor. Acceptable fasteners:
 - 1. Powers Fasteners' Zamac Hammer-Screw

2.3 RELATED MATERIAL:

- A. Solder: ASTM B32, alloy grade 58, 50% tin, 50% lead.
- B. Flux: Phosphoric acid type, manufacturer's standard.
- C. Sealant: Polyurethane, GSA TT-S-00230C, Type II, Class A.
- D. Bituminous Plastic Cement: ASTM D4586, Type I, asbestos free.

2.4 FABRICATION – GENERAL:

- A. Fabricate work in accordance with SMACNA Sheet Metal Manual and reviewed Shop Drawings.
- B. Form sheet metal on bending brake.
- C. Shape, trim and hand seam metal on bench insofar as practicable.
- D. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
- E. Form materials with straight lines, sharp angles and smooth curves.
- F. Fold back edges on concealed side of exposed edge to form a ½-inch hem.
- G. Weld or solder joints on parts that are to be permanently and rigidly assembled.

2.5 FABRICATED ITEMS:

- A. Pre-Manufacturer Fascia/Edge Metal:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated sheet steel; One-Edge ® by Metal Era, as detailed, in minimum 12 feet lengths. Provide factory mitered corners, end-caps and end-terms. Lap joints and seal per manufacturer and contract requirements.
 2. Approved equivalent.
- B. Parapet Cap:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated sheet steel Perma-Tite coping system by Metal Era, in minimum 12 feet lengths. Provide factory mitered corners. Lap joints and seal per SMACNA requirements and contract documents.
 2. Approved equivalent.
- C. Edge/Eave Metal:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated sheet steel per manufacturer's details and requirements, as detailed, in minimum 10 feet lengths. Fasten and seal per roof manufacturer requirements
- D. Fascia:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated steel Formed Fascia Extender (if required) with Offset by Metal Era as detailed, in minimum 10 feet lengths. Provide factory mitered corners. Lap joints and seal per SMACNA requirements.
- E. Through-Wall (and overflow) Scuppers:
 1. 24-gauge (0.0276-inch) Galvanized steel, SMACNA Figure 1-26 & 1-27, joints welded per manufacturer requirements.
- F. Counter flashings:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated prefinished sheet steel, formed in minimum 10 feet lengths.
- G. Gutters:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated prefinished sheet steel, formed in minimum 10 feet lengths.
 2. Provide outlet thimble to fit downspouts, complete with downspout strainer.
 3. Provide expansion joints at 50-foot on center maximum, per SMACNA Figure 1-6.
- H. Downspouts:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated prefinished sheet steel and sealed per SMACNA requirements.
- I. Roof Penetration Flashing Pipes:
 1. 24-gauge (0.0276-inch) Galvanized Kynar coated prefinished sheet steel, in accordance with the design documents and per SMACNA Figures 8-8, 8-9, 8-10, and 8-11.
- J. Metal Penetration Dams:
 1. Fabricate as detailed from 24-gauge (0.0239-inch) PVC coated steel.
- K. Umbrella Counter flashing:
 1. 24-gauge (0.0276-inch) Galvanized sheet steel, similar to SMACNA Figure 8-9C, two-piece construction, fabricated as detailed.
- L. Splash Blocks:

1. Precast concrete of size and profile indicated; minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment; suitable for downspouts discharging at grade level or onto roof surface.

2.6 UNDERLAYMENT MATERIALS

A. Self-Adhered Sheet:

1. Grace Ice and Water Shield Vycor Ultra (No other underlayment is approved).

2.7 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work:

1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Exposed to View (Unfinished) Galvanized Steel Components:

1. Paint to match pre-painted metallic-coated steel prior to installation (where applicable)
2. Clean: Comply with SSPC-1 - Solvent Wipe.
3. Primer: Apply specified or finish paint manufacturer's recommended primer in accordance with manufacturer's instructions.
4. Finish Coat: Apply powder coating or approved urethane enamel in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrates are smooth and clean to extend needed for sheet metal work.
- B. Verify that reglets, nails, cants, and blocking to receive sheet metal are installed and free of concrete and soil.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 1. **WARNING:** Confirm nailers provided by others are adequate for fastening Sheet Metal To and meet wind load structural requirements for Component & Cladding.
- D. Do not start sheet metal work until conditions are satisfactory.

3.2 GENERAL

- A. Remove all existing sheet metal and properly dispose of prior to installation of new sheet metal.
- B. Install work watertight without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
- C. Install fabricated sheet metal items in accordance with SMACNA Sheet Metal Manual and Drawing Details.
- D. Coat contact surfaces of dissimilar metals with Zinc chromate paint or isolation vinyl tape.
- E. Installation Tolerances:
 1. Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.3 INSTALLATION

A. General:

1. Install sheet metal items to produce complete roof drainage system according to SMACNA recommendations and as indicated.
2. Coordinate installation of roof perimeter flashing with installation of waterproofing membrane.

B. Pre-Manufactured Fascia/Edge Metal:

1. Prior to installation, apply a continuous 3/8-inch bead of non-curing sealant to the inside face of the 12'-0" Metal-Era base rail.
2. Along the exterior face of all parapet walls, after installation of new 3-inch x 3-inch L-metal and membrane overlay, install new 12'-0" Metal-Era base rails from right-to-left as seen from the roof top, lapping the previous section 1-inch.
3. Fasten base rails through new 3-inch x 3-inch L-metal to new wood nailers, using the provided slots within the base rails at a maximum of 12-inches on center.
4. Install new 6-inch spring clips every 48-inches on center. Ensure there is a spring clip under each fascia cover end.
5. Fascia covers shall be installed from left-to-right as seen from the roof top. Place splice plates in right end of the cover. Snap right cover onto base rail by applying downward pressure with palm of hand until the fascia cover is fully engaged along the entire length.

C. Fascia:

1. Install fascia, where indicated on drawings, with hook strip fastened at a rate of 12-inches on center and with top of the fascia fastened at a rate of 6-inches on center. Insure that fascia metal is installed to allow for movement, and to prevent warping, buckling and/or oil- canning.

D. Eave/ Edge Metal:

1. At roof edge locations with no parapet, install reinforced securement strip adhered to substrate prior to installing new edge metal.
2. Hang assembly over new continuous anchor cleat.
3. Set horizontal flanges over reinforced securement strip per manufacturer requirements, and nail to wood blocking at 3 to 4 -inch O.C. staggered.
4. Install new metal fastened per roof manufacturer and contract documents.
5. Install edge metal to ensure even/plumb appearance, allowing for expansion per manufacturer requirements.

E. Scuppers:

1. Install with joints fully soldered. Extend flanges 4 -inches in each direction.
2. Install wood nailers under flange.

F. Flashings, Counter flashings:

1. Extend flanges into reglets and securely fasten.
2. Where fastening is required, fasten at 6-inch O.C.
3. Overlap 4-inch (minimum) on base flashing, lap ends of sheets 4-inches as required by SMACNA.
4. Install continuous bead of sealant along top of and behind surface applied Reglet/Counter flashing.

G. Gutters:

1. Install gutter with proper slope to the downspouts, properly supported with new 1-inch gutter straps of same material as gutter, spaced at 24-inch O.C. maximum.
 2. Lap joints per SMACNA requirements and seal with caulking.
 3. Strip in gutter joints with 6-inch self-adhered EPDM membrane cover strip.
 4. Provide outlet thimble to fit down spouts complete with down spout strainer.
 5. Provide expansion joints at 50 feet on center maximum, SMACNA Figure 1-6.
 6. Solder and rivet down spout thimbles, extend 2 -inch into Down spout. Install strainers at each down spout.
- H. Gutter Hangers:
1. Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric sealant and 6-inch EPDM. Provide for thermal expansion.
 2. Attach gutters at eave or fascia to firmly anchored gutter brackets and straps spaced not more than 12-inches apart.
 3. Provide end closures and seal watertight with sealant.
 4. Slope to downspouts.
 5. Fasten gutter spacers to front and back of gutter.
 6. Loosely lock straps to front gutter bead and anchor to roof deck.
 7. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 12-inches apart.
 8. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
- I. Downspouts:
1. Install plumb and level, attached to wall with 1¼ -inch wide 24-gauge (0.0276-inch) prefinished galvanized sheet steel straps at top, bottom, and 10 feet on center maximum.
 2. Set splash pans in lap sealant on roof at bottom of down spouts.
- J. Splash Blocks: Install where downspouts discharge on low-slope roofs or onto grade.
1. Roof Discharge: Set on traffic pads compatible with roofing membrane.
 2. Grade Discharge: Set on a bed of compacted fill.
 3. Fire Test Nozzles: Set on traffic pads compatible with roofing membrane.
- K. Metal Penetration Dams:
1. Install at equipment supports, pipes, conduits, and other items penetrating roof where membrane or penetration flashing cannot be used.
 2. Roof Penetration Flashing-Pipes: Install at multiple pipes and small pipes and conduit penetrating roof. Fully solder connections and seams.
 3. Umbrella Counter flashing (Option for single pipe penetration):
 - a. Install sleeve with deck flanges.
 - b. Fully solder connections and seams.
 - c. Set umbrella in mastic and tighten draw bands.
 - d. Seal top of umbrella with sealant.
- L. Expansion-Joint Covers:
1. Install expansion-joint covers at locations and of configuration indicated in Drawings. If not indicated in Drawings, located expansion joints no greater than 50 feet apart in any Gutter Section.

2. Locate 2 downspouts for each 50 feet section of gutter (minimum).
3. Lap joints a minimum of 4-inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General:

1. Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual."
2. Provide concealed fasteners where possible, set units true to line, and level as indicated.
3. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
4. Install starter and edge strips, and cleats before starting installation.
5. Strip in all sheet metal flanges the same day they are installed.

B. Roof Edge Flashing:

1. Fasten to resist uplift and outward forces specified in Part 1 and as indicated.
2. Backer Plates:
 - a. Secure with fasteners suitable for substrate, 6-inches O.C. each face.
3. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 12-inch centers.
4. Apply 1/4-inch bead of sealant between each layer of metal at each edge.
5. Cover Plates:
 - a. Hook front or exposed face of cover plate over drip edge.
6. Do not use mastic between sheet metal components.

C. Pipe or Post Counterflashing:

1. Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4-inches over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing:

1. Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4-inches over base flashing.
3. Lap counterflashing joints a minimum of 4-inches and bed with elastomeric sealant.
4. Sawcut new reglets where required.
 - a. Provide bayonet style lap joints, minimum 4-inch overlap.
 - b. Fill voids between wedges with backer rod.
 - c. Seal receiver to vertical face of wall.
5. Secure in a waterproof manner by means of snap-in installation and sealant or plastic wedges and sealant.
6. Install surface mounted reglets true to lines and levels.
 - a. Seal top of reglets with sealant.
 - b. Secure in place with neoprene head screws at maximum 12-inches on center.

E. Roof-Penetration Flashing:

1. Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

2. Install lead flashings at all soil pipe penetrations. Turn lead flashing down inside piping, being careful not to block vent piping with flashing.
3. Provide Penetration Seal System at all small penetrations not otherwise detailed.
 - a. Clean roof surfaces to receive Penetration Seal Systems.
 - b. Clean pipes and penetrating elements to remove plastic cement, bitumen, and other contaminants by wire brushing and scraping.
 - c. Caulk around penetrating elements with curb adhesive.
 - d. Apply beads of curb adhesive to flat side of first precast curb component. Place caulked curb onto roof surface to form half circle around penetrating element.
 - e. Apply beads of curb adhesive to flat side and to scarf joints of second precast curb component. Place second section of curb onto roof surface to form circle with first section. Press scarf joints together firmly and press both sections down.
 - f. Apply continuous bead of curb adhesive around outside edge of curb at roof.
 - g. Fill around penetrating element with pourable sealant to top of curb.
4. Pitch Pans:
 - a. Pitch pans filled with roof cement are not allowed.
 - b. Pitch pans with pourable sealants produced by the manufacturer are allowed:
 - 1) Install only where specifically indicated or approved by Consultant.
 - 2) Fill with Pourable sealant to below top of flange.
 - 3) Top off with pourable sealant creating a flow off non-ponding surface.
5. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.
6. Protect all membrane penetrations as indicated and as recommended in SMACNA and NRCA manuals.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 CLEANING:

- A. Leave work clean and free of stains, scrap, debris, and normally in better condition than when project started.
- B. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- C. Clean and neutralize flux materials. Clean off excess solder and sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200