



Smart engineering of
roofs, walls, pavements
and waterproofing

Project Manual

2019

Partial Reroofing

Duluth Transit Authority Operations Center

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Duluth, Minnesota

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The Duluth Transit Authority

PROJECT

2019 Partial Reroofing
Duluth Transit Authority Operations Center
2402 West Michigan Street
Duluth, Minnesota

OWNER

Duluth Transit Authority Operations Center
2402 West Michigan Street
Duluth, Minnesota 55806

ARCHITECT

Inspec, Inc.
5801 Duluth Street
Minneapolis, Minnesota 55422

Project No. 214706.1

I hereby certify that roofing-related plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Architect under the laws of the State of Minnesota.

Signature  Typed Name Gary C. Patrick, AIA, RRC, CSI
Date 4.11.19 Reg. No. 22295

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SECTION 01 10 00
SUMMARY

PART 1 - GENERAL

1.1 GENERAL

- A. Sections of Division 1 - General Requirements govern the work of all sections of the Specifications.
- B. Supply all labor, transportation, materials, apparatus and tools necessary for the entire proper completion of this Work; install, maintain and remove all equipment for the proper execution of this Contract; be responsible for the safe, proper and lawful performance of equipment, maintenance and use of the same; and perform in the best manner, and everything properly incidental thereto, as stated in the Contract Documents or reasonably implied therein.

1.2 DEFINITIONS

- A. The words *install, provide, furnish, include, supply, apply, place*, or any combination thereof, are intended to be synonymous and to indicate that the material or work specifically mentioned is to be furnished and installed completely by this Contractor and incorporated into the Work, unless specified otherwise.

1.3 DESCRIPTION OF WORK

- A. Existing Roof System Description:
 - 1. **Administration (High):** Steel deck, 1/2" gypsum sheathing, two-ply vapor retarder in asphalt, and a four-ply gravel surfaced asphalt membrane.
 - 2. **Administration (Low):** Cast-in-place concrete deck, two-ply vapor retarder, multiple layers of tapered urethane insulation (1" to 11" thick), 1/2" perlite in asphalt, and a four-ply gravel surfaced asphalt membrane.
 - 3. **Maintenance:** Steel deck, 3/4" perlite insulation, two-ply vapor retarder, two layers of 1.5" urethane insulation and 3/4" perlite insulation in asphalt moppings, with a four-ply gravel surfaced asphalt membrane.
 - 4. **Bus Storage:** Steel deck, 3/4" perlite insulation, two-ply vapor retarder, two layers of 1.5" urethane insulation and 3/4" perlite insulation in asphalt moppings, with a four-ply gravel surfaced asphalt membrane.
- B. Summary of Roofing-Related Work - The Work includes, but is not limited to:
 - 1. Remove existing materials to the deck on all areas (except existing vapor retarder on Administration (Low) may remain if in good, dry condition.
 - 2. Remove up to five obsolete penetrations and cover openings in the deck as indicated on the Drawings.
 - 3. Install new non-treated roof-related wood blocking as indicated at the details. Include 2,000 board feet of wood blocking replacement in the bid for wood blocking in excess of 19 percent moisture, showing evidence of rotting, or in a condition unable to provide proper support.
 - 4. On Administration (Low), install a new two-ply vapor retarder in asphalt over the existing vapor retarder. Install 1/8"/ft. tapered isocyanurate insulation as indicated on the Drawings, followed by a top layer of 1" rigid insulation in asphalt moppings.

5. On all other areas, mechanically fasten 1" perlite to the steel decks followed by a two-ply fiberglass felt vapor retarder in asphalt moppings. Install two layers of 2" isocyanurate, one layer of 1.5" isocyanurate, and a top layer of 1" rigid insulation with all layers mopped in asphalt.
6. Install four plies of fiberglass felts in asphalt moppings with an asphalt flood coat and gravel surfacing. Install a two-ply base flashing system at all canted and vertical surfaces. Provide membrane manufacturer's 25-year NDL total system warranty.
7. Install new scuppers, overflow scuppers, downspouts, splashpans, pipe supports, pipe box enclosures, sleeper curbs, sheet metal reglet inserts.
8. Install pre-engineered standing seam metal roof panels, as detailed at the duct enclosure after roofing is completed in the area.
9. Disconnect, modify, and reinstall or replace to match, mechanical/electrical communication lines, braces/brackets, boiler/heat stack curbs and hoods. Coordinate closely with the Owner and provide temporary connectivity as required for this work.
10. Carefully remove existing metal wall panels at locations indicated on the Drawings, and deliver to the Owner for modification and reinstallation by Owner after the roofing is completed. Provide weathertight condition with temporary self-adhering membrane.
11. Carefully cut out portions of EIFS at locations indicated. Repairs will be by Owner once roofing is completed.
12. Remove existing access ladders and deliver to Owner for modification and reinstallation by Owner after roofing is completed.
13. Replace gasket, latch, and spring mechanism on existing roof hatch.
14. Cut new reglets and provide sheet metal inserts as shown on the Drawings
15. Provide a four-ply built-up asphalt membrane tie-in where necessary.
16. Install color-coated galvanized iron sheet metal flashings at the details.
17. Refer to Section 01 70 00 for information regarding examination of the existing construction.

1.4 CONSTRUCTION SCHEDULE

- A. A pre-construction conference will be held prior to the start of Work.
- B. It is the intent to start work _____
- C. Substantial Completion: _____. By Substantial Completion, it is intended all work included as part of this Contract be completed except for minor punch-list items.
- D. The Contractor agrees that said Work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will ensure full completion thereof within the time stipulated. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the Work described herein is a reasonable time for climatic range and usual environmental conditions prevailing in this locality. It is further understood and mutually agreed that the date of beginning, rate of progress, and the time for completion of the Work to be done hereunder are essential conditions of this Contract. Costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.
- E. Do not start work during threatening weather.

- F. If adverse weather conditions are the basis for requests for additional time, such requests shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that weather conditions had an adverse effect on the scheduled construction.

1.5 SITE ACCESS AND AVAILABILITY

- A. Site will be available to Contractor upon receipt of the Owner's written notice to proceed unless otherwise indicated in these Documents. Care, custody, and control of the site work area, equipment area, and material storage area are vested in Contractor during the term of operations under the Contract.
- B. Failure to examine the building and the site and to become familiar with the existing conditions shall not constitute cause for complaint or claim for extra payment. Accept Project site as it exists.
- C. Means of ingress or egress to buildings shall not be blocked for any reason or hamper the normal operation of the building in any way unless permission is first obtained from the Owner. Fire protection and immediate access for firefighting equipment must be maintained at all times.
- D. Equipment and material storage areas are limited to those designated. Fencing of ground work area may be required to keep unauthorized personnel out of the area.

1.6 PROHIBITIVE SUBSTANCES

- A. The Owner's buildings and grounds are a chemical and tobacco free.
- B. Chemicals are defined as all tobacco products, alcoholic beverages, malt beverages or fortified wine and other intoxicating liquor, any narcotic, hallucinogenic, amphetamine, barbiturate, marijuana, non-prescription inhalants, or other controlled substance, as defined by state and federal law. Abuse of a prescription drugs over-the-counter (OTC) drugs, and facsimile drugs, as well as, possession of drug paraphernalia also constitute violations of this policy.
- C. "Under the influence" is defined as detectable consumption.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

**SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES**

PART 1 - GENERAL

1.1 PAYMENT PROCEDURES

- A. Schedule of Values: Submit to the Architect/Engineer a schedule of values covering labor and materials to serve as a basis for progress payments during construction.
- B. Application for Payment: Application for payment shall be made using forms included in these documents.
- C. Certificates for Progress Payments: Provide Architect/Engineer with certificates for progress payments showing a tabulation of the completed work, labor completed, materials used, and materials in approved storage at the site.
 - 1. Do not include a Change Order which has not been completely executed with all copies signed by Contractor, Engineer, and Owner for which Contractor does not possess the properly executed and signed copy.
- D. Retainage: The Owner will retain, until final payment, 5 percent of the amount due the Contractor on account of progress payments.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION



Section 01 25 01
SUBSTITUTION REQUEST FORM
(During Construction)

Project _____ From _____
Inspec Project No. _____ Date _____
Section No. _____ Section Name _____ Page _____ Article/Para _____

Proposed Substitution

Manufacturer _____ Address _____ Phone _____

Trade Name _____ Model No. _____

Installer _____ Address _____ Phone _____

History ☐ New Product ☐ 1-4 yrs old ☐ 5-10 yrs old ☐ More than 10 yrs old

Differences Between Proposed Substitutions and Specified Product _____

☐ Point-by-Point Comparative Data Attached – REQUIRED BY A/E

Reason For Not Providing Specified Item _____

Similar Installation Project _____ Architect _____
Address _____ Owner _____
Date Installed _____

Proposed Substitution Affects Other Parts of the Work ☐ No ☐ Yes; Explain Explain _____

Savings to Owner for Accepting Substitution _____ \$ _____

Proposed Substitution Changes Contract Time ☐ No ☐ Yes [Add] [Deduct] _____ days

Supporting Data Attached ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ Other

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution, which may subsequently become apparent, are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

☐ Attachments

A/E's Review and Recommendation

- ☐ Approve Substitution – Make submittals in accordance with Specification Section 01 30 00
- ☐ Approve Substitution as noted – Make submittals in accordance with Specification Section 01 30 00
- ☐ Reject Substitution – Use specified materials
- ☐ Substitution Request received too late – Use specified materials

Owner's Review and Action

- ☐ Substitution Approved – Make submittals in accordance with Specification Section 01 30 00. Prepare Change Order.
- ☐ Substitution Approved as noted – Make submittals in accordance with Specification Section 01 30 00. Prepare Change Order.
- ☐ Substitution Rejected – Use specified materials

Signed By: _____

Date: _____

Additional Comments

☐ Contractor☐ Subcontractor☐ Supplier☐ Manufacturer☐ A/E

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Pre-Construction Conference:

1. Prior to starting any work on the Contract, the Architect/Engineer, Owner and/or Owner's representative, and the Contractor will meet at the site to discuss procedures, schedules, review submittals, etc. for the Work. The Contractor's manpower scheduler and foreman, who will be on the Project full-time directing the Work, and the Contractor's sheet metal foreman and other subcontractors' foremen, must attend this meeting. If the Contractor's foremen are not present at this scheduled meeting, the meeting will be canceled and rescheduled at Contractor's expense.

B. Progress Meetings:

1. Progress meetings will be held during the course of the Work. Architect/Engineer, Owner and/or Owner's representative and the Contractor will meet at the site to discuss progress, issues, schedules, etc.

C. Coordination with Owner:

1. It is the Owner's intention that the building will be utilized in the usual manner in accordance with the normal schedule; therefore, the Contractor shall schedule his work so as to minimize interference with normal activities and shall coordinate his work with the Owner for areas over interior spaces having critical occupancy requirements.
2. Work shall be conducted between the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday of each week. Work on other than those hours or days specified, including legal holidays, school holidays, Saturdays and Sundays may be granted provided a request is made at least 48 hours in advance and that Contractor assumes all responsibility for safeguard of Owner's property.
3. Work that might interfere with the use of the facilities by the Owner shall be accomplished at a time pre-approved by the Owner.

D. Coordination of Work:

1. The Prime Contractor is responsible for coordinating the work of all subcontractors and for scheduling all work so a watertight condition is maintained and all work required by the Contract Documents is completed as scheduled.
2. Remove or modify existing work to extent necessary to join new work to existing construction and otherwise complete the work.
3. Each daily work area must be complete and watertight at the end of each day's work and before start of any form of precipitation.

1.2 SUBMITTALS

A. Submittals Process:

1. The Contractor shall fill out and include the submittal cover sheet (included herein) with each submittal.

2. Submittals, including shop drawings, are to be reviewed by the Contractor prior to submitting. All field required verifications and missing information shall be completed and duly noted. The Contractor shall review and verify that the products submitted are acceptable per the Specifications. The Contractor shall then affix their stamp on the submittal cover sheet. Contractor must review – No pass through drawings are permitted.
 3. The Contractor shall prepare a PDF document so that all sheets of the submittal are one document. Only ONE specification section per submittal is permitted.
 4. Scans shall be in color. All pages shall be oriented correctly. Actual sheet sizes for the submittal shall be 11 x 17 or 8.5 x 11 whenever possible. All print and details must be legible at those sizes. Major parts of the pdf and larger sheets, such as 24 x 36 sheet size shall be identified separately in the pdf's bookmarks.
 5. The PDF file or attachment shall be named as follows; Section Number, Section Name, Sub Number (Example: 06 10 00-Rough Carpentry Sub 05.pdf)
 6. Samples and color selections associated with the submittal shall be included. Actual samples, color selections shall be delivered for review. The shop drawings will not be reviewed until actual samples are received.
 7. The Architect/Engineer will review the submittals, make notes as required, and affix a stamp. The PDF file shall then be renamed by adding the action required, such as Reviewed, Furnish as Corrected, Revise and Resubmit, or Rejected. (Example: 06 10 00-Rough Carpentry Sub 05 REVIEWED.pdf)
 8. No hard copies will be sent by the Architect/Engineer. Note: Hard copies will be required to be included in the O&M Manuals as part of the Project Closeout Submittals.
- B. Within Ten (10) Days After Contract Award/Notice to Proceed:
1. Provide Schedule of Values
 2. Promptly provide the Architect/Engineer with required submittals so that review and approval can be made without any delay in the Work.
 3. Provide pdf files for all submittals.
 - a. Refer to the subsequent Specification Sections for specific submittals required by each section.
 - b. Product Data: Includes illustrations, standard schedules, diagrams, performance charts, instructions, Safety Data Sheets, and brochures that illustrate physical appearance, size, and other characteristics of materials and equipment. Product data submitted should be free of inapplicable information. Strike through or delete information or data that is not applicable to this Project. Do not submit entire catalogs. Clearly mark product selection tables to indicate which product and which options are being provided. If a name change has occurred to a specified product, a letter of explanation should be included with the submittal.
 - c. Shop Drawings: Includes drawings, diagrams, illustrations, and schedules specifically prepared for this Project to illustrate and depict more clearly some portion of the work, reflecting actual project conditions. Shop drawings shall be provided in same general layout or orientation as the Contract Drawings.
 - d. Samples: Completely identify information such as brand name, brief description, source of material, date sampled, location sampled, etc.

- e. Schedule: Construction schedule indicating anticipated work progress, including pre-construction conference, starting and completion dates, crew size, and estimated average daily progress.
 - f. Permits: Copies of all permits and licenses necessary for the proper execution and completion of this Work.
- C. During Progress of the Work: Provide updated construction schedule(s) if initial anticipated schedule is revised, along with a request for any change in completion date.
- D. Closeout Submittals: Refer to Section 01 70 00

1.3 PRODUCT SUBSTITUTION PROCEDURES

- A. Substitutions or acceptance of products will be considered only for non-availability and only under the following conditions:
1. Contractors and subcontractors shall place orders for specified material and equipment promptly upon award of Contract and acceptance of list. No excuse or proposed substitution will be considered for materials and equipment due to unavailability unless proof is submitted that firm orders were placed immediately.
 2. Reason for unavailability is beyond control of the Contractor. Unavailability will be construed to be due to prolonged strikes, lockouts, bankruptcy, discontinuance of manufacture of a product, or Acts of God. The Contractor shall take into account changes in material prices and market conditions prior to bidding.
 3. Requests for substitutions shall be made in writing (using the Substitution Request Form at the end of this Section) within 10 days after date Contractor ascertains he cannot obtain the product.
 4. Requests shall be accompanied by a complete description of the product which Contractor wishes to use as a substitute, including all certifying data required.
 5. Substitutions need to be acceptable to the Architect/Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SUBMITTAL COVER SHEET

The Contractor shall fill this form out completely and include it with each required submittal (product data, sample, shop drawing) or other items submitted to the Architect/Engineer. Refer to Section 01 30 00 for specific submittal requirements.

Project Name: 2019 Partial Reroofing at the Operations Center
for Duluth Transit Authority

Inspec Project No: 214706.2

Contractor:

Project Manager:

Address:

Phone:

Architect/Engineer: Inspec, Inc.

Owner:

Duluth Transit
Authority

Contact: Gerald Peterson

Address: 5801 Duluth Street
Golden Valley, MN 55422

Phone: 763-546-3434

1. Date: _____

2. Submitted Item: _____

3. Manufacturer: _____

4. Person Submitting: _____

5. Spec. Location: Section _____ Article _____ Paragraph _____ Subparagraph _____

6. Architect/Engineer's Notes: _____

Contractor's Stamp

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

- A. In the case of an inconsistency between Drawings and Specifications or within any Document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation without change in the Contract Sum.
- B. All materials, systems, or assemblies shall be installed or applied in accordance with these Specifications and, where not specifically designated otherwise, in accordance with directions of the product manufacturer or recommendations of an association dealing primarily with the materials.

1.2 REGULATORY REQUIREMENTS

- A. Work shall meet the requirements of all governing codes, ordinances, laws, regulations, safety orders, and directives relating to the Work, including specific requirements of the city and state of jurisdiction.
- B. Contractor shall secure and pay for all permits relating to this Work, including governmental fees and licenses necessary for the proper execution and completion of the Work, which are applicable at the time the bids are received.
- C. Contractor shall be responsible to ensure that the building inspector having jurisdiction over this Project be informed of Contractor's start date for construction, that on-site visits are conducted and coordinated throughout the Project, and that the building permit is posted on-site.
- D. Work on, adjacent to, or over public land, streets, alleys, or other public facilities, will be approved by the proper authorities. Contractor shall make his own arrangements with such authorities regarding details, timing, materials, methods, protection, and similar items in connection with the Work, including street use, work on streets or blocking of streets. Contractor shall make such repairs, file bonds, conform to directions, and such other requirements that may be necessary.

1.3 QUALITY ASSURANCE

- A. Manufacturers of all products used shall have source quality control capability to show conformance of products to Specification requirements prior to shipment to the buyer.

1.4 QUALITY CONTROL

- A. The Owner may retain the services of an independent agency for testing and construction observation. This does not relieve the Contractor of his responsibilities to complete the Project in accordance with the Contract Documents. Cost for construction observation and tests will be paid by the Owner except as noted below for nonconformance, or unless specified otherwise in subsequent specification sections.
 - 1. The Architect/Engineer may request tests of any materials in addition to tests specified. The Contractor shall pay for the test if the test results show the material not in conformance with the Specifications.
 - 2. Repeat tests required because test results show material not in conformance with the Specifications shall be paid for by the Contractor.

- B. Notify Architect/Engineer whenever work is to be done in sufficient time to arrange construction observation.
- C. Test samples of materials and completed work shall be taken in the presence of the Architect/Engineer at the Project site.
- D. Cooperate by furnishing materials required for testing, access to the work, and space for necessary storage.
- E. Properly repair openings made in the work required for testing and construction observation to the satisfaction of the Architect/Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 TEMPORARY UTILITIES

- A. Coordinate all use with the Owner. At no time shall utilities be wasted.
- B. The utilities service for the building shall not be interrupted in any way by the Contractor unless agreed upon by the Owner.
- C. Owner will furnish water and electrical service (110v) required for the Work from available sources located within the building.
- D. Contractor shall arrange and pay for any special electrical service required.

1.2 SANITARY FACILITIES

- A. Sanitary facilities are available on site. Contractor shall take measures to not track dirt and debris into the building.

1.3 SPECIAL CONTROLS

- A. Protect existing lawns, sprinkler systems, rock borders, sidewalks (concrete and concrete pavers), and paved surfaces in areas of the Work, including access and staging areas during the entire construction period.
 - 1. Remove and replace damaged surfaces to match existing prior to completion of the Project, to the satisfaction of the Owner.
- B. Disturbing or disruptive noise that interferes with the normal building occupancy will not be permitted. Operations creating noise of this type must be scheduled in advance with the Owner.
- C. Any worker creating a nuisance on the premises shall be removed from the Project by the Contractor at the Owner's request.
- D. Provide necessary controls to prevent pollution of the air by odors or particulate matter.
- E. The location and operation of heating equipment shall be such that no hazard is created and objectionable odors do not enter the building.
- F. Disposal of Materials:
 - 1. All materials to be disposed of shall be loaded directly into trucks by means of approved chutes or other methods that will prevent damage to existing or new surfaces, and to control pollution.
 - 2. Disposal activities on the roof shall be limited to areas receiving a new roof system and no free-fall of debris into containers on the ground or lower roof areas is permitted.
 - 3. Dispose materials in a legal manner, only at designated landfill sites.
 - 4. Provide documentation of disposal to the Owner from an approved landfill site.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 TEMPORARY UTILITIES

- A. Heating: Provide temporary heating required for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 BASIC PRODUCT REQUIREMENTS

- A. All materials and equipment shall be of new and good quality unless specified otherwise.
- B. No asbestos-containing materials are to be used in this Work.
- C. Carefully remove existing materials that are to be salvaged for reuse or given to the Owner. Store in a manner and location to prevent damage until utilized.

1.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Make no deliveries to the Project until ready to install or until approved storage is provided. Where this provision is neglected, and materials are delivered to the Project site prior to the Owner's being able to receive them, such materials shall be properly stored elsewhere at the expense of the Contractor with adequate insurance coverage provided for the off-site storage.
- B. Deliver materials in original, unopened containers and rolls with labels intact and legible.
- C. Provide above-grade platform storage for materials, and supports for equipment, that will protect the materials from moisture damage and minimize damage to ground surfaces. Use tarpaulins to provide protection of stored materials. Factory wraps alone are not acceptable.
- D. Handle all materials in a manner which will not damage material. Store rolled goods on end.
- E. Store materials, and provide and operate material handling equipment in a manner to prevent damage to existing or new construction, and to prevent overloading the building structural system.
- F. Immediately report damage to existing construction to the Owner and Architect/Engineer.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXAMINATION

- A. Existing construction may not be as shown on the Drawings and some modification of details may be required to accomplish the intent of the Documents. The details shown and the information provided have been taken from the original drawings for the building, but are not represented, or guaranteed, by the Owner and Architect/Engineer as being accurate as to the actual as-built and present conditions.
- B. Verify dimensions and construction conditions at the site and perform all work to complete the Project under this Contract, regardless of variations that may be found, without additional cost to the Owner.
- C. All modifications or adjustments, are to be approved in advance by the Architect/Engineer.

1.2 PREPARATION

- A. Provide protective material and methods as required to protect existing building and adjacent surfaces, features, and property. The Contractor is responsible for damage, including from water or flying debris, resulting from Work under this Contract.
 - 1. Provide protection in roof-related traffic, staging, and storage areas consisting of 45-mil EPDM, 1" extruded polystyrene insulation, and 3/4" plywood ballasted with sandbags. Remove protection materials upon completion of the Work.
- B. Protect wall surfaces with tarpaulins or other suitable cover to prevent damage, staining, or discoloration that might result from operations. Windows, doorways, docks, walkways, etc. may require special protection measures.
- C. Protect the building interior, air intakes, Project site, and adjoining property from objectionable dust and wind-blown or falling debris.
- D. Take precautions to protect the building grounds from damage due to construction traffic.

1.3 EXECUTION

- A. Contractor shall be responsible for patching and repairing of existing materials not scheduled for replacement or alteration, which are damaged during any sequence of the removal or new work. Contractor is responsible for water damage to existing insulation and building interior that may result from damage to existing materials, and for subsequent water damage due to inadequate repair work.
- B. Notify the Owner if any seriously deteriorated structural member is uncovered during removal work prior to placement of new materials. Replacement of deficient structural members, not specifically designated for replacement, will be at the decision and expense of the Owner.
- C. Existing materials designated to remain which are damaged or defaced as a result of the Work and are unsuitable for the use intended shall be replaced at Contractor's expense to the satisfaction of the Owner.
- D. Where necessary to remove or alter existing construction, all construction affected shall be properly patched and filled out to match existing or new work.

- E. Repairs of existing construction required by the Contract, or necessary because of damage from this Work, shall use products equivalent to and compatible with existing materials, and shall be applied only to clean and dry surfaces.
- F. Reconnect all mechanical equipment even when the disconnection of the equipment, or any portion thereof, is inadvertent. Verify on a daily basis that all roof-mounted equipment are properly connected in areas of the Work.

1.4 CLEANING

- A. Return all unaltered site conditions to conditions which existed prior to the start of Work.
- B. In case of undue delay or dispute, Owner may remove rubbish, materials, and equipment and charge cost to Contractor, with such action permissible by Owner 48 hours after a written notice has been transmitted to Contractor.

1.5 PROTECTION OF EXISTING PROPERTY AND INSTALLED CONSTRUCTION

- A. Traffic on no-reroofing areas shall be kept to a minimum. Provide adequate protection of the roof membrane if traffic on such roof areas is necessary.
- B. Exercise reasonable precautions to prevent vandalism and to safeguard the public at the existing building, including on the roof. Do not leave openings unprotected. Carefully stack materials. Control access to the roof at all times so no unauthorized person can get on the roof by use of the Contractor's equipment or materials, day or night.
- C. Prevent access by the public to materials, tools, or equipment.
- D. Place used asphalt mops in water and remove from the roof at the end of each day's work. Dispose of or store away from combustible materials.

1.6 CLOSEOUT SUBMITTALS

- A. The following closeout submittals must be submitted to the Architect/Engineer in one single envelope with the Final Application for Payment. Items submitted separately (not included with the Final Application for Payment) will be returned to the Contractor. Contractor shall be responsible for obtaining and submitting closeouts listed below that are also applicable to subcontractors.
 - 1. Final Application for Payment (AIA G702)
 - 2. Final Project Review (punch list) with all work items marked complete. Include Change Orders and written verification that all mechanical units are properly secured and operational.
 - 3. Certificate of Substantial Completion: A Project-specific completed form (AIA G704) will be provided to the Contractor by the Architect/Engineer and is to be signed and returned as part of the Project Close-Out submittals. The date of the Certificate of Substantial Completion shall match the date of all required warranties.
 - 4. Warranties, signed and dated (date shall match the signed Certificate of Substantial Completion).
 - 5. Permits: Submit copies of building permits and plumbing permits (if required).
 - 6. Returned Permits/Keys: Submit either a letter or email stating that all permits, keys, and passes have been returned to the Owner.

7. Systems Training: Submit either a letter or email stating that all necessary systems demonstration training with the Owner has taken place, including the date of said training. This may be included with Items 3 and 4.
8. Operations and Maintenance Manuals if applicable
9. Contractor's Affidavit of Payment of Debts and Claims (AIA G706)
10. Contractor's Affidavit of Release of Liens (AIA G706A)
11. Consent of Surety to Final Payment (AIA G707)
12. Withholding Affidavit for Construction (State Tax Form IC-134)
13. Contractor's Record Drawings (as-builts). All as-built conditions which deviate from the originally issued Contract Documents shall be clearly marked.
14. Buy America documentation as may be required.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 06 10 05
ROOF-RELATED ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof-related wood blocking
 - 2. Steel angles
 - 3. Steel channels
- B. Related Sections:
 - 1. Section 07 41 00 – Pre-Engineered Standing Seam Metal Roof Panels
 - 2. Section 07 51 00 – Built-Up Bituminous Roofing
 - 3. Section 07 62 05 – Roof-Related Sheet Metal Flashings

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Codes and Standards: In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Architect/Engineer, comply with the following:
 - 1. Product Use Manual of the Western Wood Products Association for selection and use of products included in that manual.
 - 2. Plywood Specification and Grade Guide of the APA-The Engineered Wood Association.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site, insofar as practicable, in manufacturer's original containers and bearing the trademarks and names thereof. Grademark stamped on all standard yard dimension lumber or certified for compliance. Plywood grade stamped.
- B. Carefully stack lumber and plywood to prevent warping. Keep dry.

1.4 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until given conditions have been corrected.
 - 2. Replace existing wood members intended for reuse that are in unsatisfactory condition with equivalent products.
- B. Environmental Requirements: Wind velocity and temperature limitations shall be based on Contractor's ability to apply materials in the specified manner.
- C. Protection: Provide appropriate protection on roof-related traffic, staging, and storage areas. As a minimum, protection shall consist of 45-mil EPDM, 1" extruded polystyrene insulation, and 3/4" plywood ballasted with sandbags. Remove protection materials upon completion of the work.

PART 2 - PRODUCTS

2.1 LUMBER

- A. Non-preserved treated, standard light framing grade, sound and thoroughly seasoned with less than 19 percent moisture content at the time of installation and at time roofing is installed.
 - 1. Douglas Fir
 - 2. Eastern Pine
 - 3. No. 3 Southern Pine
 - 4. No. 2 Western Hemlock
 - 5. Spruce-Pine-Fir

2.2 PLYWOOD

- A. C-D Exposure 1 or better, APA Rated Sheathing, non-preserved treated, meeting U.S. Products Standard PS1 or Performance Standard PRP-108 for Soft Wood Plywood Construction and Industrial, with less than 19 percent moisture content at time of installation and at the time roofing is installed.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Application: Roof construction, including skylight and equipment curbs, building or roof system joints, blocking, backing, and parapet or roof edge construction, where wood is 24 inches or more above the roof deck.
- B. Fire retardant treated lumber and plywood by pressure process: Products with flame spread index of 25 or less when tested per ASTM E84, and with no evidence of significant progressive combustion when test is extended additional 20 minutes, and with flame front not extending more than 10.5 feet beyond centerline of burners at any time during test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

2.4 FASTENERS

- A. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153 unless indicated otherwise.
- B. Fire-retardant treated wood: Provide nails, timber rivets, wood screws, and lag screws hot-dip galvanized to comply with ASTM A153, stainless steel, silicon bronze, or copper. Fastener types other than those listed above may be mechanically-deposited zinc-coated steel complying with ASTM B695, Class 55 minimum.
- C. Stainless steel fasteners required for fastening into existing treated wood.
- D. Lag screws: Zinc or cadmium plated, 3/8" diameter with 1-1/2" penetration into blocking.
- E. Lumber to lumber: Cement coated or annular thread nails with minimum 1-1/4" penetration into adjoining member.

- F. Plywood to Lumber:
 - 1. Nails: Ring shank or annular thread nails with minimum 1-1/4" penetration into adjoining member.
 - 2. Screws: Minimum #14 flat head countersunk wood screws, zinc or cadmium plated steel or stainless steel, with minimum 1-1/4" penetration.
- G. Lumber or plywood to concrete or masonry: Tapcon or Gripcon anchors, minimum 1/4" diameter with 1" penetration, minimum 300 lb. per anchor installed withdrawal resistance. Other corrosion resistant drilled-in type masonry anchors may be used if equivalent in pull-out strength.
- H. Lumber or plywood to steel deck: Minimum #14 sheet metal screw, zinc or cadmium plated; through 5/8" diameter steel washers for lumber.
- I. Steel angles and channels to lumber: Minimum #14 flat head wood screws, zinc or cadmium plated steel or stainless steel, with minimum 1-1/4" penetration.
- J. Steel angles and channels to steel deck: Self-drilling screw fastener, size 12 - 24 by 7/8, HWH Teks/4 manufactured by ITW Buildex, or approved equal

2.5 MISCELLANEOUS

- A. Steel angles: ASTM A36, gauge and size indicated on the Drawings
- B. Steel Z-channels and J-channels: 18-gauge galvanized steel, sizes indicated on the details

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING

- A. Removed materials need not be salvaged unless specifically required for reuse. Some existing wood members may be reused as indicated on the Drawings. Contractor shall provide samples of wood to DTA Project Manager and/or Architect/Engineer for review and approval prior to reinstallation. Any wood members that are damaged or degraded must be replaced with new materials at Contractor's expense.

3.2 PREPARATION

- A. Grout, shim, patch, or fill existing construction as necessary to properly install wood members.
- B. Inspect fastening of existing wood members left in place for conformance to requirements specified herein. Fastening found not in conformance shall be upgraded to meet these requirements.
- C. Reset or replace existing fasteners for materials exposed but left in place that are loose, deformed, damaged, or corroded.
- D. Perimeter wood blocking installation shall, as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, Perimeter Flashing.

3.3 WOOD BLOCKING

- A. Vertical wood studs, wood blocking, and plywood over 24" in height above the roof deck shall be constructed with fire-treated wood. Attachment of fire-treated wood requires stainless steel nails, screws, and masonry fasteners compatible with fire-treated materials.
- B. When constructing wood curbs with multiple vertical blocking and plywood members, provide staggered joints for all layers and minimum 12" laps.

- C. Lumber or Plywood to Lumber:
 - 1. Maximum spacing of 12" on-center, staggered across face of piece and located within 3" of each end of piece. Maximum spacing of 6" on-center, 8' each way from outside corners for roof edge blocking.
 - 2. Heads shall be flush with wood surface and nail shall penetrate adjoining piece minimum 1-1/4 inch.
 - 3. Minimum 100 lb. per nail installed withdrawal resistance.
- D. Lumber or Plywood to Concrete or Masonry:
 - 1. Spacing as shown on Drawings or maximum 3' on-center when not specified, staggered. Maximum 18" on-center, 8' each way from outside corners for roof edge blocking.
 - 2. Countersink head flush with surface but no more than 1/3 the thickness of the fastened piece.
 - 3. Minimum 300 lb. per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1 inch.
- E. Lumber, Plywood, or Steel Angle to Steel Deck:
 - 1. Verify the presence of conduit below the steel deck prior to installation.
 - 2. Spacing as shown on the Drawings or maximum 18" on-center for screws when not specified, and staggered if lumber is more than 5" wide. Maximum 9" on-center, 8' each way from outside corners for roof edge blocking.
 - 3. Countersink head flush with surface but not more than 1/3 the thickness of the fastened piece.
 - 4. Minimum 150 lb. per anchor withdrawal resistance or number of fasteners increased accordingly from that specified, minimum penetration of 1-1/2 inches.

3.4 FIELD QUALITY CONTROL

- A. Construction Observation: The Owner may retain the services of an independent agency for testing and construction observation. Notify Owner's construction observer whenever work is to be done in sufficient time to arrange observation and testing. The Contractor shall not commence Work until the Owner's construction observer is present.
- B. Alignment and elevation of installed wood shall be checked by Contractor and may be checked by Architect/Engineer.
- C. Withdrawal tests of installed fasteners may be required if attachment is in question.

3.5 CLEANING

- A. Keep the premises in a neat, safe, and orderly condition, free from an accumulation of sawdust, cut ends, and debris at all times during execution of this Work.

END OF SECTION

SECTION 07 41 00
PRE-ENGINEERED STANDING SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Underlayment
 - 2. Standing seam sheet metal roof panels and accessories
- B. Related Sections:
 - 1. Section 06 10 00 – Rough Carpentry
 - 2. Section 07 62 00 – Sheet Metal Flashing

1.2 SYSTEM DESCRIPTION

- A. Panels shall be continuous lengths up to manufacturer's standard longest lengths, with no joints or seams, except where indicated or specified.
- B. The panel system shall be designed with architectural details with no exposed or penetrating fasteners except where shown on approved shop drawings. Fasteners into steel shall be stainless steel, zinc cast head, or cadmium plated steel screws inserted into predrilled holes. There shall be a minimum of two fasteners per clip.
- C. The system shall be a double lock system with 1-1/2" high seams at 12" on-center. The seam shall include a continuous factory applied sealant in seams.
- D. Roof panel anchor clips shall be concealed and designed to allow for longitudinal thermal movement of the panels, except where specific fixed points are indicated. Provide for lateral thermal movement in panel configuration.
- E. The roof system must meet ASTM E1592 wind uplift requirements.
- F. Finished roof system shall have smooth, uniform appearance with continuous shadow lines in the face of the panel to minimize oil canning.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, standard details, and installation instructions.
- B. Certificates:
 - 1. Manufacturer: Submit manufacturer's certificates stating compliance with design criteria specified herein.
 - 2. Installer: Submit drawings and engineering calculations provide by manufacturer to meet the following testing requirements for this specific Project and geographical zone. Include calculations for vented ridge, rake, wall, and eave flashings.
 - a. ASTM E1592 wind uplift
 - b. ASTM E1646 or E331 water penetration
 - c. ASTM E1680 or E283 air infiltration

- C. Shop Drawings:
 - 1. 24" x 36" shop drawings indicating thickness and dimensions of parts, fastening and anchoring methods, details and locations of seams and transitions, terminations, roof penetrations, and plan showing layout of the roof. (Details to be drawn at 3" = 1'-0").
 - 2. Temporary seal-off to be used at the termination of each days' work.
 - 3. Shop drawings must be reviewed and approved by the manufacturer prior to submittal.
- D. Sample:
 - 1. Sheet metal color samples to be verified by Owner/Architect.
 - 2. Two seamed standing seam panels
 - 3. Two unseamed standing seam panels
 - 4. Vented zee closure and vented soffit flashing
 - 5. Miscellaneous accessories
- E. Mock-up panel: Submit two 18" x 18" sample panels to the Architect/Engineer prior to installation for review and approval. Samples shall be in the profile, style, and texture specified. Provide color chips for approval. Include clips, fasteners, closures, and other exposed panel accessories.
- F. Certification: Submit documentation proving installer is factory-trained, has the specified experience, and is authorized by the manufacturer to install the products specified.
- G. Warranties

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Minimum ten years experience in application of pre-engineered standing seam panels.
 - 2. Minimum of three years experience as an approved applicator of the specified manufacturer.
- B. Manufacturer's qualifications: Minimum 10 years experience in factory fabrication of pre-engineered panel systems.
- C. Wind uplift: Provide roof panel system, including supports to meet requirements of ASTM E1592 wind uplift resistance.
- D. Field measurements: Where possible, prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.
- E. Factory shall have capability to show conformance with National Coil Coater's Association Technical Bulletins for factory color-coated steel.
- F. Manufacturer to provide factory applied protection for finished color-coated sheet metal by means of a strippable plastic film.
- G. Sheet metal items not specifically noted on the drawings or in the specification shall be in accordance with recommendations of The Architectural Sheet Metal Manual published by Sheet Metal and Air-Conditioning Contractors National Association, Inc. (SMACNA).

- H. Personnel field soldering seams shall demonstrate their ability by field soldering and cutting open a minimum 12" long test seam. The Owner's representative will check the test seam for soldering quality.
- I. Only experienced roofers shall install self-adhering underlayment.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Make no deliveries to the Project until ready to install or approved storage provided. Deliver materials in manufacturer's original, unopened containers and rolls with labels intact and legible.
- B. Deliver materials in manufacturer's original, unopened containers and rolls with labels intact and legible.
- C. Store on clean, raised platforms with weather protective covering when stored outdoors. Secure coverings against wind.
- D. Store flammable materials in conformance with fire codes and in a manner that will not create a potential fire hazard.
- E. Store color-coated sheet metal in manner that will protect it from exposure to the sun up until the time of installation.
- F. Store sheet metal components in a manner that will keep them clean and dry until installed.
- G. Provide continuous protection of applied materials against wetting and moisture absorption.
- H. Exercise care during fabrication and erection to avoid damage to finished metal surfaces.
- I. Select and operate material handling equipment and store materials in a manner to prevent damage to materials, existing construction, and without overloading the building structural system.
- J. Damage to existing construction must be immediately reported to the Owner and Architect/Engineer.

1.6 PROJECT CONDITIONS

- A. Existing construction may not be as shown on the Drawings and some modification of details may be required to accomplish the intent of the documents. All modifications or adjustments are to be approved in advance by the Architect/Engineer.
- B. Removal and new work shall only be accomplished in dry weather above 40°F, with no precipitation expected during the work period.
- C. Contractor must take every precaution to prevent interior leakage.
- D. Provide temporary protection over the existing or temporary roof membranes to complete work under this Section without damage to the membrane, the surface exposed during the work, and to new materials applied under this Contract.
- E. Damage to existing roof membranes must be immediately reported to the Owner. Damage shall be properly repaired by the approved roofing contractor.
- F. Provide temporary enclosures to protect against water entry or other damage from the elements on a daily basis. Roofing must be kept watertight on a daily basis.

G. Protection:

1. Prevent damage to new or existing materials, including protection from damage by ladders and other equipment. Potentially damaging materials such as metal scraps, acid flux, and other debris shall not be permitted to come into contact with the roof surface.
2. Suitable fire extinguishing equipment shall be immediately available at all locations where soldering, welding, or cutting equipment is used.
3. Maintain a fire watch wherever soldering, welding, or cutting is performed.

H. Construction Schedule: Install sheet metal as soon as possible after membrane work has been completed. Sheet metal work shall be fully complete by the given completion date.

1.7 WARRANTY

A. Contractor's Warranty:

1. Prior to acceptance of the Work, furnish written five (5) year warranty covering all roofing work specified herein, using the form at the end of this Section. The Contractor's warranty shall cover the period of time ending five years after the date of Substantial Completion.
2. The Contractor's warranty period is not intended to correspond with the term of the Performance Bond. Term of bond is one year and is not required to extend through the term of the Contractor's warranty.

B. Manufacturer's Warranties:

1. Prior to acceptance of Work, furnish manufacturer's written 20 year no-dollar-limit weathertight warranty covering the roofing system. The warranty shall be issued directly to the Owner. The warranty shall provide that if within the warranty period, the metal roofing system becomes non-watertight or shows evidence of corrosion, perforation, rupture, or excess weathering due to deterioration of the roofing system resulting from defective materials or workmanship, the repair or replacement of the defective materials and correction of the defective workmanship shall be the responsibility of the roofing system manufacturer. Repairs that become necessary because of defective materials and workmanship while roofing is under warranty shall be performed within 7 days after notification, unless additional time is approved by the Owner. Failure to perform repairs within the specified period of time will constitute grounds for having the repairs performed by others and the cost billed to the manufacturer.
2. Provide a 20-year written warranty for color-coated paint coating covering color fade, chalk, and film integrity.

PART 2 - PRODUCTS

2.1 UNDERLAYMENT

A. Self-Adhering Membrane:

1. Grace Ultra, high temperature cold-applied self-adhering butyl rubber membrane manufactured by Grace Construction Products, or approved equal. Use with manufacturer's recommended primer.
2. Approved equal per metal panel manufacturer to meet specified warranty requirements.

2.2 STANDING SEAM ROOF PANEL SYSTEM

- A. Approved Systems:
 - 1. Firestone UC3
 - 2. Atas Field Lok FLM125
 - 3. Englert A1300
 - 4. Approved equal
- B. Panel system must meet all of the following requirements:
 - 1. 1.5" seam height
 - 2. 12" maximum seam spacing
 - 3. Low profile light gauge stainless steel sliding thermal expansion clip 25-gauge maximum thickness (0.375" high raised based not acceptable)
 - 4. 22-gauge, 6" wide x 6" wide, or 6" continuous bearing plates acceptable
 - 5. Factory-applied non-curing sealant in seam
 - 6. Striations in face of panel
 - 7. 20-year no-dollar-limit weathertight warranty
 - 8. Engineer for minimum 1" thermal movement of the panels at the eave edge
 - 9. ASTM E1592 wind testing requirements
 - 10. ASTM E1646 water penetration testing requirements
 - 11. ASTM E1680 air infiltration testing requirements
- C. Material: 24 gauge galvanized steel with factory applied Kynar 500 coating
- D. Color for roof panels: Firestone Sherwood Green or equal. Verify with Owner at the pre-construction conference.
- E. Accessories:
 - 1. Provide components required for a complete roof panel system, including ridge, rake, eave, valley, and roof penetration flashings as shown on the Drawings.
 - 2. Panels clips: 28-gauge stainless steel thermal clips, 18" on-center in the field of the roof, 12" on-center at eaves, rakes, ridges, and corners. Manufacturer to engineer to meet or exceed specified spacing.
 - 3. Roof curbs and vent stacks: Shop fabricate and fully weld curbs from 0.040" aluminum. Prep, prime, and paint to match roof panels with Kynar 500 coating.
 - 4. Use sheet metal manufacturer's matching Kynar 500 touch-up paint as required.

2.3 FASTENERS

- A. Provide exposed fasteners with heads matching color of roof panel by means of plastic caps or factory-applied coating.
- B. Fasteners shall be of same material as flashings on which they are used and shall be of type and size as shown on Drawings or specified herein unless noted otherwise. Exposed fasteners through sheet metal shall match new sheet metal color.
 - 1. Zinc or cadmium plated for galvanized steel

- C. Provide metal-backed neoprene washers under head of exposed fasteners bearing on weather side of panels.
- D. Sheet metal to wood: No. 8 minimum size screw with 1-1/4" penetration into wood. Minimum 150 lbs. per screw installed withdrawal resistance.
- E. Sheet metal to sheet metal: Self-tapping screws of 1/2" length and a minimum #3 diameter.
- F. EPDM washers: EPDM laminated to metal washer, Weath-R-Seal manufactured by FABCO, or approved equal.
- G. Keeper strips to wood: Minimum #12 wood screw, zinc or cadmium plated steel or stainless steel, with minimum 1-1/4" penetration.
- H. Clips to plywood or lumber: Minimum #12 wood screw, zinc or cadmium plated steel or stainless steel, with minimum 1-1/4" penetration.
- I. Panel clips, keeper strips, zee closure, etc. to wood deck: Minimum #12 sheet metal screw, zinc or cadmium plated steel or stainless steel, with minimum 1" penetration

2.4 MISCELLANEOUS

- A. Butyl sealant: ASTM C920, one component, low-viscosity, self-wetting butyl-blend mastic, compatible with roofing materials, and as recommended by the panel wall manufacturer.
- B. Solvents/cleaners: As recommended by the manufacturer for cleaning surfaces prior to sealant/tape installation, soldering, or painting.
- C. Seal-off:
 - 1. 45-mil thick EPDM with associated solvents, adhesives, sealants, etc. as recommended by the membrane manufacturer.
 - 2. Sand bags, clamping devices, 24-gauge galvanized iron angles, temporary wood blocking etc., as indicated on the Drawings.

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING

- A. Coordinate removal so the existing system and newly installed work is watertight at the end of each day's work.
- B. Removed materials need not be salvaged unless specifically required for reuse.
- C. Where existing sheet metal is to be reused, extra precautions shall be taken to prevent damage to metal during reinstallation.
- D. Removal/relocation/modification of mechanical units and mechanical lines (i.e. conduit and piping):
 - 1. Remove and reset rooftop units as required. Coordinate downtime of the unit with the Owner. Provide work in stages or phases to accommodate the Owner's occupancy requirements. Keep existing mechanical equipment and services in operation as much as possible during construction.
 - 2. Electrical and/or mechanical extensions/connections found necessary shall be the Contractor's responsibility. Proper mechanical/electrical and ductwork extensions shall be provided where necessary by a licensed contractor to meet all state and local code

requirements and to meet licensing requirements regarding the handling of chlorofluorocarbons (CFC's).

3. Obtain and pay for all licenses and permits. Coordinate and request all inspections from authority having jurisdiction and submit certificates of inspection and final approval of the local inspection authority to the Architect/Engineer.
4. Verify with Architect/Engineer before permanent reinstallation of mechanical units. Perform a test run to ensure equipment is working properly after reinstallation.

3.2 PREPARATION

- A. Surfaces to receive new material shall be free of dirt, debris, loose materials, and free moisture in any form. Scrape exposed surface if necessary to remove projections.
- B. Verify that surfaces to receive new materials have no defects or errors which would result in poor application or cause latent defects in workmanship.
- C. Verify that nailers to receive sheet metal are properly placed.
- D. Verify shapes and dimension of surface to be covered before fabrication of sheet metal.
- E. Cut, clean, and prime reglets to receive new reglet insert flashing.

3.3 UNDERLAYMENT

- A. Cut self-adhering membrane into manageable lengths and reroll. Peel back one to two feet of release paper, align the membrane on the lower edge of the roof and place the first 1' to 2'. Pull the release paper under the membrane and continue to peel it from the membrane. Press the membrane in place and roll lower edges firmly with a hand roller. Ends and edges shall be overlapped a minimum of 6".
- B. At all rake edges and fascias, carry self-adhering membrane down entire face of new plywood or eave angle.
- C. Apply an additional layer at all valley conditions and intersection of valley to ridge and valley to eave conditions.
- D. Extra precautions shall be taken by installer to ensure good adhesion of underlayment during cooler weather, including primer and warming surfaces as necessary.
- E. Install no more than can be covered within 28 days with remainder of roof system.
- F. For application in temperatures below 40 F:
 1. Store materials in a heated storage area, in a manner which does not pose a fire hazard, when ambient temperatures fall below 40 F. Do not remove material from storage areas until ready to install.
 2. Lay heat blankets directly over the deck prior to membrane application. Surface temperature of deck shall be a minimum of 40 F at the time of membrane installation.
 3. After installation of the membrane, lay heat blankets over the membrane to maintain a minimum surface temperature of 40 F for installation of subsequent materials.

3.4 FABRICATION AND INSTALLATION

- A. Shop fabricate all items requiring soldering or welding unless noted otherwise.
- B. Re-coat soldered joints of color-coated sheet metal with material and in manner specified by manufacturer.
- C. Sheet metal work shall be of material and gauge specified, and shaped to be installed in strict conformance with details on Drawings.
- D. Plane surfaces shall be free from waves or buckles.
- E. Turn back exposed metal edges into hemmed edge.
- F. Use elastomeric sealant at reglets and scuppers as necessary to make a watertight installation including foam backer rod as necessary to make a good sealant joint.
- G. Screw fasteners shall be turned into place rather than driven.

3.5 DOUBLE-LOCK STANDING SEAM ROOFING

- A. Install metal panels, concealed fasteners, and related items in accordance with manufacturer's specifications meeting ASTM E1592 requirements, approved shop drawings, and details; plumb and true, in proper alignment and relation to established lines and grades.
- B. Apply panels with standing seams parallel to the slope of the roof. Provide panels in longest practical lengths from ridge to eaves, with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys, and similar openings.
- C. Standing seam pan shall be 12" to 12/5" in width. Panels shall be full length from eave to ridge.
- D. Provide thermal panel clips at locations shown on the Drawings and space cleats 18" on-center in the field of the roof, 12" on-center at eave, rake, ridges, and corners (manufacturer to engineer to meet or exceed specified spacing).
- E. Standing seam shall finish 1-1/2" high with factory-applied in-seam sealant. Provide a continuous 1/4" bead of butyl sealant to inside of each panel clip prior to installation.
- F. Fix panels at ridge location through zee closure as shown on the Drawings.
- G. At ridge locations, extend standing seams full height. Notch and fold end of standing seam pan in vertical direction and fold 1-1/2" tabs around corner at each standing seam. Complete termination of pan as shown on the Drawings.
- H. At eave terminations, hook 1-3/8" fold on lower end of pan onto receiver, cleat, or locking strip detailed. Fold end tab of standing seam 180° back against itself prior to folding the double-lock seam.
- I. All bends shall be rounded and not sharp.
- J. Installation shall meet manufacturer's requirements for specified weathertight warranty.

3.6 FIELD QUALITY CONTROL

- A. Alignment and elevation of installed panels will be checked by the Owner's representative and by the Contractor.
- B. Withdrawal tests of installed fasteners may be required if attachment is in question.

3.7 CLEANING

- A. Carefully inspect and remove debris or metal shavings (using a magnet) from the roof membrane on a daily basis.
- B. Clean surfaces of flux, scraps, dirt, or other blemishes immediately. Potentially damaging materials shall not contact the roof surface.
- C. Carefully remove temporary protection materials.
- D. Remove strippable plastic film from color-coated sheet metal immediately after installation.

END OF SECTION

PRE-ENGINEERED STANDING SEAM SHEET METAL PANEL WARRANTY

Owner:

Street Address:

City

State

Zip

Project Name:

Project No.

Project Address:

Date of Final Acceptance:

Sheet Metal Panel Installation Contractor:

Street Address:

City

State

Zip

Phone No. ()

Fax No. ()

Email:

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of final acceptance of the Work, maintain the sheet metal panel systems and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of any wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty any damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the sheet metal in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until necessary repair work has been completed.

SHEET METAL PANEL INSTALLATION CONTRACTOR

Signature

Printed Name

Title

Date

SECTION 07 51 00
BUILT-UP BITUMINOUS ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removal of existing materials
 - 2. Vapor retarder
 - 3. Insulation
 - 4. Bituminous membrane roofing
 - 5. Lead flashing for drains
 - 6. Pipe supports
- B. Products Installed But Not Furnished Under This Section:
 - 1. Caps, sleeves, and umbrella hoods
 - 2. Scuppers and overflow scuppers
 - 3. Pipe box enclosures
- C. Related Sections:
 - 1. Section 06 10 05 – Roof-Related Rough Carpentry
 - 2. Section 07 41 00 – Pre-Engineered Standing Seam Metal Roof Panels
 - 3. Section 07 62 05 – Roof-Related Sheet Metal Flashing

1.2 SUBMITTALS

- A. Product Data:
 - 1. Vapor retarder and membrane felts
 - 2. Insulation, each type
 - 3. Base flashing, each type
 - 4. Bituminous materials, each type
 - a. Asphalt manufacturer shall identify softening point, minimum flashpoint, minimum finished blowing temperature, and equiviscous temperature (EVT)
 - 5. Fasteners: Insulation fastener only
 - 6. Concealed flashing, each product
 - 7. Uncured membrane and adhesive
- B. Shop Drawings:
 - 1. Tapered insulation system
 - 2. Heat stack detailing, including maximum stack temperature
- C. Samples:
 - 1. Bitumen, one quart for each asphalt type. Bitumen samples shall be submitted for each shipment to the site.
 - 2. Aggregate (25 lbs.)
 - 3. Aggregate weight tickets for each shipment to the site.

- D. Manufacturer's certification that all submitted products intended for installation on this Project meet the specified warranty requirements.
- E. Warranties:
 - 1. Prior to the start of Work, as part of the initial submittal package, provide manufacturer's sample NDL total system warranty, indicating coverage in compliance with these Specifications and Drawings.
 - 2. As part of Project Closeout Documents, provide signed Contractor and manufacturer warranties as specified.

1.3 QUALITY ASSURANCE

- A. Provide thermostatic controls and visual thermometer on bitumen kettle, maintain in working order, and keep calibrated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Provide continuous protection of materials against wetting and moisture absorption.

1.5 PROJECT CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until given conditions have been corrected.
 - 1. Existing construction may not be as shown on the Drawings and some modification of details may be required to accomplish the intent of the Documents. The details shown and the information provided have been taken from the original drawings for the building, but are not represented, or guaranteed, by the Owner and Architect/Engineer as being accurate as to the actual as-built and present conditions.
 - 2. Verify dimensions and construction conditions at the site and perform all work to complete the Project under this Contract, regardless of variations that may be found, without additional cost to the Owner.
 - 3. All modifications or adjustments, are to be approved in advance by the Architect/Engineer.
- B. Environmental Requirements:
 - 1. Wind velocity and temperature limitations shall be based on Contractor's ability to apply materials in the specified manner.
 - 2. No work permitted when ambient temperature is below 0 F, or wind chill factor is below -20 F.
 - 3. Special precautions are required when ambient temperature is below 40 F.
- C. Protection:
 - 1. Provide appropriate protection in roof-related traffic, staging, and storage areas. As a minimum, provide 45-mil EPDM, 1" extruded polystyrene insulation, and 3/4" plywood ballasted with sandbags. Remove protection materials upon completion of the Work.
 - 2. Provide protective material and methods as required to protect existing building and adjacent surfaces, features, and property.
 - 3. Contractor is responsible for water damage to existing insulation and building interior that may result from damage to existing materials, and for subsequent water damage due to inadequate repair work.

4. Traffic on no-reroofing areas shall be kept to a minimum. Provide adequate protection of the roof membrane if traffic on such roof areas is necessary.
5. Install temporary insulation seal-offs at completion of each day's work and completely remove upon resumption of work.
6. Install materials in manner that will prevent bitumen drippage.
7. Coordinate application of membrane to protect underlying materials from wetting or other damage by the elements on a continuous basis.
8. Completely install sheet metal sleeves, caps, or enclosures on a daily basis.

1.6 WARRANTIES

- A. Warranties shall be dated not earlier than the date of the Certificate of Substantial Completion created by the Architect/Engineer.
- B. Manufacturer's Warranty: Prior to acceptance of work, furnish roof system manufacturer's written 25-year no-dollar-limit total system warranty. Include a final inspection report, provided by the manufacturer's representative, certifying compliance with specified warranty requirements.
- C. Contractor's Warranty:
 1. Prior to acceptance of the Work, furnish written five (5) year warranty covering all roofing work specified herein, using the form at the end of this Section. The Contractor's warranty shall cover the period of time ending five years after the date of Substantial Completion.
 2. The Contractor's warranty period is not intended to correspond with the term of the Performance Bond. Term of bond is one year and is not required to extend through the term of the Contractor's warranty.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. All products installed are to be approved by roof system manufacturer to meet requirements for the total system warranty specified.
- B. Approved equal materials must be submitted prior to the bid deadline for review and acceptance prior to award.
- C. Approved Manufacturers:
 1. CertainTeed
 2. Firestone
 3. GAF
 4. Johns Manville
 5. Tamko
 6. Approved equal

2.2 VAPOR RETARDER AND MEMBRANE FELTS

- A. Fiberglass Felt: Type VI (6)

2.3 INSULATION

- A. Isocyanurate:
 - 1. Flat stock: Closed-cell polyisocyanurate foam core with fiberglass facers both sides, meeting ASTM C1289, Type II, Class 1, Grade 2 (20 psi), dimensional stability of 2%, 24 hr minimum cure time plus an additional 24 hours per inch, and a maximum board thickness of 2 inches. Maximum 4' by 4' boards. All packages shall have RIC/TIMA label. Approved manufacturers are:
 - a. Atlas
 - b. CertainTeed
 - c. Firestone
 - d. GAF
 - e. Johns Manville
 - f. Hunter Panels
 - g. Approved equal
 - 2. Tapered: Factory-fabricated isocyanurate insulation as described above, with slope as shown on the Drawings. Direction changes shall use mitered boards. Minimum 1" rigid insulation shall cover isocyanurate boards.
- B. Rigid: Only perlite will be acceptable for contact with steel decks
 - 1. Perlite: ASTM C728, U.L. and F.M. rated and labeled, with TopLoc coating, maximum 4' by 4' boards.
 - a. Johns Manville Fesco
 - b. GAF EnergyGuard
 - c. Approved equal
 - 2. Wood fiberboard: ASTM C208, with surface treatment, maximum 4' by 4' boards, manufactured by:
 - a. Blue Ridge Fiberboard
 - b. Firestone
 - c. Huebert Fiberboard
 - d. International Bildrite
 - e. Approved equal
- C. Tapered edge strip: Rigid wood fiberboard or perlite insulation with maximum 1/2 in./ft. slope, 1-1/2 in./ft. slope approved for use at seal-offs.
- D. Batt: ASTM C665, Type I, preformed glass fiber batt
- E. Spray polyurethane foam (SPF): Froth-Pak two-component polyurethane spray foam system, 1.75 pcf, manufactured by Dow Chemical Company, phone 800-800-FOAM; or approved equal.
- F. High-Temperature Insulation:
 - 1. Calcium silicate: Equal to Johns Manville Thermo-12 Gold asbestos-free, molded, high temperature pipe and block insulation composed of hydrous calcium silicate for systems operating up to 1200 F; or approved equal. Flame spread/smoke developed of 0/0. Provide all-service jacket for fiberglass pipe insulation, unless noted otherwise.
 - 2. High temperature mineral fiber: Equal to Paroc 1200, having average thermal conductivity not exceeding 0.23 btu/in./sq.ft./°F./hr. at mean temperature of 75°F. Mineral fiber insulation shall be rated for 1200 F.

2.4 BASE FLASHING

- A. First ply: Fiberglass felt, Type IV
- B. Exposed sheet: Granule surfaced, asphalt mopped modified bitumen, black granules
 - 1. CertainTeed Flintlastic GMS Premium
 - 2. Firestone SBS Premium
 - 3. GAF Ruberoid Mop Plus / Ruberoid Mop Plus Granule FR (new name)
 - 4. Johns Manville Dynalastic 250 or DynaFlex
 - 5. Tamko Awaplan Premium
 - 6. Approved equal

2.5 BITUMINOUS MATERIALS

- A. Asphalt primer: ASTM D41
- B. Asphalt: ASTM D312, Type III
- C. Plastic Cement:
 - 1. Premium grade, asphalt base, asbestos-free, ASTM D4586. The following products are approved. No substitutions permitted unless approved prior to Contract award.
 - a. CertainTeed FlintPatch
 - b. GAF LeakBuster Matrix 202 SBS Flashing Cement
 - c. Karnak 19 AF
 - d. Johns Manville Bestile Utility Cement
 - e. Tremco ELS
 - f. Approved equal
 - 2. Non-premium grade, asphalt base, asbestos-free, ASTM D4586, Type I may be used only at seal-offs and temporary conditions.

2.6 FASTENERS

- A. Insulation to Steel Deck:
 - 1. Self-tapping #12 or #14 fluorocarbon coated screw with drill point, through minimum 6.5 sq. in. hot-dipped galvanized steel plate. Plates and screws must be clearly labeled from the same manufacturer and shall be intended to be used together.
 - 2. Install screws with manufacturer's recommended screw guns and bit sizes.
 - 3. Minimum pull-out strength of 300 lb. per fastener.
 - 4. Minimum 3/4", maximum 1-1/4" penetration through flanges. Length to penetrate top of deck but not to extend below the bottom of the rib. Change screw length in tapered insulation sections to meet this criteria.
- B. Base flashing system: Galvanized 1-1/4" barbed roofing nails through 1" metal discs into wood members; 1" length into vertical plywood blocking.
- C. Scupper flanges to wood blocking: 1-3/4" galvanized roofing nails

2.7 MISCELLANEOUS

- A. Reinforcing fabric: ASTM D1668, Type I

- B. Concealed Flashing:
 - 1. Termination bar, 1/8" x 1" aluminum with pre-drilled holes at 6" on-center, as shown on the Drawings with compatible sealant
 - 2. Grace Ultra cold-applied self-adhering membrane manufactured by GCP Applied Technologies, or approved equal, with compatible sealant for use at top of termination bar
 - 3. Cured EPDM field sheet, 45 mil thick; manufactured by Carlisle, Firestone, Johns Manville; or approved equal
 - 4. Uncured EPDM: 60 mil thick; manufactured by Carlisle, Firestone, Johns Manville; or approved equal
 - 5. EPDM Adhesive: As recommended by flashing manufacturer
- C. Uncured Flashing:
 - 1. Uncured neoprene: 60 mil manufactured by Carlisle, Firestone, or approved equal
 - 2. Adhesive: As recommended by flashing manufacturer
- D. Air Stop:
 - 1. Cured EPDM flashing sheet, 45 mil thick, manufactured by Carlisle, Firestone, or approved equal
 - 2. Adhesive: As recommended by the flashing manufacturer
 - 3. Other products as recommended by the membrane/flashing manufacturer
- E. Aggregate: ASTM D1863, crushed stone and gravel; hard, durable, opaque and free of clay, loam, sand or other foreign substances
- F. Lead flashing for roof drains: Fed. Spec. QQ-L-201F and Amendment 2, Grade B, 4 lb/sq.ft., 36" by 36" sheets.
- G. Vent Pipe Extensions:
 - 1. Polyvinyl chloride pipe: Equivalent diameter of vent pipe, ASTM D2665, Schedule 40
 - 2. Hubless cast-iron soil pipe: CISPI 301, service weight; with joints conforming to CISPI 310
 - 3. No-hub connectors: Neoprene pipe sleeves with stainless steel drawbands, ASTM C564
 - 4. At laboratory vents, use appropriate glass and/or approved chemical resistant pipe to match existing.
- H. Pipe supports: Non-penetrating rooftop pipe supports from these listed. Use according to conditions/loads/lateral conditions on the roof
 - 1. Pipe Pier by Pipe Pier Support Systems
 - 2. PipeGuard Small, or PipeGuard Large by OMG Roofing Products
 - 3. Nylon Pipe Roller by MAPA Products
 - 4. Mifab C-Port supports
 - 5. B-Line C-Port Rooftop Support System by Cooper (excluding the CX-Series)
 - 6. Approved equal
- I. Gypsum board: 5/8" gypsum board, Type X
- J. Covering deck openings at obsolete penetration locations:
 - 1. Match existing

2. 12-gauge steel plate for openings less than 12" x 12"
3. 3" x 3" x 1/4" steel angles and 20-gauge steel plate for openings greater than 12" x 12" when matching steel deck type is not available.

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING

- A. Removed materials need not be salvaged unless specifically required for reuse.
- B. Removal/relocation/modification of mechanical units and mechanical lines (i.e. conduit and piping):
 1. Remove and reset rooftop units as required. Coordinate downtime of the unit with the Owner. Provide work in stages or phases to accommodate the Owner's occupancy requirements. Keep existing mechanical equipment and services in operation as much as possible during construction.
 2. Reconnect mechanical equipment (on a daily basis if required), even when the disconnection of the equipment, or any portion thereof, is inadvertent.
 3. Electrical and/or mechanical extensions/connections found necessary shall be the Contractor's responsibility. Proper mechanical/electrical and ductwork extensions shall be provided where necessary by a licensed contractor to meet all state and local code requirements and to meet licensing requirements regarding the handling of chlorofluorocarbons (CFC's).
 4. Obtain and pay for all licenses and permits. Coordinate and request all inspections from authority having jurisdiction and submit certificates of inspection and final approval of the local inspection authority to the Architect/Engineer.
 5. Verify with Architect/Engineer before permanent reinstallation of mechanical units. Perform a test run to ensure equipment is working properly after reinstallation.

3.2 PREPARATION

- A. Surfaces shall be free of all dirt, debris, loose materials, and free moisture in any form. Mechanically scrape exposed surface if necessary to remove projections.
- B. Reset or replace existing fasteners for materials exposed but left in place that are loose, deformed, damaged, or corroded.
- C. Perimeter wood blocking installation shall, as a minimum, be in accordance with recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, Perimeter Flashing.

3.3 VAPOR RETARDER

- A. Over the existing vapor retarder on Administration (Low) and over base layer of insulation on all other areas, install two plies of fiberglass felt in a continuous shingle sequence in asphalt moppings in a manner to prevent asphalt drippage. Glaze coat of installed felt plies required if subsequent roof system construction cannot be installed the same day, or as approved by Architect/Engineer. Phased vapor retarder construction (one ply plus one ply) will not be permitted.
- B. Maximum moisture content of felts at the time of application shall be one percent of dry weight.

- C. Squeegee or press felts into hot bitumen providing tight, smooth laminations without wrinkles, buckles, kinks, or fishmouths. Air void pockets as determined by test samples, shall not exceed 5% per interply mopping for individual sample and average of all samples shall be less than 3% per interply mopping.
- D. Carry all plies a minimum of 8" up the masonry surfaces, or as shown on the Drawings.

3.4 INSULATION

- A. Mechanically fasten first layer of new insulation to steel decks using one fastener for every two sq.ft. in a pattern recommended by Factory Mutual. Use two fasteners minimum for partial boards. Verify the presence of conduit below the deck prior to fastener installation. Install screws with manufacturer's recommended screw guns and bit sizes with minimum 3/4", maximum 1-1/4" penetration below flange. Screws penetrating the rib shall be removed and a new screw installed.
- B. Use full moppings of asphalt for application of each subsequent insulation layer over steel decks, and for all layers over concrete deck.
- C. No moisture content in the insulation will be permitted at time of application.
- D. Place each insulation board while bitumen still tacky. Lay with edges in moderate contact but do not force into place.
- E. Stagger joints of upper layer with joints of bottom layer and stagger short joints in each layer. Stagger joints a minimum of 25% of the board dimension. Fill insulation joint wider than 1/4" with insulation cut to fit.
- F. Step-down or roll-down all insulation layers so that full embedment and a flat surface is obtained.
- G. Extra care shall be required to properly cut and fit insulation boards to conform to changes in deck slope and other irregularities.
- H. Install tapered insulation with primed side up or between layers of insulation as shown on Drawings. If tapered isocyanurate insulation is used, provide minimum 1" rigid insulation over isocyanurate.
- I. Provide tapered edge strip and batt insulation at locations shown on the Drawings.
- J. Top surface of insulation shall be smooth and continuous with the primed surface exposed to receive the new membrane.

3.5 MEMBRANE ROOFING

- A. Installation of felt plies shall be in a continuous shingle sequence, such that there are no laps against the flow of water, after installation of insulation. Glaze coat of installed felt plies required if flood coat and gravel surfacing cannot be installed the same day, or as approved by the Architect/Engineer. Phased membrane construction will not be allowed.
- B. Maximum moisture content of felts at time of application shall be one percent of dry weight.
- C. Provide full, uniform moppings of asphalt for membrane construction so that felt shall not touch felt.

- D. Squeegee or press felts into hot bitumen providing tight, smooth laminations without wrinkles, buckles, kinks, or fishmouths. Air void pockets, as determined by test samples, shall not exceed 5% per interply mopping for individual sample and average of all samples shall be less than 3% per interply mopping.
- E. Carry felts to the top of the cant strip and cut off evenly.
- F. Install two additional plies of fiberglass felt in full mopping of asphalt at sleeper curbs, pipe supports, and splashpans.
- G. Install one additional felt ply in full mopping of asphalt in valleys of drain sumps.
- H. Minimize traffic on recently installed membrane. Use sequencing and equipment that will prevent asphalt displacement.
- I. Application of hot asphalt on any surface that causes foaming of the asphalt shall be cause for rejection of the roof area.
- J. Prime both sides of metal flanges for flashing sleeves, set in a trowel coat of plastic cement, and strip in with two plies of fiberglass felts and hot bitumen moppings feathered onto flange and onto membrane.
- K. Extend all vent stacks as necessary to maintain a minimum height of 12" above the completed membrane.
- L. Install prefabricated expansion joint per manufacturer's installation instructions.

3.6 COMPOSITION BASE FLASHING SYSTEM

- A. Install where roofing system joins vertical or canted surfaces on a daily basis or as approved by the Architect/Engineer.
- B. Install felt in full mopping of asphalt, pressing in the felt to obtain full contact with bitumen.
- C. Install base flashing membrane in a full mopping of asphalt with a minimum temperature of 400 F at application, by mopping surface to receive the membrane and back-mopping the membrane. Fully embed membrane into mopping so as not to create voids. Do not stretch membrane. Seal 4" end laps with plastic cement and reinforcing fabric.
- D. Fasten top edge of base flashing at 8" on-center for wood and 12" on-center for masonry.
- E. Concealed Flashing over Base Flashing:
 - 1. Install concealed flashing immediately after the base flashing is complete.
 - 2. At locations shown on the Drawings, install termination bar along with concealed flashing, sealed at the top with compatible sealant.
 - 3. Self-adhering membrane concealed flashing: Pull the release paper under the membrane and continue to peel it from the membrane. Press the membrane in place and roll seams firmly with hand roller. Laps shall be a minimum of 3 inches.
 - 4. EPDM concealed flashing: Fully cement minimum 3" laps with adhesive and fully adhere EPDM to substrate.
- F. Where concealed flashing over base flashing is not shown on the Drawings, immediately seal the top of the base flashing to vertical surface to make watertight until sheet metal flashing can be installed.

3.7 FLOOD COAT AND AGGREGATE SURFACING

- A. Ensure that all roof surfaces are clean, dry, and free of loose gravel.
- B. Pour flood coat uniformly over roof surface prior to installation of exposed sheet metal flashings.
- C. Apply aggregate uniformly into hot bitumen with complete coverage, 400 lbs./100 sq. ft.
- D. Double flood and gravel in a 10' by 10' area at exterior corners; below splashpans, pipe supports, and access ladders; and within 3' of roof hatches. Remove loose non-embedded aggregate, pour a uniform additional flood coat, and completely cover with aggregate, as described above.

3.8 BITUMEN

- A. Maximum temperature in heating equipment:
 - 1. Do not heat asphalt to the minimum flashpoint.
 - 2. Do not exceed the minimum finished blowing temperature for more than a total of four hours for any batch or portion thereof.
 - 3. Remove from Project asphalt heated above these limits.
- B. Temperatures at time and point of application:
 - 1. Asphalt shall be within 25 F of its equiviscous temperature when applied in the roof system.
 - 2. Bitumen not meeting this criterion shall be reheated or allowed to cool as required.
 - 3. Do not heat to the minimum flashpoint.
 - 4. Do not exceed the minimum finished blowing temperature for more than a total of four hours for any batch or portion thereof.
 - 5. Remove from Project bitumen heated above these limits.
- C. Rate of bitumen application:
 - 1. Insulation: 30 lbs./100 sq. ft.
 - 2. Asphalt interply moppings: 27 lbs./100 sq. ft. with tolerance of plus and minus 15 percent.
 - 3. Glaze coat: 10 lbs./100 sq. ft.
 - 4. Asphalt flood coat: 60 lbs./100 sq. ft.

3.9 PIPE SUPPORTS

- A. Space and install in accordance with manufacturer's requirements.

3.10 ROOF DRAINAGE

- A. Owner must be present during installation of lead flashing at first roof drain; and may also need to be present at up to all roof drain installations, at Owner's discretion.
- B. Check roof drains prior to starting the roofing in each drainage area to determine if the drain is plugged, or if the drain bowl, clamping ring, dome, etc. are damaged. These items shall be brought to the attention of the Owner or Architect/Engineer prior to starting work, and will be the Owner's responsibility for correction. Plugged or damaged drains brought to the attention of the Owner or Architect/Engineer after work has begun shall be the responsibility of the Contractor to correct.
- C. Extend membrane and lead flashing into the drain bowl, and clamp.

- D. Prime scupper flanges and lead flashing for drains. Set in trowel coat of plastic cement and strip in with two plies of fiberglass felt and hot bitumen moppings.
- E. Complete and coordinate flashing of the drains and scuppers with construction so that roof drainage is fully functional at the end of each day's work.
- F. Temporarily protect drains. Sections of insulation board may be cut to fit into drain base to keep debris from falling into drain leaders. Remove temporary protection prior to precipitation.

3.11 FIELD QUALITY CONTROL

- A. Protection: Place used asphalt mops in water and remove from the roof at the end of each day's work. Dispose of or store away from combustible materials.
- B. Construction Observation: The Owner may retain the services of an independent agency for full-time or periodic testing and construction observation. Notify Owner's construction observer whenever work is to be done in sufficient time to arrange observation and testing. The Contractor shall not commence Work until the Owner's construction observer is present.
- C. Testing:
 - 1. Bitumen:
 - a. Samples of bitumen may be taken and tested for conformance to the specifications by the Architect/Engineer for each shipment delivered to the Project.
 - b. Bitumen temperatures may be periodically checked at the discretion of the Architect/Engineer in the kettle and/or on the roof.
 - 2. Membrane Samples:
 - a. At the discretion of the Architect/Engineer, 4" x 36" test cuts taken perpendicular to the long dimension of felts may be required, a minimum one for each 5,000 sq.ft.
 - b. Samples will be examined for quality of construction and compliance with roofing specifications based on an evaluation of entrapped moisture, felt on felt, quantity of air voids, and presence of harmful foreign materials. This evaluation will be based on the delamination of the felt plies (the Jennings Method for built-up membrane analysis).
 - c. Remove test samples before application of the surface coating at locations selected by Architect/Engineer.
 - d. Take additional samples as directed by Architect/Engineer when deficiencies are found.
 - e. Repair of Built-Up Membrane Test Cut:
 - 1) Immediately rebuild test area with cut felts of same type as roof system, set in plastic cement.
 - 2) Cover repaired area with four layers of felts. Solid mop each layer into place in hot bitumen. Overlap cut area 3" on all sides with first layer. Lap each succeeding layer 3" on all sides over layer below.
 - 3. Aggregate: Samples may be required if delivered material is in question.
 - 4. Other Tests:
 - a. Isocyanurate insulation will be observed, and may be tested, for conformance with ASTM D303 and C550 criteria.
 - b. Field tests may be performed to evaluate moisture content of installed materials.
 - c. Withdrawal tests of installed fasteners may be required if attachment is in question.

- d. Application of roof system will be checked by Contractor and may be checked by Architect/Engineer.

3.12 CLEANING

- A. Remove bitumen from surfaces not specified to receive bituminous materials; such as walls, walkways, metal flashing, etc.
- B. Repair staining or damage caused by solvent or oil spills.
- C. Finished gravel surface roof is to completely cover flood coat and have uniform appearance.

END OF SECTION

BUILT-UP BITUMINOUS ROOFING WARRANTY

Owner:		
Street Address:		
City	State	Zip
Project Name:		Project No.
Project Address:		
Date of Final Acceptance:		

Roofing Installation Contractor:		
Street Address:		
City	State	Zip
Phone No. ()		
Fax No. ()		
Email:		

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of Substantial Completion of the Work, maintain the roof membrane and flashing systems in a watertight condition and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of any wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes membrane or flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty any damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the roof in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until the necessary repair work has been done.

ROOFING INSTALLATION CONTRACTOR

Signature
Printed Name
Title
Date

SECTION 07 62 05
ROOF-RELATED SHEET METAL FLASHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sheet metal flashing
 - 2. Sealant and primer
 - 3. Backer rod
- B. Products Furnished But Not Installed Under This Section:
 - 1. Caps, sleeves, and umbrella hoods
 - 2. Scuppers and overflow scuppers
 - 3. Pipe box enclosures
- C. Related Sections:
 - 1. Section 06 10 05 – Roof-Related Rough Carpentry
 - 2. Section 07 41 00 – Pre-Engineered Standing Seam Metal Roof Panels
 - 3. Section 07 51 00 – Built-Up Bituminous Roofing

1.2 SUBMITTALS

- A. Product Data:
 - 1. Color-coated metal
 - 2. Sealant
 - 3. Primer
 - 4. Backer rod
- B. Shop Drawings: For all sheet metal including typical seaming and sheet metal to sheet metal connections.
- C. Test results: If Contractor proposes new cap flashing which deviates from the Project Drawings, proposed substitution must be in accordance with the design intent of the Project and test results must be submitted verifying compliance with IBC 2012 ANSI/SPRI ES-1.
- D. Samples:
 - 1. Sample piece of color-coated sheet metal that will be used on the Project
 - 2. Sheet metal manufacturer's standard color chart
 - 3. Sealant manufacturer's standard color chart
- E. Warranty: Signed warranty forms (Close-out submittal)

1.3 QUALITY ASSURANCE

- A. Perimeter edge metal and parapet cap (coping) for low-slope roofs shall comply with IBC 2012 ANSI/SPRI ES-1.
- B. Factory shall have capability to show conformance with National Coil Coater's Association Technical Bulletins for factory color-coated steel.

- C. Manufacturer to provide factory applied protection for finished color-coated sheet metal by means of a strippable plastic film.
- D. Sheet metal items not specifically noted on the Drawings or in the specification shall be in accordance with recommendations of The Architectural Sheet Metal Manual published by Sheet Metal and Air-Conditioning Contractors National Association, Inc. (SMACNA).

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store flammable materials in conformance with fire codes and in a manner that will not create a potential fire hazard.
- B. Exercise care during fabrication and erection to avoid damage to the finished surface.
- C. Store color-coated sheet metal in manner that will protect it from exposure to the sun up until the time of installation.
- D. Store sheet metal components in a manner that will keep them clean and dry until installed.

1.5 PROJECT CONDITIONS

- A. Protection:
 - 1. Prevent damage to new or existing materials, including protection from damage by ladders and other equipment. Potentially damaging materials such as metal scraps, acid flux, and other debris shall not be permitted to come into contact with the roof surface.
 - 2. Suitable fire extinguishing equipment shall be immediately available at all locations where soldering, welding, or cutting equipment is used.
 - 3. Maintain a fire watch wherever soldering, welding, or cutting is performed.
- B. Construction Schedule: Install sheet metal as soon as possible after membrane work has been completed. Sheet metal work shall be fully complete by the given completion date.

1.6 WARRANTY

- A. Warranties shall be dated not earlier than the date of the Certificate of Substantial Completion created by the Architect/Engineer.
- B. Manufacturer's Warranty: Provide a 20-year written manufacturer's warranty for color-coated sheet metal covering color fade, chalk, and film integrity.
- C. Contractor's Warranty:
 - 1. Prior to acceptance of the Work, furnish written five (5) year warranty covering all roofing work specified herein, using the form at the end of this Section. The Contractor's warranty shall cover the period of time ending five years after the date of Substantial Completion.
 - 2. The Contractor's warranty period is not intended to correspond with the term of the Performance Bond. Term of bond is one year and is not required to extend through the term of the Contractor's warranty.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. Color-coated steel: Kynar 500 fluoropolymer coating factory applied to 24-gauge galvanized steel, ASTM A653. Touch-up paint for color-coated sheet metal shall be color match as recommended and supplied by the sheet metal manufacturer.

1. Color shall be Mansard Brown, verify with Owner at the pre-construction conference.
2. A sample of all metal products to be applied to the roof edges shall be supplied to the Architect/Engineer and DTA Project Manager prior to the start of construction for compatibility with the esthetics of the building.
3. Acceptable Materials:
 - a. ColorKlad by Ryerson
 - b. Pac-Clad by Petersen Aluminum Corporation
 - c. Una-Clad by Firestone Metal Products
 - d. Ultra-Clad by Coated Metals Group
 - e. Carlisle Metal Products
 - f. Berridge Manufacturing Company
 - g. Approved equal
- B. Galvanized steel: ASTM A653, commercial quality, G90 coating designation
- C. For components requiring painting (scuppers, end closures etc.): Paint Grip bonderized steel; phosphate etched galvanized steel, ASTM A653, commercial quality, G90 coating designation
- D. Aluminum: ASTM B209, Alloy 3003-H14, mill finish

2.2 FASTENERS

- A. Fasteners shall be of same material as flashings on which they are used and shall be of type and size as shown on Drawings or specified herein unless noted otherwise. Exposed fasteners through sheet metal shall match new sheet metal color.
 1. Zinc or cadmium plated for galvanized steel
 2. Stainless steel for aluminum
- B. Fasteners exposed to the weather shall have EPDM washers under heads to ensure watertightness.
 1. EPDM bonded washers: Fabco Fastening System Weath-R-Seal Bonded Washers, or approved equal
- C. Sheet Metal to Wood:
 1. Where exposed: No. 8 minimum size steel hex head screw, 1-1/2" long. Minimum 150 lbs. per screw installed withdrawal resistance
 2. Where not exposed: Minimum #14 flat head wood screw
- D. Sheet metal to sheet metal: Self-tapping screws of 1/2" length and a minimum #3 diameter.
- E. Sheet metal to concrete or masonry: Tapcon Blue Climaseal, or approved equal, hex head threaded removable masonry anchor, 1/4" minimum diameter, length to penetrate masonry minimum 1". Minimum 300 lbs. per anchor installed withdrawal resistance.
- F. Keeper Strips to Wood:
 1. Nails: Ring shank nail, with minimum 3/16" diameter head, and minimum 1-1/4" penetration into wood.
 2. Screws: No. 8 minimum size steel pan head screw, minimum 3/4" penetration into wood. Minimum 150 lbs. per screw installed withdrawal resistance.

2.3 SEALANT

- A. Polyurethane-based elastomeric sealant: ASTM C920, Type S or M, Grade NS, Class 25, Use M, color selected and approved by Owner
 - 1. MasterSeal NP 1 or NP 2
 - 2. Tremco Dymeric 240FC
 - 3. Tremco Vulkem 116
 - 4. Manos Products, Manos-Bond 75-AM Industrial Grade sealant/adhesive; Waconia, MN
 - 5. Approved equal
- B. Primer: Non-staining, quick-drying type and consistency recommended by the sealant manufacturer.

2.4 MISCELLANEOUS

- A. Solder: ASTM B32, alloy grade Sn50 (50% tin, 50% lead) or Sn60 (60% tin, 40% lead). Use solder alloy grade which is appropriate for types of flux and heating ranges being used.
- B. Soldering flux: Use least corrosive flux suitable for specific application. Use materials and methods to neutralize as recommended by the flux manufacturer and American Welding Society (AWS).
 - 1. Fed. Spec. O-F-506C, Type I, Form A or B
- C. Backer rod: ASTM C1330, Type B, bi-cellular, non-staining, non-gassing, chemically inert foam rod of diameter 25 to 50 percent greater than width of joint. Backer rod shall be compatible with sealant.
 - 1. Sof-Rod by Construction Foam Products, Zebulon, North Carolina, 800-345-7279, www.cfoamproducts.com
 - 2. ITP Soft Type Backer Rod 104 by Industrial Thermo Polymers Ltd., Brampton, Ontario, Canada, 800-387-3847, www.tundrafoam.com
 - 3. Approved equal

PART 3 - EXECUTION

3.1 REMOVALS

- A. Removed materials need not be salvaged unless specifically required for reuse.
- B. Where existing sheet metal is to be reused, extra precautions shall be taken to prevent damage to metal during reinstallation.

3.2 PREPARATION

- A. Verify that surfaces to receive sheet metal are smooth, clean, and have no free water present in any form.
- B. Verify that nailers to receive sheet metal are properly placed.
- C. Verify shapes and dimension of surface to be covered before fabrication of sheet metal.
- D. Cut, clean, and prime reglets to receive new reglet insert flashing.

3.3 FABRICATION AND INSTALLATION

- A. Sheet metal installation shall as a minimum, be in accordance with ANSI/SPRI ES-1 and recommendations of Factory Mutual Loss Prevention Data Sheet 1-49, Perimeter Flashing. <https://www.fmglobal.com/research-and-resources/fm-global-data-sheets>
- B. Shop fabricate all items requiring soldering or welding unless noted otherwise.
- C. Re-coat soldered joints of color-coated sheet metal with material and in manner specified by manufacturer.
- D. Sheet metal work shall be of material and gauge specified, and shaped to be installed in strict conformance with details on Drawings.
- E. Plane surfaces shall be free from waves or buckles.
- F. Turn back exposed metal edges into hemmed edge.
- G. Use elastomeric sealant as necessary to make a watertight installation including foam backer rod as necessary to make a good sealant joint.
- H. Screw fasteners shall be turned into place rather than driven.

3.4 SOLDERING

- A. Clean surfaces to be soldered, removing oils and foreign matter.
- B. Pre-tin edges of sheet metal before soldering is begun.
- C. Apply flux and begin soldering immediately.
- D. Soldering shall be done slowly with well-heated soldering irons until the seams are thoroughly heated and the solder has been completely sweated through the full width of the seams.
- E. Remove acid flux residue as recommended by the manufacturer. As a minimum, use a solution of washing soda in water.

3.5 CAP FLASHING, COUNTERFLASHING, WALL PANELS, AND KEEPER STRIPS

- A. Provide preformed cap flashing extending out two to four feet maximum in each direction at corners and intersections of new sheet metal cap flashings. Lap inside and outside corners, seal with sealant, and carefully fasten with rivets to prevent damage to underlayment.
- B. Space cap flashing sections so cover plate locations will be balanced between corners of roof edge.
- C. Align cover plates for cap flashing and fascia flashing along roof edges.
- D. Lap intersecting counterflashings, except fascia counterflashings, minimum 3", and securely fasten.
- E. Sheet metal flashing (not including fascia flashing) exceeding 24" high shall be a vertical flat seam single-lock wall panel consisting of:
 - 1. Panels shall not exceed 16" in width unless noted otherwise.
 - 2. Fabricate and space seams accurately. Flat seams shall be, straight, and uniform. Bends shall be rounded and not sharp. Seam interlock shall be 3/4".

3. Fasten sides of panels with cleats spaced 12" on-center and locked into panel seam. Fasten cleats to plywood with two annular thread nails, and to concrete with one flat or pan head masonry anchor. Install fastener 3/4" from end and turn end of cleat to cover fastener head.
 4. Fasten top edge of panel with a minimum of two screws through EPDM washers. Locate screws just below drip edge of overlying flashing.
 5. Fasten lower edge of panel with a continuous keeper strip.
- F. Fasten counterflashing corners with pop rivets or screws and seal with sealant.
- G. Fasten at center of cover plates along inside face with screws through EPDM washers and field crimp inside edge over cap flashing. Nail fasten S-cleat cover plates at 6" on-center. No fasteners will be allowed in outside face of cover plate.
- H. Screw fasten cap flashing on roof edges at 18" on-center. Screw fasten cap flashings (non-roof edge related) and counterflashing to wood blocking with screws through EPDM washers at 30" on-center.
- I. For perimeter edge metal with 12" maximum width, fasten outer edge of cap flashing with continuous keeper strip fastened to blocking at 6" on-center. Do not field crimp cap flashing to keeper strip. For perimeter edge metal over 12" in width, fasten outer and inner edge of cap flashing with continuous keeper strip fastened to blocking. Crimp inside face of cap flashing to keeper strip only. When cap/fascia flashing is present, allow additional break in keeper strip to maintain plumb installation of cap/fascia flashing.

3.6 FIELD QUALITY CONTROL

- A. Alignment and elevation of installed sheet metal will be checked by Contractor and may be checked by Architect/Engineer.
- B. Withdrawal tests of installed fasteners may be required if attachment is in question.

3.7 CLEANING

- A. Clean surfaces of flux, scraps, dirt, and other blemishes immediately. Potentially damaging materials shall not contact the roof surface.
- B. Remove strippable plastic film from color-coated sheet metal immediately after installation.

END OF SECTION

SHEET METAL INSTALLATION WARRANTY

Owner:		
Street Address:		
City	State	Zip
Project Name:		Project No.
Project Address:		
Date of Final Acceptance:		

Sheet Metal Installation Contractor:		
Street Address:		
City	State	Zip
Phone No. ()		
Fax No. ()		
Email:		

This warranty stipulates that the above-named Contractor shall, during a period of five (5) years from the date of Substantial Completion of the Work, maintain the sheet metal flashing systems and repair all defects which result from faulty workmanship or defective materials, without further cost to the Owner, including replacement of any wet insulation caused by such defects.

Excluded from this warranty may be any and all damage to said roof, the buildings or their contents caused by acts or omissions of the Owner; fire, lightning, winds of peak gust speeds of 72 mph or higher, hailstorm, or other unusual phenomenon of the elements; movement or failure of the supporting building structure that causes flashing failure; or vapor condensation beneath the roof.

Exclude from this warranty any damages to the building or the contents.

Before expiration of the above warranty period, the above-named Contractor shall inspect the sheet metal in the presence of the Owner and make necessary correction of all deficiencies not considered normal. The warranty shall remain in force until necessary repair work has been completed.

SHEET METAL INSTALLATION CONTRACTOR

Signature
Printed Name
Title
Date