PROJECT MANUAL
ROOF REPLACEMENT

FOR
UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER
UCT DATA CENTER
7000 FANNIN
HOUSTON, TEXAS

UTHealth
The University of Texas
Health Science Center at Houston

PREPARED
BY
PRICE CONSULTING, INC.
211 HIGHLAND CROSS DRIVE, #220
HOUSTON, TEXAS 77073

TEXAS REGISTERED ENGINEERING FIRM NO. F-3814

PCI PROJECT NO. 11320.17
MAY 30, 2018
PROJECT DIRECTORY

PROJECT: University of Texas Health Science Center
UCT Data Center: Roof Replacement
7000 Fannin
Houston, Texas

OWNER: University of Texas Health Science Center/Houston
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END OF PROJECT DIRECTORY
THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER
UCT DATA CENTER
HOUSTON, TEXAS

DOCUMENT 00 00 30

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END OF INDEX OF DRAWINGS
1.01 SECTION INCLUDES:
   A. Roof replacement and roof related renovations of the existing facility known as the UCT Data Center located at 7000 Fannin in Houston, Texas. Work includes, but is not limited to, the following:
      1. Remove and properly dispose of existing roofing, insulation, and sheet metal down to the existing fluted steel deck on designated roof area.
      2. Install two layers of flat-stock polyisocyanurate insulation board mechanically attached to fluted steel deck.
      3. Install tapered polyisocyanurate insulation board set in low-rise foam adhesive over base layers of insulation.
      4. Install gypsum roof cover board in low-rise foam adhesive.
      5. Install two-ply modified bitumen roof membrane.
      6. Install new modified bitumen flashings and sheet metal flashing at rise walls and penetrations.
      7. Install new sheet metal edge flashings/fascias along roof perimeters.
      8. Install new sheet metal gutters and downspouts at designated locations.
      9. Disconnect roof-top lightning protection system to install new roofing system and re-install upon completion of new roof system installation.
     10. Provide specified contractor and manufacturer warranties.

1.02 WEATHER PROTECTION:
   A. Upon beginning work on the existing roof, Contractor shall patch and protect existing roofing as required to prevent leaks.
   B. Contractor shall have at the work site, a sufficient amount of moisture proof coverings to provide quick temporary protection to exposed decking, unfinished roof, or open roof in the event of a rapid change in the weather.

1.03 CONTRACTOR’S USE OF PREMISES:
   A. Confine operations at site to areas permitted by law, ordinances, permits and to limits of Contract as shown on Contract Documents.
   B. Do not unreasonably encumber site with materials or equipment.
   C. Do not load structure with weight that will endanger structure.
D. Assume full responsibility for protection and safekeeping of products stored on premises.
E. Move stored products which interfere with operations of Owner.
F. Obtain and pay for use of additional storage or work areas needed for operations.
G. Coordinate use of premises under direction of Owner's Representative.
H. Use of Site for Work and Storage:
   1. Restrict Work to areas indicated on Drawings.
   2. Store materials off site except for minor amounts of material which may be stored at designated staging area as approved by Owner.
   3. Access site in areas approved by Owner.
   4. Restrict parking to specific areas as approved by Owner.
   5. Restrict debris removal to Owner-approved area of building site.
   6. Restrict location of construction cranes to areas as approved by Owner.
   7. Do not allow construction traffic on existing roof membrane except as absolutely necessary to perform new work. Provide protection such as plywood/sheathing and plastic sheeting over existing roof membrane at traffic and work areas.
I. Maintenance of Access and Operations:
   1. Do not perform operations that would interrupt or delay Owner's daily operations.
   2. Maintain access to existing building, facilities, parking, streets, and walkways; especially fire lanes.
   3. Schedule demolition and renovation operations with Owner in such a manner as to allow Owner operations to continue with minimum interruption.
   4. During period of construction, do not obstruct exit ways of Owner-occupied areas in any manner.
J. Maintenance of Existing Services:
   1. Do not disrupt existing utility services to existing building.
   2. Maintain environmental control in existing building, especially temperature, humidity, and dust control.
K. Building Access:
   1. Access to roof construction areas shall be by way of route as designated by Owner.
   2. Contractor will not have access to building interior except as pre-arranged with Owner.

1.04 OWNER OCCUPANCY:
A. Owner will occupy premises during entire period of construction for the conduct of normal, daily operations. Cooperate with Owner's Representative in all construction operations to minimize conflict and to facilitate Owner usage.
B. Contractor shall conduct his operations so as to ensure least inconvenience to Owner's operations.
C. Contractor shall take precautions to avoid excessive noise or vibration that would disturb Owner's operations. When directed by Owner, Contractor shall perform certain operations at designated time of day or night in order to minimize disturbance to Owner's operations.
D. Contractor shall take all necessary precautions to assure a watertight condition in the operation portion of the building during construction.
E. Refer to Section 01 12 00 for provisions on security, special sequence of Work, maintenance of access and operations, maintenance of existing utilities and services, and building access restrictions.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01 01 00
SECTION 01 02 60

UNIT PRICES

PART ONE - GENERAL

1.01 SECTION INCLUDES:
A. Unit prices for calculation of work, complete in place, to be added or deleted from the project.

1.02 MEASUREMENT AND PAYMENT:
A. It is the intent of the Bid Form that aggregate bid amount as submitted shall cover work required by Contract Documents in place, complete, and ready for use.
B. Unit prices include costs to fully complete work in place, including providing labor, materials, tools, equipment, services, supplies, incidentals, necessary operations, profit, taxes, overhead, maintenance, and warranties.
C. No costs in connection with work required by Contract Documents for proper and successful completion of Contract will be paid outside of or in addition to prices submitted.
D. Work not specifically set forth as pay items shall be considered subsidiary obligations of Contractor and costs shall be included in prices named.
E. Method of measurement and basis of payment shall be as stipulated in following paragraphs.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

3.01 UNIT PRICE ITEMS:

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
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<tr>
<td></td>
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<tr>
<td>1. Wood Nailers:</td>
<td></td>
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<tr>
<td>2 x 4 wood nailer:</td>
<td>$_______ per linear foot</td>
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<td>2 x 6 wood nailer:</td>
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<td>2 x 8 wood nailer:</td>
<td>$_______ per linear foot</td>
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<td>2 x 12 wood nailer:</td>
<td>$_______ per linear foot</td>
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2. Roof Deck: Remove, replace, and/or repair damaged/deteriorated decking, matching existing type, weight, gauge, and dimension:

   a. Fluted Steel Deck Replacement: $________ per square foot
   b. Fluted Steel Deck Prepare/Paint: $________ per square foot

3.02 AUTHORIZATION, RECORD KEEPING, AND PAYMENT FOR UNIT PRICE ITEMS:
   A. Consultant's Field Representative will authorize Contractor when Unit Price Items are to be installed by Contractor. No payment will be made for any Unit Price Items installed by Contractor that is not authorized by Consultant's Field Representative or Owner.
   B. Consultant's Field Representative will maintain a record of all installed Unit Price Items and this record shall be utilized to produce the Change Order to include the Unit Price Items in Contractor's contract.

END OF SECTION 01 02 60
SECTION 01 07 50

DEFINITIONS

PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. Definitions for construction terminology not otherwise defined in Contract Documents.
   B. Definitions for special terminology used for this Project.

1.02 ABANDONED - (NO LONGER NECESSARY OR IN USE):
   A. "Remove" items so noted, or later defined, as an all inclusive responsibility within this contract. Pay for all work in connection with removal of these items, including municipal, disposal, utility, and service charges. Dispose of all "Excess".

1.03 ADDITION - (TO ADD TO AND BE INCORPORATED) ALSO TO "ADD":
   A. Work supplementary to that indicated to accomplish that which is required by the Contract Documents. To bring to a new condition; to extend, fasten, patch, and match to that which is existing.

1.04 DEFECTIVE - (NOT ACCEPTABLE):
   A. Refer to Conditions of the Contract, that which does not conform to the Contract Documents. As it applies to "Salvage", in addition to the above, shall mean "unsuitable".

1.05 EXCESS - (NOT REQUIRED):
   A. More quantity than required to conform to the Contract Documents and not desired by the Owner. Debris shall be considered "Excess" and not be used as fill or be buried on this site. Remove "Excess" from the site and legally dispose of. "Excess" "Suitable" "Salvage" shall be property of Contractor unless otherwise specified.

1.06 EXISTING - (PRESENTLY THERE):
   A. Also may be noted "original". Present conditions and assumed locations, if known, as of the Date of Contract Documents.

1.07 NEW - (TO BE INCORPORATED) NOT EXISTING:
   A. Refer to various specification sections for requirements of Work to be incorporated.

1.08 REINSTALL - (TO INCORPORATE AS WAS ONCE DONE):
   A. "Remove" and "salvage" existing from its location, if it does exist. "Restore", "Renovate", or "Remodel" and "Reinstall" in its existing location. Reincorporate and "re-work" the original work to the extent required by the Contract Documents.
   B. If the "Existing" item, so indicated, is missing, defective, or unsuitable as "Existing", then "Reconstruct" only that portion with "New" products and incorporate as was original. Syn. Replace.
1.09 RELOCATE - ("REINSTALL" IN A NEW LOCATION):
A. "Reinstall" in a new location as indicated on Drawings.

1.10 REMAIN - (TO LEAVE WHERE IT IS EXISTING):
A. The final location of an item in its "existing" position, however, this shall not mandate
   the fact that this item will not move during this contract, specifically in order to
   "Preserve" or "Rework".

1.11 REMOVE - (TO TAKE FROM EXISTING LOCATION):
A. Work required to extract a portion or whole by one or a combination of methods and
   moved to a new location.
   1. "Abandoned": Remove items by dismantling, excavation, extraction, or
e   demolition, if acceptable.
   2. Salvage: Remove by disassembly. "Relocate".
   3. Products: Where a specific portion of component of an assembly or whole is to
   be removed, take all precautions to prevent damage, defacement, and
d   displacement to the "existing" to remain (i.e., mortar, bricks, and finishes).

1.12 RENOVATE - (TO REPAIR AND MAKE NEW):
A. The process required to bring an item to a present new standard of condition
   required by the Contract Documents (e.g., to "rework" "existing" "suitable" "salvage"
   "products" and perform "new" work and "additions" required). (Syn. rehabilitate,
   recondition, repair.)

1.13 REPLACE - (TO TAKE THE PLACE OF):
A. "Remove" "existing" unserviceable product and provide "new" product in place of
   unserviceable product.

1.14 REUSE - (TO USE AS ONCE WAS):
A. The use of "suitable" "salvage" for incorporation or re-incorporation in the Work.
   "Remove", "Relocate", and "Reinstall" as required for "Reuse".

1.15 SALVAGE - (TO BECOME ABANDONED):
A. "Remove", protect, "preserve" incomplete material condition as found "existing".
   Also to "Save". Determine suitability for incorporation in this Contract. Store at a
   location mutually agreed upon. Dispose of all "Excess".
1.16 **UNKNOWN - (NOT SHOWN ON DRAWINGS):**

A. Products beneath surfaces indicated by drawings and encountered during the Work. Immediately support, shore, and protect. Immediately notify the Consultant and authority having jurisdiction. Allow free access for inspection. "Preserve" in proper condition until the Consultant determines definition and interpretation of Work. Take such measures as required for protection, reinforcement, or adjustment.

**PART TWO - PRODUCTS**

Not Used.

**PART THREE - EXECUTION**

Not Used.

**END OF SECTION 01 07 50**
PART ONE - GENERAL

1.01 DESCRIPTION:
A. Summary: The procedures and administrative requirements of this Section apply to all of the following Sections of the Specification which are involved in alterations to the existing building.
B. Extent Notes: Cut into or partially remove portions of the existing building as necessary to make way for new construction. Include such work as:
   1. Cutting, moving, or removal of items shown to be cut, moved, or removed.
   2. Cutting, moving, or removal of items not shown to be cut, moved, or removed, but which must be cut, moved, or removed to allow new work to proceed. Work or items which are to remain in the finished work shall be patched or reinstalled after their cutting, moving, or removal, and their joints and finishes made to match adjacent or similar work.
   3. Removal of existing surface finishes as needed to install new work and finishes.
   4. Removal of abandoned items and removal of items serving no useful purpose, such as abandoned piping.
   5. Repair or removal of dangerous or unsanitary conditions resulting from alterations work.

1.02 SCHEDULING AND ACCESS:
A. Work Sequence: Contractor shall submit detailed project plan with work sequence and phasing schedule.
B. Security:
   1. Be solely responsible for job site security.
   2. Protect completed work and stored items from vandalism and theft.
   3. Contact Owner for access to all security areas.
C. Maintenance of Access and Operations:
   1. During period of construction, Owner will continue to perform normal activities in existing building. Maintain proper and safe access to Owner-occupied areas at all times.
   2. Schedule demolition and remodeling operations with Owner in such a manner as to allow Owner operations to continue with minimum interruption.
   3. During period of construction, do not obstruct existing exit ways of Owner-occupied areas in any manner.
D. Maintenance of Existing Services:
   1. Maintain environmental control in existing building, especially temperature, humidity, and dust control.
   2. Provide temporary lines and connections as required to maintain existing mechanical and electrical services in building.
   3. Equipment handling shall be limited to Owner-approved hours and may be limited to night time hours.
4. Notify Owner a minimum of forty-eight hours prior to each required interruption of mechanical or electrical service in building. Such interruptions shall be only at such times and for lengths of time as approved by Owner. In no event shall interruption occur without prior approval of Owner.

E. Temporary Barricades:
1. Provide and erect barricades as necessary to protect ground personnel, employees, passersby, etc., from hazards resulting from the Work during construction operation.
2. Prevent public access to construction activities, equipment, and storage areas.

F. Building Access:
1. Contractor will limit access to building interior except:
   a. To install temporary enclosures, protections, and equipment.
   b. For project or medical emergency.
2. Access to roof construction areas shall be by way of Owner designated method.

1.03 ALTERATIONS, CUTTING AND PROTECTION:

A. Extent:
1. Perform cutting and removal of deck work so as not to cut or remove more than is necessary and so as not to damage adjacent work.
2. Conduct work in such a manner as to minimize noise and to minimize accumulation and spread of dirt and dust.
3. Perform cutting for ductwork and other rectangular openings with carborundum saw with approved dust arrestor.

B. Securement of Openings: Protect all openings made in existing roofs, etc., with barricades to prevent accidents to Owner's and Contractor's personnel. If required by Owner, provide a workman at ground level inside the building at all times during the tear-off operations and when the roof deck or roofing is being installed. It will be the responsibility of this individual to alert personnel in the area of the work being performed overhead, to watch for falling debris, and to broom clean the area each day of any dirt that may result from the roof replacement operations.

C. Responsibility and Assignment of Trades:
1. Contractor shall assign the work of moving, removal, cutting, patching, and repair to trades under his supervision so as to cause the least damage to each type of work encountered, and so as to return the building as much as possible to the appearance of new work.
2. Patching of finish materials shall be assigned to mechanics skilled in the work of the finish trade involved.

D. Protection:
1. Protect remaining finishes, equipment, and adjacent work from damage caused by cutting, moving, removal, and patching operations. Protect surfaces which will remain a part of the finished work.
2. Cover existing walls and floors where necessary to prevent damage from construction operations.
3. During demolition, cutting, and construction, provide positive dust control by wetting dusty debris and by completely sealing openings to Owner-occupied areas with temporary seals so as to prevent spread of dust and dirt to interior areas.

4. After materials are installed, properly protect Work until final acceptance.

5. Repair any damage resulting from construction operations without cost to Owner.

6. Provide continuous security at openings cut into existing exterior walls and roofs during non-working hours. Prevent unauthorized entry into the existing facility through areas demolished or accessed as part of the Work.

E. Special Protection:
   1. Comply with welding and cutting precautions specified in Section 01 50 00 - Temporary Facilities and Controls. In addition, provide Type I fire retardant enclosure around area of welding.
   2. Provide temporary weather protection over open roof penetrations until final flashing is completed.
   3. During equipment handling, provide a roof applicator at project with sufficient materials for temporary patching and sealing.
   4. Provide roof applicator at jobsite continuously during rainstorms which may occur while job is in progress to make temporary or emergency repairs.

F. Debris:
   1. Remove debris from the site daily. Removed material becomes property of the Contractor. Load removed material directly on trucks for removal from site. Dispose of removed material legally. Do not allow debris to enter sewers.
   2. Do not allow material accumulations to endanger structure.
   3. Cover and secure material accumulations as necessary to prevent the material from spreading over the rooftop or becoming airborne.
   4. Submit material storage and disposal plan for review prior to job start.

1.04 PATCHING, EXTENDING, AND MATCHING:

A. Patch and extend existing work using skilled mechanics who are capable of matching the existing quality of workmanship. The quality of patched or extended work shall not be less than that which exists.

B. In areas where any portion of an existing finished surface is damaged, lifted, stained, or otherwise made or found to be imperfect, patch or replace the imperfect portion of the surface with matching material.

C. Provide adequate support or substrate for patching of finishes.

D. Quality:
   1. In the Sections of the product and execution of Specifications which follow these General Requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend, or replace existing work. Obtain all such products in time to complete the Work on schedule. Such products shall be provided in quality which is in no way inferior to the existing products.
   2. The quality of the products that exist in the building, as apparent during pre-bid site visits, shall serve as the Specification requirement for strength, appearance, and other characteristics.
E. Transitions:
   1. Where new work abuts or finishes flush with existing work, make the transition as
      smooth and workmanlike as possible. Patched work shall match existing
      adjacent work in texture and appearance so as to make the patch or transition
      invisible to the eye at a distance of no closer than 3 feet (1m).
   2. Where masonry or other finished surface is cut in such a way that a smooth
      transition with new work is not possible, terminate the existing surface in a neat
      fashion along a straight line at a natural line of division and provide trim
      appropriate to the finished surface.
F. Restore existing work that is damaged during construction to a condition equal to its
   condition at the time of the start of the Work, and to satisfaction of Owner.

1.05 REPAIR:
   A. Replace work damaged in the course of alterations, except at areas approved by
      Owner for repair.
   B. Where full removal of extensive amounts of almost-suitable work would be needed to
      replace damaged portions, then filling, straightening, and similar repair techniques,
      followed by finishing, will be permitted.
   C. If the repaired work is not brought up to the standard for new work, Owner will direct
      that it be cut out and replaced with new work.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01 12 00
SECTION 01 20 00

PROJECT MEETINGS

PART ONE - GENERAL

1.01 PROJECT MEETINGS:
   A. Project meetings will be held at the site at a time to be designated by Owner.
   B. Representatives of Contractor shall meet with Owner or his appointed representative.

1.02 PRE-CONSTRUCTION MEETING
   A. Attendance:
      1. Owner.
      2. Consultant/Engineer.
      3. Contractor.
   B. Sign-in list for all attending including names, title, phone number, and company.
   C. Contract Review:
      1. Schedule of values and progress payment processing.
      2. Notice to proceed and start date.
      3. Project communications and problem resolution.
   D. Job Site Conditions and Requirements:
      1. Services (temporary):
         a. Water.
         b. Power (110, 220).
         c. Sanitary facilities.
         d. Parking areas.
      2. Site Access and Restrictions:
         a. Set-up areas, material storage, and handling.
         b. Protection of buildings, grounds, and building interior.
      3. Working Area and Preparation:
         a. Review work flow and schedule.
   E. Technical Sections:
      1. Function of on-site inspector and other on site personnel.
      2. Material storage methods.
      4. Manufacturer inspections:
   F. Safety and Security - Review Contractor responsibilities, and establish Owner monitoring procedures.
   G. Summary and Questions
   H. Issue record of meeting minutes to all attendees.
1.03 PROJECT MEETING
A. Attendance:
   1. Owner.
   2. Consultant/Engineer.
   3. Contractor.
   4. Subcontractors.
B. Sign-in list for all attending, including names, titles, phone numbers, and company name.
C. Project Review:
   1. Problem resolution.
   2. Project communication.
   3. Review projected work flow and schedule against work completed to date.
   4. Progress payment processing.
D. Job Site Conditions:
   1. Review set-up area, material storage, and handling.
   2. Review work to date against schedule.
   3. Review quality of work to-date.

PART TWO - PRODUCTS
Not Used.

PART THREE - EXECUTION
Not Used.

END OF SECTION 01 20 00
PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. Submittals required by Specification Sections and as listed in attached List of Submittals.

1.02 REQUIRED SUBMITTALS:
   A. Applicator's License Certificate: Copy of the roofing material manufacturer's agreement/contract indicating date application was approved and expiration date.
   B. Material manufacturer's roof system assembly letter indicating approval/acceptance of specified roof system including listing of roof system components, general installation requirements, performance criteria of proposed system with corresponding system report designation, and warranty to be issued for project.
   C. Copies of independent test reports indicating criteria of proposed roof system meeting specified roof system performance.
   D. Shop drawings of proposed details.
   E. Manufacturer's product data sheets and Safety Data Sheets (SDS) on each material proposed for usage.
   F. Sample of warranty that is to be issued upon project completion.
   G. Detailed project schedule showing work phasing with annotated roof plan depicting proposed daily progress schedule.

1.03 SHOP DRAWINGS:
   A. Original drawings illustrating the proposed Work, showing flashing details.
   B. Prepare shop drawings for details and indicate on a roof plan, the proposed location of detail presented on shop drawings.
   C. Indicate joints, types, and locations of fasteners, shapes, sizes, expansion joints, and any special conditions for each flashing condition. Note critical dimensions, gauge, and finish of sheet metal for each flashing condition.
   D. Submit shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including counter flashings, metal edge flashings, and expansion joint systems.
1.04 PRODUCT DATA:
A. Submit manufacturer's product/technical data sheets each material proposed for use in construction of roof assembly and related flashings and components.
   1. Clearly mark each copy to identify pertinent materials, products, or models.
   2. Show dimensions and sizes proposed.
   3. Show performance characteristics.

1.05 SAMPLES:
A. Physical examples to illustrate materials, equipment, and workmanship; and to establish standards by which completed Work is judged, if requested.

1.06 CONTRACTOR RESPONSIBILITIES:
A. Review shop drawings, product data, and samples prior to submission. Initial, sign, or stamp, certifying the Contractor's review of the submittal.
B. Verify:
   1. Field measurements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.
C. Coordinate each submittal with requirements of Work and of Contract Documents.
D. Contractor's responsibility for errors and omissions in submittals is not relieved by Consultant review of submittals.
E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by the Consultant's review of submittals, unless Consultant gives written acceptance of specific deviations.
F. Begin no work which requires submittals until return of submittals with Consultant's stamp and initials or signature indicating review and indication to proceed as noted. Work performed prior to submission and approval of submittals may be subject for rejection.

1.07 SUBMISSION REQUIREMENTS:
A. Schedule submissions to the Consultant after Contract award.
B. Submit one electronic copy of submittals.
C. Submit samples as requested.
D. Accompany submittals with transmittal letter containing:
   1. Date.
   2. Project title and number.
   3. Contractor's name and address.
   4. The number of each submittal.
E. Provide submittals bound together with a Cover and Table of Contents.
1.08 **RE-SUBMISSION REQUIREMENTS:**
   A. **Product Data and Samples:** Submit new data and samples as required for initial submittal.
   B. **Shop Drawings:**
      1. Revise initial drawings as required and re-submit as specified for initial submittal.
      2. Indicate on drawings any changes which have been made other than those requested by Owner.

1.09 **DISTRIBUTION OF SUBMITTALS AFTER REVIEW:**
   A. Consultant will retain approved submittals.
   B. Consultant will forward approved submittals to Owner.
   C. Consultant will return submittals to Contractor.

1.10 **LIST OF SUBMITTALS:**

**SECTION 01 30 00 - SUBMITTALS**
- Submittals - 1 electronic copy.

**SECTION 02 07 20 - MINOR DEMOLITION AND RENOVATION WORK**
- Product Data.

**SECTION 07 22 00 - ROOF AND DECK INSULATION**
- Product Data.
- Shop Drawings, where applicable.
- Samples, if requested.

**SECTION 07 52 50 - MODIFIED BITUMEN MEMBRANE ROOFING**
- Product Data.
- Roof system test reports.
- Shop Drawings, where applicable.
- Samples, if requested.

**SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM**
- Product Data.
- ANSI/SPRI ES-1 Fabrication certifications.
- Shop Drawings, where applicable.
- Color Chart.
SECTION 26 41 00 - LIGHTNING PROTECTION SYSTEM

• Product Data.
• Shop Drawings/System layout.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01 30 00
SECTION 01 40 00

QUALITY CONTROL

PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. General Quality Control.
   B. Manufacturers’ Field Services.

1.02 QUALITY CONTROL, GENERAL:
   A. Maintain quality control over suppliers, manufacturers, products, services, site
      conditions, and workmanship to produce work of specified quality.
   B. Contractor shall be approved by manufacturer to perform the work for the specified
      guarantee period. Contractor shall have completed previous projects utilizing same
      materials and provide same warranty as specified herein.
   C. Examine each phase of Work and have defective conditions corrected before
      starting subsequent operations which would cover, or are dependent upon, work in
      question.
   D. Where visual examination is not sufficient, such as in verifying slope of roof deck for
      proper drainage, use instruments with qualified operators to examine work.
   E. Perform roof removal and new roof material installation using full-time employees of
      the Contractor.

1.03 WORKMANSHIP:
   A. Comply with industry standards, except when more restrictive tolerances or specified
      requirements indicate more rigid standards or more precise workmanship.
   B. Utilize qualified personnel who have experience with the specified materials to
      produce workmanship of specified quality.
   C. Secure products in place with positive anchorage devices designed and sized to
      withstand stresses, vibration, and racking.
   D. Provide finishes to match accepted samples.

1.04 MANUFACTURER’S FIELD SERVICES:
   A. When specified in respective Specification Section, require manufacturer to provide
      qualified personnel to observe field conditions, conditions of surfaces and
      installation, quality of workmanship, and to make appropriate recommendations.

PART TWO - PRODUCTS

Not Used.
PART THREE - EXECUTION

Not Used.

END OF SECTION 01 40 00
SECTION 014300

MOCK-UPS

PART ONE - GENERAL

1.01 DESCRIPTION:
   A. Preparation of mock-ups representing proposed finished sheet metal, flashings, and sheet metal assemblies for review and approval.

1.02 QUALITY ASSURANCE:
   A. Contractor to prepare mock-ups utilizing materials proposed for the finished product and to simulate the desired appearance of the finished product.
   B. Construct mock-ups at locations on the building for review.
   C. Mock-ups shall be of appropriate size to depict finishes and connections.
   D. Materials, finishes, thickness, attachments, dimensions, and profiles shall be as specified herein and as shown within the project.
   E. Owner or Owner’s Representative reserves the right to require any modifications deemed necessary. No requests for extra costs will be entertained unless an upgrade of the original design is involved.
   F. Mock-ups shall constitute standard of acceptance for remaining work.

1.03 SCHEDULE OF MOCK-UPS:
   A. Typical rise wall flashing condition(s); size 3-feet minimum.
   B. Typical metal edge/fascia condition(s); size 3 feet minimum; 2 color options.
   C. Typical sheet metal gutter; size 3 feet minimum; 2 color options.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 014300
SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART ONE - GENERAL

1.01 SANITARY FACILITIES:
A. Provide adequate temporary chemical toilets at time Work is commenced.
B. Maintain facilities in compliance with applicable health laws and regulations. Keep clean and unobtrusive.
C. Upon completion of Work, remove these facilities and all traces thereof.

1.02 STORAGE OF MATERIALS:
A. Provide suitable non-combustible, watertight coverings for storage of materials subject to damage by weather. Covering shall be of sufficient size to hold materials required on site at one time. Pallets shall be raised at least 6-inches (150mm) above ground, on heavy joists or sleepers.
B. If temporary storage sheds are used, locate storage areas where directed, maintain in good condition, and remove storage sheds when so directed. Locate storage areas of combustible construction a minimum of 30 feet (10m) from existing building.
C. Store materials on site unless otherwise approved by Owner.
D. Cover and protect materials subject to damage by weather, including during transit.
E. Do not use building as storage facility.
F. Provide additional storage at no cost to Owner in the event that additional storage area is required beyond that provided at project site.
G. Stored materials shall be available for inspection by Owner at all times.
H. Store flammable and volatile liquids in sealed containers located a minimum of 20 feet from existing buildings.
I. Transport flammable or volatile liquids in, and use from, U.L. listed safety cans.
J. Deliver material and equipment in manufacturer's original packaging with all tags and labels intact and legible. Handle and store material and equipment in such a manner as to avoid damage. Liquid products shall be delivered sealed, in original containers. Store roll goods in an upright position.
K. Proper storage of materials is the sole responsibility of Contractor. Protect all materials susceptible to moisture including, but not limited to, all roll goods, insulation, cant strip, wood, and plywood in dry, above ground, watertight storage. Keep all labels intact and legible, clearly showing the product, manufacturer, and other pertinent information.
L. Reject any materials becoming wet or damaged and remove from the jobsite immediately. Any insulation found to be improperly stored at the jobsite shall be considered wet at the discretion of Owner's Representative and removed from the jobsite.
M. Maintain products liable to degrade as a result of being frozen above 40 degrees Fahrenheit (4 degrees Celsius) in heated storage.
N. Random samples of all materials susceptible to moisture will be taken at various stages of the installation to ensure no significant variations in moisture.
O. Distribute material, debris, and equipment over the roof deck to avoid damage to the structural deck. Place materials and equipment to be stored on the roof as nearly direct over structural members as can be determined. Secure equipment, material, and debris on the roof to prevent movement by wind or other elements. Contractor assumes full responsibility for loading on the structural deck or roofing materials during roof replacement operations. Owner's Representative reserves the right to reject any loadings deemed unacceptable.

1.03 TEMPORARY WATER:
A. Make arrangements with Owner for water required for construction. Owner will pay for costs of water.
B. Provide hoses for conveyance.

1.04 TEMPORARY ELECTRICAL ENERGY:
A. Make arrangements with Owner for temporary electrical service for completion of the Work. Owner will pay energy charges for temporary power and lighting.
B. Provide all necessary temporary wiring (in conduit if requested by Owner), extensions, and temporary lighting devices.

1.05 TEMPORARY LADDERS, SCAFFOLDS, HOISTS:
A. Furnish and maintain temporary ramps, scaffolds, hoists, or chutes as required for proper execution of Work.
B. Such apparatus, equipment, and construction shall meet requirements of applicable federal, state, and local safety and labor laws.

1.06 GUARDRAILS, BARRICADES, AND TEMPORARY COVERINGS:
A. Provide barricades as required to protect natural resources, site improvements, existing property, adjacent property, and passers-by.
B. Where pedestrian traffic is through or adjacent to work areas, provide necessary guardrails and barricades to protect pedestrians and to prevent pedestrian access to Work areas.
C. Remove guardrails and barricades at completion of construction.
D. Provide suitable temporary watertight coverings over roof openings as required to protect interior equipment from inclement weather.
E. Provide suitable protection for stairs, elevator, and/or walls and floors in areas used for contractor roof access.

1.07 PROTECTION:
A. Maintain bench marks, monuments, and other reference points. If disturbed or destroyed, replace as directed.
B. Protect existing adjacent streets, sidewalks, curbs, buildings, and property including trees, lawns, and plants.
C. Refer to Section 01 12 00 - Alterations Project Procedures, for protection requirements of existing building.
1.08 TEMPORARY FIRE PROTECTION:
   A. During construction, Contractor and his subcontractors and sub-subcontractors and
   their agents and employees shall comply with fire safety practices as outlined in
   NFPA Pamphlet 241 and local fire protection codes, and in addition shall:
   1. Provide following stored pressure extinguishers during entire construction period:
      a. One U.L. rating 4A-60B:C dry chemical fire extinguisher.
      b. One U.L. rating 2A 2-1/2 gallon water fire extinguisher.
      c. One U.L. rating 10B:C carbon dioxide fire extinguisher with horn and hose
         assembly.
   2. Provide fire extinguishers together in each of following areas:
      a. Each 3000 square feet of work area or fraction thereof.
   3. Contractor's superintendent or other assistant superintendents shall be
      appointed as project fire warden for entire construction period.
   4. Train workmen in proper use of each type fire extinguisher.
   5. Post telephone number of fire department, specific information regarding location
      of on-site fire fighting equipment, and procedures to be followed in event of fire.
   6. Maintain free access at all times to fire extinguisher equipment, street fire
      hydrants, and outside connections for standpipe hose systems.
   7. Maintain all exit facilities and access thereto, free of material and other
      obstructions.

1.09 EMPLOYEE CONTROL:
   A. Do not allow construction employees to enter Owner-occupied areas. Maintain
      construction traffic in designated access routes.

1.10 PARKING FACILITIES:
   A. Parking area for a designated number of construction personnel vehicles will be
      made available at the site by Owner.

1.11 CLEANING DURING CONSTRUCTION:
   A. Oversee cleaning and ensure that building and grounds are maintained free from
      accumulations of waste materials and rubbish.
   B. Sprinkle dusty debris with very fine water mist to control accumulation of dust. Do
      not use water in quantity so as to puddle.
   C. At not less than every day during progress of work, clean up work areas and access
      areas and dispose of waste materials, rubbish, and debris.
   D. At Contractor's option, on-site dump containers may be used for collection of waste
      materials, rubbish, and debris. Locate containers a minimum of 30 feet (10m) away
      from building entrances at a location acceptable to Owner. If used, remove
      containers when filled.
   E. Do not allow waste materials, rubbish, and debris to accumulate and become an
      unsightly or dangerous condition.
   F. Remove waste materials, rubbish, and debris from site and legally dispose of at
      public or private dumping areas off Owner's property.
G. Keep streets and access to site free of rubbish and debris.
H. Lower waste materials in a controlled manner with as few handlings as possible.
    Do not drop or throw materials from heights.

1.12 LEAK (WATER) DAMAGE CONTROL:
A. In the event of rain during roof replacement construction operations, immediately
    inspect interior of building for leaks.
B. Coordinate with Owner for access to building.
C. Continue to inspect building on a regular basis until rain ceases.
D. If leaks are discovered during rains, immediately cover and protect equipment with
    fire retardant sheeting in the area of the leak. Immediately notify Owner of leak
    condition.
E. Take necessary precautions to protect the roof from damage. Repair all new areas
    of damage caused by the negligence of Contractor, at Contractor's expense.
    Owner's On-site Representative shall determine damage caused by Contractor
    negligence.

1.13 PERMITS:
A. Obtain and pay for all required local and state permits, licenses, and registrations.
    Work may be subject to ordinances, laws, codes, and regulations.
B. Prior to bidding, notify Owner and Consultant of any violation, omission, or questions
    of compliance. Required corrections to Specifications will be made via Addenda
    prior to receipt of Bids.
C. Be responsible for full compliance and bear cost of additional work not specified that
    may be required by authorities having jurisdiction.

1.14 REGULATORY REQUIREMENTS:
A. International Building Code (IBC), latest edition; as amended by the governing body.
B. Occupation Safety and Health Administration (OSHA) requirements, as applicable.
C. United States Environmental Protection Agency (EPA) requirements, as applicable.
D. Adhere to all limitations, cautions, and regulatory standards referenced by the
    manufacturer of each material provided.

PART TWO - PRODUCTS
Not Used.

PART THREE - EXECUTION
Not Used.

END OF SECTION 01 50 00
SECTION 01 60 00
MATERIAL AND EQUIPMENT

PART ONE - GENERAL

1.01 SECTION INCLUDES:
A. Material and Equipment Incorporated Into Work:
   1. Conform to applicable specifications and standards.
   2. Comply with size, make, type, and quality specified, or as specifically approved in writing by Owner.
   3. Manufactured and Fabricated Products:
      a. Design, fabricate and assemble in accordance with recognized industry standards.
      b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
      c. Two or more items of same kind shall be identical, by same manufacturer.
      d. Products suitable for service conditions.
      e. Adhere to equipment capacities, sizes, and dimensions shown or specified unless variations are specifically approved in writing.
B. Do not use material or equipment for purposes other than that for which it is designed or is specified.

1.02 REUSE OF EXISTING MATERIAL:
A. Except as specifically indicated or specified, materials and equipment removed from existing structure shall not be used in completed Work.
B. For material and equipment specifically indicated or specified to be reused in Work:
   1. Use special care in removal, handling, storage, and reinstallation to assure proper function in completed Work.
   2. Arrange for transportation, storage, and handling of products which require off-site storage, restoration, or renovation. Pay costs for such work.

1.03 MANUFACTURER'S INSTRUCTIONS:
A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copy of such instructions to parties involved in installation.
   1. Maintain one set of complete instructions at jobsite during installation and until completion.
   2. Submit copy to Consultant with appropriate Product Data submittal.
   3. Consultant will forward copy to Owner.
B. Handle, install, connect, clean, condition, and adjust products in strict accordance with such instructions and in conformity with specified requirements.
   1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Consultant for further instructions.
   2. Do not proceed with work without clear instructions.
C. Perform Work in accordance with manufacturer's instructions. Do not omit preparatory steps or installation procedures unless specifically modified or exempted by Contract Documents.

1.04 TRANSPORTATION AND HANDLING:
A. Arrange deliveries of products in accordance with construction schedules. Coordinate to avoid conflict with work and conditions at site.
   1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
   2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.05 SUBSTITUTIONS AND PRODUCT OPTIONS:
A. Contractor's Options:
   1. For products specified only by reference standard, select any product meeting that standard, by any manufacturer.
   2. For products specified by naming several products or manufacturers, select any product and manufacturer named.
   3. Products specified by naming only one product and manufacturer are to establish a quality standard. For products other than the named product, submit request for substitution.
B. Substitutions:
   1. During Bidding, Consultant will consider written requests from Bidders and manufacturers for substitutions of products in place of those specified. Such requests must be received at least two days prior to Bid Date. Requests received after that time will not be considered. Approval of proposed substitutions will be set forth in an Addendum. Requests for substitutions shall include data listed below.
   2. Submit request for each substitution, supported with complete data, drawings, and appropriate samples substantiating compliance of proposed substitution with Contract Documents, including:
      b. Name and address of similar projects on which product was used and date of installation.
      c. Itemized comparison of qualities of proposed substitution with that specified.
      d. Changes required in other elements of Work because of substitution.
      e. Effect on construction schedule.
      f. Availability of maintenance service and source of replacement materials.
C. Contractor’s Representation: Request for substitution constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it is equal to or superior in all respects to that specified.
   2. Will provide same warranties for substitution as for product specified.
   3. Will coordinate installation of accepted substitution into Work and make such other changes as may be required for Work to be complete in all respects.
   4. Waives all claims for additional costs, under his responsibility, related to substitution which subsequently becomes apparent.

D. Substitutions will be not be considered if:
   1. They are indicated or implied on Shop Drawings or Product Data submittals without formal request submitted in accordance with this Section.
   2. They are submitted after time limit specified above.
   3. Acceptance will require substantial revision of Contract Documents.

E. If substitution is not approved or accepted, Contractor shall furnish specified product.

PART TWO - PRODUCTS

Not Used.

PART THREE - EXECUTION

Not Used.

END OF SECTION 01 60 00
SECTION 01 70 00

CONTRACT CLOSEOUT

PART ONE - GENERAL

1.01 GENERAL:
   A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.

1.02 SUBSTANTIAL COMPLETION:
   A. Contractor: Shall notify Owner's Representative that Project is substantially complete and schedule time for inspection.
   B. Owner's Representative will make an inspection after notification.
   C. Should Owner's Representative consider Work not complete:
      1. He will immediately notify Contractor, in writing, stating reasons.
      2. Contractor shall complete Work and send second written notice to Owner's Representative certifying Project is substantially complete.
      3. Owner's Representative will reinspect Work.

1.03 FINAL INSPECTION:
   A. Contractor shall submit written certification that:
      1. Contract Documents have been reviewed.
      2. Project has been inspected for compliance with Contract Documents.
      3. Work has been completed in accordance with Contract Documents.
      4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
      5. Project is complete and ready for final inspection.
   B. Owner's Representative will make final inspection after notification from Contractor.
   C. Should Owner's Representative consider Work complete in accordance with requirements of Contract Documents, he will request Contractor to make Project Closeout submittals.
   D. Should Owner's Representative consider Work not complete:
      1. He will notify Contractor in writing, issuing inspection list to Contractor with noted items requiring further consideration.
      2. Contractor shall take immediate steps to remedy the stated deficiencies and submit initialed inspection list to Consultant certifying Work is complete.
      3. Owner's Representative will reinspect Work.

1.04 CLOSE-OUT SUBMITTALS:
   A. Evidence of compliance with requirements of governing authorities.
   B. Warranties and Bonds: Refer to requirements of this Section.
   C. Evidence of Payment and Release of Liens: Refer to requirements of General and Supplementary Conditions.
1.05 WARRANTY/GUARANTEE:
   A. Submit original and duplicate copies of both Contractor's Warranty and Manufacturer's Guarantee to Owner's Representative for review. After review, Owner's Representative will forward Warranty and Guarantee to Owner. Consultant shall approve final payment (retainage) upon receipt of both Contractor's Warranty and Manufacturer's Guarantee.

1.06 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS:
   A. Final Release and Waiver of Liens:
      1. Contractor's Waiver of Liens.
      2. Separate waivers of liens for subcontractors, suppliers, and others with lien rights against property of Owner, together with complete list of those parties.
   B. All submittals shall be notarized and sealed before delivery to Owner's Representative.

1.07 FINAL APPLICATION FOR PAYMENT:
   A. Submit final application in accordance with requirements of General Conditions.
   B. Owner's Representative shall review all data supplied for conformance with Contract Documents. When approved, Owner will accept the Work, release Contractor (except as to conditions of the Performance Bond, any legal rights of Owner, required guarantees, and correction of Faulty Work after final Payment), and make final payment to Contractor.
   C. Final payment will not be approved or released until receipt of proper close-out documents.

PART TWO - PRODUCTS
Not Used.

PART THREE - EXECUTION
Not Used.

END OF SECTION 01 70 00
PART ONE - GENERAL

1.01 GENERAL:
   A. Maintain premises free from accumulations of waste, debris, and rubbish caused by
      construction operations.
   B. At completion of Work, remove waste materials, rubbish, tools, equipment,
      machinery, and surplus materials. Clean all sight-exposed surfaces. Leave project
      clean and ready for occupancy.

1.02 REQUIREMENTS OF REGULATORY AGENCIES:
   A. Codes and Standards: Applicable federal, state, and local codes and regulations
      relative to environmental safety regulations.
   B. Hazards Controls: Store volatile waste in covered metal containers and remove from
      premises daily. Prevent accumulation of wastes which create hazardous conditions.
   C. Pollution Control: Conduct clean-up and disposal operations to comply with local
      ordinances and anti-pollution laws.
      1. Burning or burying of rubbish and waste materials on the project site is
         prohibited.
      2. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in
         storm or sanitary sewer systems or into streams or waterways is prohibited.

PART TWO - PRODUCTS

2.01 CLEANING MATERIALS:
   A. Use only cleaning materials recommended by manufacturer of surface to be
      cleaned.
   B. Use cleaning materials only on surfaces recommended by cleaning material
      manufacturer.

PART THREE - EXECUTION

3.01 DURING CONSTRUCTION:
   A. Keep work area and all occupied property in neat and orderly condition at all times.
      Oversee cleaning and ensure that building and grounds are maintained free from
      accumulations of waste materials and rubbish. Sprinkle dusty debris with very fine
      water mist to control accumulation of dust. Do not use water in quantity so as to
      puddle. Do not allow waste and other materials such as rubbish, debris, wrappers,
      etc., to accumulate and become unsightly or hazardous. Promptly remove
      equipment and excess materials as they become no longer needed for the progress
      of the work. At not less than every day during progress of work, clean up work and
      access areas and dispose of waste materials, rubbish, and debris.
B. Legally dispose of waste materials, rubbish, and debris at public or private dumping areas off Owner's property. At the completion of work, restore work area to its original condition. Lower waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Keep street and access to site free of rubbish and debris.

C. Contractor shall be responsible for damage to or destruction of property of any sort resulting from the work or caused by defective work, or the use of unsatisfactory materials or workmanship.

D. Contractor shall be responsible for the preservation of all private property, trees, fences, etc., along the adjacent street, right-of-way, etc., and shall use every precaution necessary to prevent damage or injury thereto. Use suitable precautions to prevent damage to pipes, conduits, and other structures.

E. If damage to any structures, utilities, or other improvement occurs by reason of Contractor's operations even though special precautions have been employed, Contractor shall be entirely responsible for such damage and shall make all repairs as required to the satisfaction of Owner.

F. Do not injure, destroy, or trim landscaping without authorization by Owner. Landscaping damage will be replaced by Contractor with new stock or with other stock satisfactory to Owner at the expense of Contractor.

3.02 FINAL CLEANING:

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastics, adhesives, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior surfaces.

C. Repair, patch, and touch-up marred surfaces to match adjacent finishes.

D. Broom clean paved surfaces; rake clean other surfaces of grounds.

E. Clean areas impacted by work activities.

F. Prior to final completion or Owner occupancy, conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that entire Work area is clean.

END OF SECTION 01 71 00
SECTION 02 07 20

MINOR DEMOLITION AND RENOVATION WORK

PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. Removing existing roofing, insulation, flashing, and sheet metal.
   B. Modifying existing roof penetrations to provide proper flashing height and flashing detail.
   C. Installing new wood nailers at designated locations.
   D. Repairing or securing existing metal deck, as required.
   E. Other miscellaneous and incidental work required to install complete roofing system as specified and to obtain specified manufacturer's warranty.

1.02 RELATED SECTIONS:
   A. 07 22 00 - Roof and Deck Insulation.
   B. 07 52 50 - Modified Bitumen Membrane Roofing.
   C. 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCES:
   B. Corps of Engineers (CRD).

1.04 PROJECT CONDITIONS:
   A. Environmental Requirements:
      1. Do not remove existing roofing and flashing in inclement weather or when rain is predicted with 30 percent possibility.
      2. When ambient temperature is below 60 degrees Fahrenheit (15 degrees Celsius), expose only enough applicable materials required within four hour working period.
      3. Do not expose membrane and accessories to constant temperature in excess of 180 degrees Fahrenheit (82 degrees Celsius).
   B. Emergency Equipment: Maintain on-site materials necessary to apply emergency temporary seal in event of sudden storms or inclement weather.
   C. Smoking is prohibited on roof areas, in existing building, and all of Owner's property.

1.05 SEQUENCING AND SCHEDULING:
   A. Sequence minor demolition and renovation with sequence of new work to maintain facility in dry, watertight condition.
   B. Coordinate roof work so that no more existing items are removed in one day than can be replaced with new roofing work in same day.
   C. Coordinate work with Owner's operational requirements.
D. Coordinate demolition work and removal with roofing work to maintain facility in dry, watertight condition.

1.06 WARRANTY:
A. Provide Contractor's warranty covering defects in installed materials and workmanship for period of two years from date of final acceptance.

PART TWO - PRODUCTS

2.01 MATERIALS:
A. Treatment for Wood Members: Pressure preservative treated in accordance with AWPA C2, C9 standards, Ground Contact using ACQ, MCQ, or other similar treatment at 0.20 pounds per cubic foot wood above ground.
B. Lumber for Nailers and Blocking: Standard Grade Fir or No. 2 Southern Yellow Pine bearing UL label; size shall be appropriate for application, minimum 2-inch (50mm) (nominal) thickness, kiln dried after treatment.
C. Plywood: Minimum 5/8-inch APA exterior grade sheathing, EXP 1 or "CDX", bearing APA trademark.
D. Gypsum Sheathing: 5/8-inch thick moisture resistant gypsum core with fiberglass facer and primed top surface such as "Dens-Deck Prime" by Georgia Pacific, "SecuRock" by US Gypsum, or approved equal.
E. Fasteners:
   1. Wood Substrate:
      a. Securement of metal flanged items such as flashing pans, metal edge/fascia, cleats, etc., shall be nails, No. 11 gauge, double hot-dipped galvanized, ASTM A153, steel or stainless steel wire with 3/8-inch (9mm) diameter head and ring shank fasteners for anchoring flanges of sheet metal fabrications shall be of sufficient length to achieve a minimum 1-1/4-inch embedment into solid wood substrate such as "R-103-A Stormguard Asphalt and Fiberglass Shingle Nail" by Maze Nails (800/435-5949).
      b. Securement of wood to wood shall be nails, No. 11 gauge, double hot-dipped galvanized steel or stainless steel wire nail with ring shank and 9/32-inch (7mm) diameter head such as "Stormguard PTL Anchor-Down Nail" by Maze Nails (800/435-5949); 10d or length required to provide 1-inch (25mm) penetration minimum into substrate.
      c. Securement of exposed items to wood substrate shall be No. 14 stainless steel screw with stainless steel washer and integral rubber seal; length required to provide 1-inch (25mm) penetration minimum into substrate.
      d. Fasteners for securing roofing materials to wood substrate shall be hardened steel nail with a 1-inch (25mm) diameter round head and ring shank; length to provide 1-inch (25mm) penetration into substrate, as manufactured by Simplex Nail Co.
      e. Fasteners for securing steel to wood substrate shall be No. 10 stainless steel wood screw with stainless steel washer and integral rubber seal, length to achieve 1-inch embedment into wood.
f. Fasteners for securing wood nailer to wood nailer in vertical position shall be 20 gauge galvanized steel plate, 2-inches wide by 4-inches long such as “MP 24 Mending Plate” by Simpson Strong-Tie Co., Inc. and “A34 Framing Anchor” by Simpson Strong-Tie Co., Inc. for corner connections.

2. Concrete Substrate:
   a. Fasteners for securing sheet metal items such as surface-mounted counterflashings, termination/compression bars, etc., to concrete substrate shall be a pre-assembled drive anchor with a stainless steel drive screw, a lead/zinc alloy expansion anchor body (1/4-inch (6mm) diameter, 1-1/2-inch [38mm] length) and a stainless steel washer with integral rubber seal (1-1/8-inch diameter) such as "Zamac Hammer-Screw" as manufactured by Powers Fasteners, Inc.
   b. Fasteners for securing wood blocking to concrete substrate at roof perimeters shall be sleeved stud expansion bolt, 1/2-inch (13mm) diameter (minimum), with 3/4-inch diameter steel washer such as "Kwik Bolt II" by Hilti, "Tru Bolt Wedge" by ITW Ramset, or "Lok/Bolt" by ITW Buildex. Fasteners for securing wood blocking to concrete substrate for miscellaneous applications shall be 1/4-inch diameter, 2-3/4-inch long coated screw with hex head such as "Tapcon" by ITW Buildex.

3. Masonry Substrate:
   a. Fasteners for securing wood to solid masonry at roof perimeters shall be galvanized steel expansion anchor, 3/8-inch (9mm) diameter (minimum), with 3/4-inch diameter steel washer such as "Countersunk Kwik Bolt II" by Hilti. Fasteners for securing wood to solid masonry for miscellaneous applications shall be 1/4-inch diameter, 2-3/4-inch long coated screw with hex head such as "Tapcon" by ITW Buildex.
   b. Fasteners for securing wood to hollow base masonry shall be 3/8-inch (9mm) diameter (minimum), threaded rod, with 3/4-inch diameter washer, nut, and screen tube such as "HIT C-20 Adhesive Anchor" by Hilti.
   c. Fasteners for securing sheet metal items to concrete substrate shall be a pre-assembled drive anchor with a stainless steel drive screw, a lead/zinc alloy expansion anchor body (1/4-inch (6mm) diameter, 1-1/2-inch [38mm] length) and a stainless steel washer with integral rubber seal (1-1/8-inch diameter) such as "Zamac Hammer-Screw" as manufactured by Powers Fasteners, Inc.

4. Steel Substrate:
   a. Fasteners for securing plywood to steel substrate shall be self-drilling, 1-1/2-inch long coated No. 10 screw with wafer head such as "Traxx Wood to Metal Fastener" by ITW Buildex. Fasteners for securing wood nailers/blocking to steel substrate shall be self-drilling coated heavy duty screw, 1/4-inch (6mm) diameter (minimum), with 5/8-inch (16mm) diameter washer such as "No. 14 Heavy Duty Screw" by OMG Roof Products.
   b. Fasteners for securing steel to steel substrate shall be self-tapping No. 14, 1-1/2-inch long stainless steel screw with stainless steel washer and bonded integral rubber seal.
5. Plywood Clip: 20 gauge galvanized steel H-clip such as "PSCL Panel Sheathing Clip" by Simpson Strong-Tie Co., Inc. (800/999-5099).
6. Receiver in Reglet: Soft, malleable lead sheet, size and shape to fit in joint and maintain compression against receiver.
F. Rust Inhibitive Primer: 100 percent acrylic resin primer such as “Metalclad Interior-Exterior Acrylic Latex Flat Primer & Finish #41702”, Devoe & Raynolds Co.
G. Paint for Roof-top Items: Lusterless (Flat) Acrylic Finish: Two coats over filler coat or primer coat such as Acrylic Primer of "ProlIndustrial Acrylic Primer" by Sherwin Williams and Finish Coat of "ProlIndustrial Acrylic Paint" by Sherwin Williams or approved equal.

PART THREE - EXECUTION

3.01 EXAMINATION:
A. Examine existing building and existing roofing to determine existing physical conditions that affect removal of existing roofing and installation of new roofing.
B. Verify that required barricades and other protective measures are in place.

3.02 PREPARATION:
A. Take measures to maintain watertight conditions during term of Contract.
B. Install interior protection and dust partitions where deck penetrations shall be removed or replaced.
C. Protect adjacent surfaces.

3.03 MINOR DEMOLITION OPERATIONS:
A. Execute demolition in careful and orderly manner with least possible disturbance or damage to adjoining surfaces and structure.
B. Avoid excessive vibrations in demolition procedures that would be transmitted through existing structure and finish materials.
C. Roof Removal:
   1. Remove existing roofing, insulation, and flashings; and sheet metal down to roof deck.
   2. Do not stockpile debris on roof surface. Promptly dispose of obsolete equipment and debris at authorized disposal site each day. Use chutes or other controlled containerized system to transfer debris from roof surface to dumpsters.
   3. Provide protective method, such as plywood set on minimum 1-inch (25mm) EPS insulation, when hauling debris over existing roof membrane.

3.04 MINOR RENOVATION WORK:
A. Prepare substrates in accordance with roofing manufacturer's recommendations.
B. Decking:
   1. Install new decking of like type, weight, gauge, and dimensions to provide suitable substrate in areas of deteriorated deck or where penetrations through deck are removed.
2. **Metal Decking:**
   a. Cover holes or openings 12-inches (300mm) in diameter or smaller with a plate of 18 gauge sheet metal. Extend plate minimum 4-inches (100mm) beyond edge of hole and onto adjacent unaffected rib. Mechanically fasten new decking or plate with screws spaced 6-inches (150mm) on-center.
   b. Repair holes or openings greater than 12-inches (300mm) in diameter with new deck material. Extend new decking 18-inches (300mm) minimum past nearest bar joist or support member. Mechanically fasten new decking with screws spaced 6-inches (150mm) on-center.
   c. Remove loose rust or other foreign material from existing deck that would prohibit proper installation of new materials.
   d. Remove rust by wire brushing or other appropriate method down to bare sound metal. Apply rust inhibitor over prepared areas of metal deck.
   e. Secure existing metal roof deck to existing steel framing with self-drilling #14 screws spaced 6-inches on-center.

C. **Nailers:**
   1. Replace damaged or deteriorated wood nailers with new nailers as required.
   2. Install wood nailers to match height of new insulation board.
   3. Secure 2X base nailer into structure and/or substrate for anchorage of cleats and/or fascias of sheet metal fabrications, width as necessary to extend beyond horizontal flange of sheet metal fabrication.
   4. Clean and prepare existing surfaces to receive wood nailers and curbs.
   5. Install 2 X 6 wood nailer, minimum, as base nailer at perimeters.
   6. Install wood nailers continuously with 1/4-inch (6mm) gap between each section. Set level and true. Pre-drill nailers prior to attachment. Countersink fastener in base nailer so that washer and head of fastener or nut are recessed below top of nailer.
   7. Securely fasten to structure with appropriate fasteners to resist minimum 175 pounds per linear foot (780N per 300mm) force in any direction and spaced 12-inches on-center. Use of powder-actuated fasteners is prohibited. Place a fastener within 3-inches (75mm) of each end of each section of wood blocking.
   8. Stagger joints in subsequent layers of nailers from joints in underlying layer of nailers a minimum of 12-inches (300mm).
   9. Install nailers so that ends and sides of adjoining nailers are aligned to form right angles (nominal) at corners.
   10. Weave ends of subsequent layers of nailers at corners so that ends of nailers do not align.
   11. Secure nailers to metal deck with screws spaced 12-inches (300mm) on-center, 6-inches (150mm) on-center, 10 foot (3m) from each corner.
   12. Secure nailers to wood substrate using nails 24-inches (600mm) on-center, staggered. Install nails on an angle.
14. Reduce fastener spacing 50 percent at a distance of 10 feet (3m) from each corner.

D. Plywood/Gypsum Sheathing:
1. Install new sheathing at walls. Replace damaged, deteriorated, or non-salvageable sheathing.
2. Secure sheathing to substrate with flat head fasteners (type appropriate for substrate) spaced 12-inches (300mm) on-center.
3. Secure sheathing to wood substrate with nails spaced 6-inches (150mm) on-center.

E. Plumbing Vents:
1. Extend plumbing vents or modify as necessary to accommodate new roof installation.
2. Provide pipe extensions and no-hub couplings where necessary to achieve minimum 8-inch (200mm) height above top of newly finished roof surface.
3. Utilize same material type and size as existing for new extension.

F. Sheet Metal Fabrications:
1. Remove and replace ferrous rooftop sheet metal fabrications to match existing.
2. Modify existing sleeves and umbrellas on existing equipment as scheduled.
3. Repair and renovate non-ferrous rooftop and drainage system sheet metal fabrications as required for permanent watertight installation.
4. Paint sheet metal with metal primer. Paint existing equipment hoods, covers, heat-flues/exhausts, steel framed supports, and other rooftop related exposed steel, penetration sleeves, and other sheet metal items to remain. Use rotary wire wheel or other mechanical abrading method to remove corrosion on sheet metal surfaces down to bare sound metal. Clean prepared areas and adjacent surfaces to receive new paint. Apply paint to prepared and cleaned surfaces in adequate coverage utilizing napped rollers to achieve monolithic finish appearance. Utilize heat resistant paint at heat exhaust vents.

3.05 CLEANING:

A. Materials, equipment, and debris resulting from demolition operations shall become property of Contractor. Remove and dispose of demolition debris in accordance with applicable city, state, and federal laws at authorized disposal site.

B. Leave substrate clean and dry, ready to receive roofing system.

END OF SECTION 02 07 20
SECTION 07 22 00

ROOF AND DECK INSULATION

PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. Installation of flat-stock polyisocyanurate, tapered polyisocyanurate insulation, and gypsum roof cover board as designated on the applicable roof areas.

1.02 RELATED SECTIONS:
   A. 07 52 00 – Modified Bitumen Membrane Roofing System.

1.03 REFERENCES:
   B. Standards:
      1. FM Global Approval Guide.

1.04 QUALITY ASSURANCE:
   A. Regulatory Requirements:
      1. Classified by Underwriters Laboratories Inc. as Class A rated material.
      2. Follow local, state, and federal regulations, safety standards, and codes. When conflict exists, the more restrictive document shall govern.
   B. Installation:
      1. Install in accordance with manufacturer's current published application procedures and general requirements of NRCA.
      2. Consider roof system manufacturer's technical specifications part of this Specification and use as reference for specific application procedures.
      3. Provide and install roof system to meet or exceed wind uplift resistance pressures of 90 psf in the field, 135 psf along 8-foot wide perimeters of the roof, and 187.5 psf in 8-ft X 8-ft corners of the roof in accordance with ASCE 7-10 and assuming 150 mph wind speed, Exposure B, Enclosed Building, Risk Category of III/IV, Eave Height of 66-feet; and a Safety Factor of 1.2.

1.05 DELIVERY, STORAGE, AND HANDLING:
   A. Store materials in accordance with manufacturer's recommendations.
   B. Outdoor Storage:
      1. Tarp and shield insulation from moisture and ultraviolet rays.
      2. Elevate insulation above substrate 4-inches minimum.
      3. Secure insulation to resist high winds.
4. Do not use insulation which has been determined "wet" or which has been wet and has dried.
5. Distribute insulation stored on roof deck to prevent concentrated loads that would impose excessive stress or strain on deck or structural members.
6. Remove manufacturer plastic shrink wrapping from materials, prior to covering with protective tarps.

1.06 SEQUENCING AND SCHEDULING:
A. Plan roof layout with respect to roof deck slope to prevent rainwater drainage into completed roofing.
B. Do not install more insulation than can be made watertight in same day.

1.07 PROJECT CONDITIONS:
A. Environmental Recommendations:
1. Apply roofing and insulation in dry weather.
2. Do not proceed with roof construction during inclement weather or when precipitation is predicted with 30 percent or more possibility.
3. Do not apply insulation over wet or moist deck or in foggy conditions.
4. Consider days when wind speeds are 30 mph or greater as "bad weather" days.
B. Maintain on site equipment and material necessary to apply emergency temporary weather protection in event of sudden precipitation.

PART TWO - PRODUCTS

2.01 ROOF INSULATION:
A. Polyisocyanurate Insulation: Rigid, closed cell polyisocyanurate rigid board insulation utilizing non-chlorine/non-ozone depleting blowing agent, bonded to non-asphaltic coated fiberglass facers, ASTM C 1289, Type II, Class 2, Grade 2 (20 psi), two layers 2-inch + 2.5-inch thickness or total of 4.5-inches; maximum board size 4 feet by 8 feet boards for mechanically attached applications; such as "ACFoam-III" by Atlas Roofing Corp, "DerbiBoard CA" by DerbiGum, "ENERGY CGF" by John Manville, "Resista" by Firestone "Paratherm CG" by Siplast, or approved equal.
B. Tapered Polyisocyanurate Insulation: Rigid, closed cell tapered polyisocyanurate rigid board insulation utilizing non-chlorine/non-ozone depleting blowing agent, bonded to non-asphaltic coated fiberglass facers, ASTM C 1289, Type II, Class 2, Grade 2 (20 psi), to achieve ¼-inch resulting slope; such as "Tapered ACFoam-III" by Atlas Roofing Corp, “Tapered ENRGY CGF” by John Manville, “Tapered DerbiBoard CA” by DerbiGum, “Tapered Resista” by Firestone, "Tapered Paratherm CG" by Siplast, or approved equal.
C. Cover Board: Moisture-resistant, 1/2-inch thick X 4-feet X 4-feet size gypsum-based roof board such as "Dens Deck Prime" by Georgia Pacific or “SecuRock” by US Gypsum.
D. Tapered Edge Strip: Tapered perlite insulation complying with ASTM C-728, to be used for tapered edge strips, size 1/2-inch (13mm) to 1-1/2-inch (37.5mm) thick by 6-inches (150mm) to 24-inches (600mm) wide, suitable for site conditions, such as "Tapered Fesco Edge Strip" by Johns Manville.

2.02 RELATED MATERIALS:
A. Compressible Fill Insulation: Foil or paper faced compressible fiberglass batten roll insulation of proper size and thickness to insert at openings at penetrations, perimeters, and curbs such as manufactured by Owens Corning.

B. Insulation Fasteners - Steel Deck: CR-10 fluorocarbon coated, self-tapping screws of sufficient length to penetrate the steel deck a minimum of 1-inch (25mm), minimum 3-inch (75mm) diameter steel plates with recessed screw head for use with insulation, such as "#15 Heavy Duty Roofing Fastener", "#21 Extra Heavy Duty Roofing Fastener" such as manufactured by OMG, “PerLock Heavy Duty Fastener” by DerbiGum, “Parafast HD Fastener” by Siplast, “All Purpose Fastener” by Johns Manville, or fastener approved by manufacturer as required to achieve the desired wind uplift resistance.

C. Low-Rise Foam Insulation Adhesive:
1. Single-component Moisture-cured Adhesive: ASTM D-2126, dispensed from portable pressurized containers, such as “DerbiBond LR” by DerbiGum, "Insta-Stik Professional Roofing Adhesive" by Dow Chemical Co., “Para-Stick” by Siplast, or approved equal

2. Dual-component Reaction-cure Adhesive: Two-part spray-applied low-rise urethane foam adhesive such as "OlyBond 500" by OMG, “JM Two-Part Urethane Insulation Adhesive” by Johns Manville, or approved equal.

PART THREE - EXECUTION
3.01 EXAMINATION:
A. Roof system manufacturer's representative shall inspect roof deck and associated substrates and provide written acceptance of conditions.

B. Manufacturer's approved roofing contractor shall inspect and approve deck and substrates.

C. Roofing contractor shall examine roof deck and related substrates and verify that there are no conditions that would prevent roof system manufacturer's approved application of roof system. These conditions include, but are not limited to, the following:
1. Inadequate anchorage of decking or substrates to structure.
2. Accumulations of moisture.
3. Tears, holes, cracks, or punctures.
4. Ridges, uneven conditions, or gaps.
5. Rust or other forms of deterioration.

D. Start of work constitutes acceptance of substrate and site conditions.
3.02 PROTECTION:
   A. Provide special protection from traffic on newly installed roof.

3.03 PREPARATION:
   A. Do not install insulation until defects in roof deck and substrates are corrected in
      order to meet roof system manufacturer's requirements and to ensure that deck
      conditions will not restrict roof drainage.
   B. Broom sweep and clean areas to receive new insulation.
   C. Perform pull-out resistance tests in general accordance with ANSI/SPRI FX-1-2006
      with the specified insulation fastener on the existing fluted steel roof deck. Provide
      results of pull-tests to the Roof System Manufacturer and Engineer/Consultant for
      determination of fastener spacing.

3.04 APPLICATION:
   A. General Insulation Installation:
      1. Install insulation with longitudinal joints continuous and end joints staggered.
      2. Install insulation layers to roof deck in strict accordance with manufacturer's
         criteria to resist designated minimum wind uplift pressures.
      3. Field cut and fit insulation boards at penetrations, walls, and curbs.
      4. Stagger all joints (side and end) between layers of insulation.
      5. Install tapered edge strips at changes in elevations, edges of crickets, and other
         locations to create monolithic and uniform substrate for installation of roof
         membrane.
   B. Mechanically Attached Insulation Layer:
      1. Mechanically attach two layers of polyisocyanurate insulation to deck, staggering
         joints of second layer from first layer.
      2. Simultaneously attached membrane base ply with insulation layers if required by
         manufacturer to achieve specified wind uplift resistance
      3. Install insulation so that insulation board ends and sides bear completely on ribs
         of the steel deck a minimum of 1/2-inch (13mm).
      4. Install insulation with longitudinal joints continuous and end joints staggered.
      5. Mechanically fasten insulation layers to roof deck in strict accordance with
         manufacturer's criteria to achieve specified wind uplift resistance.
      6. Fully engage and seat fasteners. Do not overtighten or strip threads. Bent,
         deformed, or unseated fasteners or plates are unacceptable.
      7. Fasteners must penetrate deck 1/2-inch (13mm), minimum, through the top
         flange (rib) of the deck. Do not overdrive fasteners. Remove and replace
         overdriven, stripped, or non-engaged fasteners.
      8. Properly seat mechanical fasteners and keep heads flush with plates. Cupped
         plates or unseated screw heads are not acceptable.
      9. Do not rupture or deform surface of the insulation by mechanical fastening.
   C. Adhered Layers of Insulation:
      1. Adhere insulation to previously installed layers of insulation.
2. Butt joints tightly allowing no more than 1/4-inch (6mm) wide gaps between units. Fill joints between adjacent boards with like insulation or spray-foam adhesive.

3. After installation of mechanically attached layer of insulation, install subsequent layers of insulation directly over preceding layer.

4. Install tapered insulation in field of roof to achieve a resulting 1/4-inch per foot (minimum) slope on designated roof areas.

5. Install tapered edge strips at changes in elevations, edges of crickets, and other locations to create monolithic and uniform substrate for installation of roof cover board and membrane.

6. Adhere tapered insulation, tapered crickets, and tapered edge strips over the substrate or fill layer. Adhere cover board over the preceding layers to form the substrate to receive the roof membrane base ply.

D. Ribbon Application (Low-rise Foam Adhesive):

1. Dispense 3/4-inch to 1-inch (19mm to 25mm) diameter/wide continuous ribbons of adhesive on substrate to adhere insulation board.

2. Place the initial ribbon of adhesive 3-inches (75mm) inside each edge/side of the insulation board in a picture-frame fashion. Apply additional parallel ribbons of adhesive across the remainder of the board in a serpentine fashion and spaced approximately 12-inches (300mm) on-center in the field of the roof; spaced 6-inches (150mm) on-center in a 8-foot wide area along the roof perimeter, and 3-inches (75mm) on-center in 8-foot by 8-foot areas at corners or spacing as required to achieve designated wind uplift resistance.

3. Firmly set insulation boards in the ribbons of foam adhesive following application of the adhesive when adhesive has risen to proper height and walk-in the insulation to spread the adhesive ribbons, ensuring maximum contact. Do not push or slide insulation into position. Set weighted objects on ends, sides, and corners of boards until adhesive has set and insulation is firmly attached (approximately 20 to 45 minutes).

4. On additional insulation layers, dispense ribbons of adhesive in direction perpendicular to the direction of the beads that were dispensed on the underlying layer.

5. Fill voids or open joints in top layer of insulation with spray-foam adhesive to provide monolithic surface to receive new membrane.

6. Adhere partial boards and tapered edge strips with adhesive ribbon positioned in picture-frame fashion along perimeter of board and remaining adhesive ribbons spaced in accordance with location on roof (field, perimeter, or corner).

7. At end of each work day, provide staggered ends of installed boards so that proper joint stagger can be achieved on following roof installation.

3.05 CLEANING:

A. Remove debris and material wrappers from roof to dumpster daily. Leave insulation clean, dry, and ready to receive new roofing.
3.06 ADJUSTING:
   A. Remove damaged insulation, components, or accessories and install acceptable new units.

3.07 PROTECTION:
   A. Provide special protection from traffic on completed work.

END OF SECTION 07 22 00
SECTION 07 52 50
MODIFIED BITUMEN MEMBRANE ROOFING

PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. Installation of new two-ply modified bitumen roof system and related flashings on subject roof.

1.02 RELATED SECTIONS:
   A. 02 07 20 - Minor Demolition and Renovation Work.
   B. 07 22 00 - Roof and Deck Insulation.
   C. 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCES:
   B. Standards:
      1. FM Global Approval Guide.
      5. SPRI "Application Guidelines for Modified Bitumen Roofing Systems".
      6. Cool Roof Rating Council (CRRC).
      7. FMGlobal Property Loss Prevention Data Sheets
         a. DS 1-28 "Wind Design".
         b. DS 1-29 "Roof Deck Securement and Above-deck Roof Components".
         c. DS 1-33 "Safeguarding Torch-applied Roof Installations"
         d. DS 1-49 "Perimeter Flashing".

1.04 QUALITY ASSURANCE:
   A. Application:
      1. Approved by manufacturer of accepted roofing system.
      2. A single applicator with a minimum of five years previous successful experience in installations of similar systems.
   B. Manufacturer Requirements:
      1. Roof Membrane Assembly: Classified by Underwriters’ Laboratories, Inc. as a Class A roof covering with no slope limitations.
      2. Roof Membrane Assembly: Classified by FM Global as a Class 1, approved assembly and Class 1-SH (Severe Hail) exposure.
      3. Manufacturer to have direct actual in-house experience in the manufacturing of the specified products for a period of a minimum of twenty years.
4. Manufacturer to have documented project history of installation of the specified products in the United States for a period of a minimum of twenty years.

5. Manufacturer to provide authorized documentation of the physical/mechanical properties from the testing laboratory of Manufacturer of the actual materials utilized for the project indicating compliance with applicable ASTM standards D 5147 and D 6298.

6. Manufacturer's products shall comply with the following standards:
   a. Polyester/Fiberglass composite reinforcement SBS modified bitumen sheet, ASTM D 6162, Grade S or G, Type 1 – 3.
   b. Fiberglass-reinforced SBS modified bitumen sheet, ASTM D 6163, Type 1 – 3, Grade S or G.
   c. Polyester-reinforced SBS modified bitumen sheet, ASTM D 6164, Type 1 – 3, Grade S or G.
   d. Polyester-reinforced APP modified bitumen sheet, ASTM D 6222, Type 1 or 2, Grade S or G.

C. Regulatory Requirements:
   1. Products Manufactured in the United States.
      a. Classified by Underwriters' Laboratories, Inc. as a Class A roof covering.
      b. Classified by FM Global as a Class 1-A approved assembly.
      c. Provide and install roof system to meet or exceed wind uplift resistance pressures of 90 psf in the field, 135 psf along 8-foot wide perimeters of the roof, and 187.5 psf in 8-ft X 8-ft corners of the roof in accordance with ASCE 7-10 and assuming 150 mph wind speed, Exposure B, Enclosed Building, Risk Category of III/IV, Eave Height of 66-feet; and a Safety Factor of 1.2..
   2. Follow federal regulations, safety standards, and codes mandated in the United States related to the subject work.

D. Laboratory Testing and Samples:
   1. At Owner's request, obtain field samples of the completed roof membrane, laps, and/or assembly.
   2. Take samples at locations designated by Consultant and test for compliance with the requirements on the Contract Documents and with manufacturer's published performance criteria.
   3. Perform test in accordance with accepted ASTM methods.
   4. Assume all costs for extraction and patch of all samples. Owner shall assume all costs for testing of field sample.
   5. Correct all deficiencies in accordance with the manufacturer's recommended procedures at no cost to Owner.
   6. If for any reason, areas that are tested by Owner fail to meet manufacturer's requirements, then all subsequent expense for retesting of those areas will be borne by Contractor.
E. Installation:
1. Install in accordance with manufacturer's current published application procedures and the general recommendations of the NRCA.
2. Upon completion of installation, an inspection shall be conducted by a technical representative of the manufacturer to certify that roofing system has been installed according to manufacturer's most current published specifications and details.
3. Roofing as described in this Section shall be provided and/or approved by roof system manufacturer.
4. Obtain written approval from the manufacturer for any materials not manufactured or provided by manufacturer stating that materials are acceptable and are compatible with other materials and systems required.
5. Personnel designated to utilize propane torching equipment to install roofing materials must have current CERTA safety certification issued by MRCA.

F. Make no deviations made from this Specification or the approved shop drawings without prior written approval of Owner's Representative and roof membrane manufacturer.

G. Perform entire work of this Section in accordance with the best standards of practice relating to the trades involved.

1.05 DELIVERY, STORAGE, AND HANDLING:
A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
B. Store materials in accordance with manufacturer's recommendations. Store rolled goods on clean raised platforms. Store other materials in dry area, protected from water and direct sunlight, and maintain at a temperature of 16 to 27 degrees Celsius.
C. Provide continuous protection of materials against deterioration.
D. Materials Stored on Roof Levels for Immediate Use:
   1. Distribute to prevent concentrated loads that would impose excessive strain on deck or structural members or restrict positive drainage.
   2. Positively secure to prevent displacement by wind.
   3. Tarp for protection from exposure.
   4. Cut and remove manufacturer's plastic "shrink wrapping" from materials during storage.

1.06 PROJECT CONDITIONS:
A. Existing Conditions: Examine existing building and existing roofing and decking to determine physical conditions that affect removal of existing roofing and installation of new roofing.
B. Environmental Requirements:
   1. Apply roofing in dry weather.
   2. Do not remove existing roofing and flashing in inclement weather or when rain is predicted (30 percent or more possibility).
3. Do not remove existing roofing and flashing when ambient temperature is below 4 degrees Celsius.
4. Do not expose membrane and accessories to a constant temperature in excess of 82 degrees Celsius.

C. Protection:
1. Provide special protection or avoid heavy traffic on completed work when ambient temperature is above 26 degrees Celsius.
2. Restore to original condition or replace work or materials damaged during handling or roofing materials.

D. Emergency Equipment: Maintain on-site equipment necessary to apply emergency temporary protection of roof and building in the event of sudden storms or inclement weather.

1.07 SEQUENCING AND SCHEDULING:
A. Do not remove more existing roofing in one day than can be replaced with new roofing and flashing in same day.

1.08 WARRANTY:
A. Submit to Owner, prior to final payment, copies of the following warranties:
1. Roofing Material Manufacturer's Warranty: Project shall be installed in such a manner that the roof system manufacturer will furnish a written full-system (including, but not limited to, insulation layers, fasteners, adhesives, flashing sheets, etc.), no dollar limitation, labor and material warranty agreeing to replace/repair defective materials and workmanship, for a warranty period of twenty years after date of written final acceptance by Owner.
2. Contractor's Warranty: In addition, furnish a written warranty agreeing to repair/replace defective installation and workmanship labor causing leakage of water, deterioration of materials, and other failures of the installed system, sealants, painting, coatings, and related work on this project, to perform as required within the warranty period. Warranty period is two years after date of written final acceptance by Owner.

PART TWO - PRODUCTS

2.01 MANUFACTURER:
A. Modified Bitumen Roofing Manufacturers
1. Siplast.
2. DerbiGum.
4. Soprema.
5. Firestone.
7. Or approved equal.
2.02 SHEET MATERIALS:
   A. Roof Membrane:
      1. SBS Membrane:
         a. SBS Membrane Base Ply: Smooth surfaced, polyester reinforced, SBS modified bitumen sheet, suitable for heat-welding/torching such as "Paradiene 20 PR TG" by Siplast or "DynaWeld 180S" or "DynaBase PR" by Johns Manville, "Sopralene Flam 180" or "Sopralene 180 PS" by Soprema, or approved equal.
         b. SBS Membrane Top Ply: Granule-surfaced, polyester/fiberglass reinforced, SBS modified bitumen sheet, suitable for heat-welding/torching such as "Paradiene 30 CR FR BW TG" by Siplast or "Sopralene Flam 180 FR GR SG" by Soprema; "DynaWeld Cap 180 CR FR G" by Johns Manville, or approved equal.
         c. SBS Base Flashing: One-ply of specified membrane base ply and one ply of top sheet or polyester-reinforced SBS modified bitumen flashing sheet with same finish as cap sheet.
      2. APP Membrane:
         a. APP Membrane Base Ply: Smooth surfaced, polyester reinforced, torch-applied APP modified bitumen sheet such as "DerbiBase HV" by DerbiGum, "APP 160" by Firestone, "Flintlastic STA" by Certainteed, or approved equal.
         b. APP Membrane Top Ply: Granule-surfaced, white color, polyester/fiberglass reinforced, APP modified bitumen sheet suitable for application with cold-adhesive or heat-welding/torching such as "DerbiColor P CR FR" by DerbiGum, "APP 180 FR UltraWhite" by Firestone, "Flintlastic GTA FR CoolStar" or approved equal.
         c. APP Base Flashing System: One-ply of specified membrane base ply and one ply of specified top ply or approved equal.

2.03 RELATED MATERIALS:
   A. Asphalt Primer: ASTM D 41.
   B. Edge Sealant: Rubberized asphaltic plastic roof cement that is gun-grade version for sealing top edges of base flashings and terminations of cap sheet such as "Elastomastic 209" by Henry Co.
   C. Elastomeric Plastic Roof Cement: Rubberized plastic roof cement/adhesive such as "PA-1021" by Siplast, "PerFlash" by DerbiGum, "MBR Flashing Cement" by Johns Manville, or approved equal to be used for temporary seals of flashings, embedding sheet metal flanges, and three coursing of seams and cuts in modified bitumen sheets.
   D. Reinforcing Fabric: 6-inch wide asphalt coating fiberglass or polyester mesh.
   E. Liquid Flashing System: Fluid-applied reinforced flashing system to apply around roof penetrations, low-profile flashing substrates, or other suitable locations that would be included in the warranty coverage for the roof membrane system, "Parapro" by Siplast", "DerbiFlash" by Derbigum, "SeamFree PMMA Flashing" by Johns Manville, "Alsan" by Soprema, "UltraFlash" by Firestone, "SmartFlash" by Certainteed, or approved equal.
2.04 MISCELLANEOUS MATERIALS:
   A. Best grade or quality approved by the manufacturer for the specific application.

PART THREE - EXECUTION

3.01 EXAMINATION OF SURFACES:
   A. Contractor shall examine the substrate, roof deck, and related surfaces and verify
      that there are no conditions such as inadequate anchorage, foreign materials,
      moisture, ridges, or other conditions which would prevent the satisfactory installation
      of the roofing system.
   B. Correct or complete any condition requiring correction or completion prior to the
      installation of the roofing system. Notify Owner’s Representative in writing of
      unacceptable conditions.
   C. Verify the location of all interior ducts, electrical lines, piping, conduit, and/or similar
      obstructions. Perform all work in such a manner as to avoid contact with the above-
      mentioned items.
   D. Start of work under this Part Three constitutes acceptance of substrate and site
      conditions.

3.02 PREPARATION:
   A. Do not stockpile debris on roof surface.
   B. Promptly remove debris each day. Use hoist to transfer debris from roof surface to
      disposal container.
   C. Cleaning:
      1. Verify that debris has been completely removed.
      2. Broom clean and airblow substrate immediately prior to surface preparation.

3.03 APPLICATION:
   A. Prior to roof membrane installation, seal all openings, projections, and penetrations
      in the substrate to prevent entry of materials into the building. Correct damage to the
      building or interior components caused by material entry.
   B. Membrane Installation - General:
      1. Apply roofing in accordance with roofing system manufacturer’s instructions and
         the following requirements.
      2. The overall appearance of the finished roof application is a standard requirement
         for this project. Make necessary preparations, utilize recommended application
         techniques, apply specified materials, and exercise care to ensure finished
         application is acceptable to Owner’s Representative.
      3. Prime top and bottom of metal surfaces (flashing flanges, lead drain flashings,
         etc.), concrete surfaces, and masonry surfaces with a uniform coating of asphalt
         primer, at a nominal rate of 1 gallon/100 square feet (3.8 liters per 9.29 square
         meters).
4. Place cant strips on top of substrate to form continuous monolithic substrate at walls and curbs. Secure fibrous cants by embedding in ribbons of low-rise foam adhesive or uniform troweling of plastic roof cement, nominal 1/4-inch thick, across entire bottom of cant. Miter cut cant strips to form continuous substrate at corners. Adhere cut piece of roof cover board in low-rise foam adhesive over top of fibrous cant.

5. Lay all layers of roofing free of wrinkles, creases, or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.

6. Lay layers of roofing perpendicular or parallel to the slope of the deck as recommended by manufacturer.

7. Install roof system configuration and components as required to meet the requirements of the testing assembly for the respective proposed roof material manufacturer. Provide additional ply of polyester-reinforced base ply mechanically-attached with insulation board to steel deck as required to meet wind uplift criteria.

C. Membrane Base Ply Application:
1. Install roof system configuration and components as required to meet the requirements of tested assembly for the respective proposed roof material manufacturer. Provide additional ply of polyester-reinforced base ply mechanically-attached with insulation board to steel deck as required to meet wind uplift criteria for respective area.

2. Unroll base ply sheet and cut into 15-foot (5m) lengths. Lay cut sections of sheet down to allow sheet to relax prior to application. Prior to application, re-roll "relaxed" sheet using cardboard insert provided with roll.

3. Beginning at the low point on the roof, fully adhere the modified bitumen sheet to the substrate. Maintain a steady torching technique to ensure that the entire bottom surface of the sheet achieves the proper temperature for adhesion. Keep the roll in close proximity to the torch technician. Exert sufficient pressure on roll during application.

4. Apply heat evenly across the face and full width of the roll while unrolling roll uniformly with an even downward pressure. Apply torch flame to roll until the bitumen back coating reaches the design application temperature, resulting in melting of the burn-off film, a glossy appearance of the back coating, and an approximate ¼-inch to ½-inch (6 mm to 13 mm) bitumen flow from edge of sheet.

5. Fully adhere membrane base ply to substrate and have a minimum of 3-inch (75 mm) side laps and 6-inch (150 mm) end laps. Stagger end laps of adjacent sheets of membrane base ply a minimum of 3-feet (1 m). Extend field sheet of membrane base ply to top edge of cant.
6. Complete membrane base ply application over respective roof area prior to application of membrane top ply. Apply additional ply of membrane base ply in low areas or areas that may be subjected to ponding water. Install base ply at roof drain with side lap centered over drain opening.

7. Apply a patch over areas of membrane with areas of physical damage or other defects. Patch shall be the full width of membrane base ply and extend a minimum of 2-inches (50 mm) beyond the defect in each direction.

8. Check lap seams and seal unbounded or discontinuous seams using a heated steel trowel.

D. Base Flashing Application - Base Ply:

1. Install and complete application of base ply of flashing each day the base ply of membrane is installed.

2. Install first ply of base flashing extending horizontally 4-inches (100 mm) beyond edge of cant or flange and vertically 4-inches (100 mm), minimum above the top of the cant.

3. Length of base flashings shall be maximum 6-feet (2 m). Lap ends of base ply flashings 4-inches (100 mm), minimum. Seal top edge of base ply flashing on a daily basis with a continuous troweling of elastomeric roof cement.

4. Check lap seams and seal unbonded or discontinuous seams of base ply flashing using a heated steel trowel.

5. For wood substrate, mechanically attach a base sheet 8-inches (200mm) on-center in all directions and along lap seams, overlapping adjacent sheets 4-inches (100mm), minimum. Adhere modified bitumen base ply flashing to base sheet.

6. Where existing substrate is deemed unacceptable to install new materials, attach plywood or acceptable gypsum sheathing to serve as new substrate for flashing membrane.

E. Strip-in Flashing:

1. Prime top and bottom of metal flanges and other sheet metal components completely and allow to dry prior to installation.

2. After membrane base ply has been applied, install metal flange flashings according to Section 07 62 00 - Sheet Metal Flashing and Trim. Strip-in flange/metal with strips of base flashing (base ply) concealing entire flange or horizontal surface of metal flashing and extending a minimum of 4-inches (100mm) beyond edge of flange/metal and heat-fusing strip-in to base ply.

F. Membrane Application - Top Ply:

1. Unroll top ply and cut into 15 foot lengths. Lay cut sections of top ply down to allow sheet to relax prior to application. Prior to application, re-roll "relaxed" sheet using cardboard insert provided with roll.

2. Beginning at the low point on the roof, fully adhere membrane top ply to membrane base ply and have a minimum of 3-inches (75 mm) side laps or width of selvage edge and 6-inches (150 mm) end laps. Extend membrane top ply to top edge of cant. Apply each sheet directly behind torch technician. Stagger side laps of top ply a minimum of 12-inches (300 mm) from side laps of base ply.
3. Apply heat evenly across the face and full width of the roll while unrolling roll uniformly with an even downward pressure. Apply torch flame to roll until the bitumen back coating reaches the design application temperature, resulting in melting of the burn-off film, a glossy appearance of the back coating, and an approximate ¼-inch to ½-inch (6 mm to 13 mm) bitumen flow from edge of sheet. Apply heat to top surface of base ply to receive heated cap sheet to develop an initial softening or “tackiness” of top coating.

4. While installing membrane top ply, provide proper protection or method during application to prevent contamination, soiling, charring, or marking the granule surfacing of previously installed sheet. Exert sufficient downward pressure on roll during application. Utilizing appropriate tool, pull the roll toward direction of application while heating bottom portion of roll and substrate. Do not stand on subject sheet during torching process.

5. During end lap application, trim the inside corner along the selvage edge of the underlying sheet at the end of the roll. The trimmed area shall be the width of the selvage edge and extend downward from the end of the roll to the outer side of the roll in a linear direction approximately 5-1/2-inches (138mm) from end of roll. Trim outside corner of membrane top ply at end laps to provide rounded finished corner.

6. On colored-granulated sheet, embed colored granules into bituminous bleed-out along edges of cap sheet to provide monolithic surface color. On white-surfaced sheet, apply elastomeric coating or surfacing material approved/supplied by manufacturer over bituminous bleed-out along edges of cap sheet to provide monolithic surface color.

7. Install membrane top ply so that end laps of every other sheet is aligned.

8. Roof Drain: Install top ply centered over drain opening extending under clamping ring. Apply elastomeric plastic cement and reinforcing fabric on sheet to cover cuts made to conform sheet to sump. Install clamping ring and secure.

9. Apply a patch over areas of membrane with displaced top bitumen coating or other defects. Patch shall be the full width of membrane top ply and extend a minimum of 2-inches (50 mm) beyond the defect in each direction.

10. Check lap seams and seal unbonded or discontinuous seams using a heated steel trowel.

11. At sheet metal flashings, apply membrane top ply and terminate at the rise in the metal component. Apply a continuous bead of edge sealant along edge terminations of modified bitumen sheet (i.e. flashing flanges, exhaust vents, metal edge, etc.). Bead of edge sealant shall match height of top sheet surfacing and shall be “canted” to shed water. Embed loose granules or coat with elastomeric coating, color to match top ply, into newly installed edge sealant.
G. Base Flashing Application - Top Ply:

1. Apply top ply of flashings only after membrane top ply is in place.
2. "Torch de-granulate" granulated surfaces of flashings to receive flashing. Pre-heat the subject area of the underlying granule-surfaced sheet so that granules can be "depressed" or sunk into the compound and the bitumen compound exudes up through the granules to result in a bituminous material-to-bituminous material contact.
3. Cut modified bitumen flashing membrane to extend a minimum of 4-inches (100 mm) above the top of the membrane top ply covering the cant. The overall minimum height of the top of the flashing membrane above the top of the roof surface is 8-inches (200 mm). Extend flashings to full height of vertical substrate.
4. Extend the flashing membrane horizontally 4-inches (100 mm) onto the field of the roof surface beyond the bottom edge of the cant strip.
5. Cut flashing from roll using selvage edge as lap seam for adjacent sheets resulting in sheet lengths of nominal 3-feet (1 m). Lap ends a minimum of 4-inches (100 mm) and stagger laps from laps of underlying plies.
6. Fully adhere and conform top ply of flashing to substrate. Extend bleed-out of applied base flashing a minimum of ½-inch (13 mm) beyond the side or end lap.
7. Mechanically attach top edge of modified bitumen membrane flashing with termination bar and appropriate fasteners spaced 6-inches (150 mm) on-center. Apply continuous troweling of elastomeric plastic roof cement and reinforcing fabric along top edge of base flashing.
8. Walls: Mechanically attach top edge of modified bitumen membrane flashing with appropriate fasteners and termination bar. Fastener spacing shall be 6-inches (150 mm) on-center. Apply three-coursing consisting of an initial continuous troweling of elastomeric plastic roof cement, embedded reinforcing fabric, and a secondary application of elastomeric plastic roof cement along and concealing the top edge of base flashing and termination bar.
9. Curbs: For curbs with non-removable hoods/covers/units, extend flashing to full height of curb, mechanically attach top edge of flashing with termination bar with appropriate fasteners secured 6-inches (150 mm) on-center and apply three-coursing of plastic cement and reinforcing fabric. For curbs with removable hoods/covers/units, wrap flashing sheet over top of curb, secure to top or inside of curb with sheet metal angle termination bar and appropriate fasteners spaced 6-inches (150 mm) on-center.
10. Apply a boot or oval section of modified bitumen sheet over outside corners of curb flashings to conceal cuts in flashing material at corner laps.
11. Install flashing sheets on adjoining perpendicular sides (outside corners) of curbs or walls so that outside corners of flashing sheet align and are rounded.
H. Metal Flange Flashing:
   1. Apply membrane top ply and terminate at the rise in the metal component.
   2. Apply a target around penetrations or utilize flashing method to conceal cuts in
      the membrane top ply.
   3. Apply a continuous bead of edge sealant along edge terminations of modified
      bitumen sheet (i.e. flashing flanges, exhaust vents, metal edge etc.). “Cant”
      bead of edge sealant to shed water. Embed loose granules in newly installed
      edge sealant and apply coating to match finish of top ply, where applicable.

I. Liquid-Flashings
   1. Apply liquid flashing system around penetrations and along walls where suitable
      traditional ply sheet or sheet metal flashings cannot be installed. Apply liquid
      flashings in accordance with the manufacturer’s application guidelines at
      applicable select locations.
   2. Apply liquid flashing system on roof membrane within narrow “gutter/drainage”
      areas between sloped roof areas as designated on Area “C”.
   3. Clean penetrating element or approved substrate to receive liquid flashing
      system.
   4. Apply masking tape on substrate to create straight-edge terminations of the liquid
      flashing system.
   5. Embed reinforcing fabric in the liquid flashing system to form monolithic flashing
      with the finished roofing membrane.
   6. Apply reinforced liquid flashing system on top of cap sheet in an area 3-feet X 3-
      feet around each primary roof drain. Embed granules, color to match cap sheet,
      in surface of liquid flashing.
   7. Apply finish granule surfacing on the liquid flashing system to match the granule
      color of the finished top ply of the roof membrane.

J. Daily Seal:
   1. Install temporary night seal at completion of each day’s work and remove upon
      resumption of work.
   2. Ensure that water does not flow beneath any completed sections of the
      membrane system. This will include completion of all flashings, terminations,
      and daily seals. When possible, install starting at the highest point of the project
      area, working to the lowest point.
   3. Seal membrane edge with continuous troweling of plastic roof cement. Caution
      must be exercised to ensure that membrane is not temporarily sealed near
      drainage medium in such a way to promote water migration below the membrane
      or impede drainage.
   4. Install primary night seal beneath daily night seal in such a manner to seal both
      new and existing roof system to roof deck to prevent moisture migration from
      either old roof or new roof.
   5. Install daily night seals by extending the new roof membrane beyond the
      insulation and sealing to the existing roof surface using plastic cement.
   6. When work is resumed, remove and dispose of membrane where cement or
      other sealants were previously applied before resuming installation.
K. Daily Fire Watch: Contractor personnel to perform daily “Fire Watch” a minimum of two hours upon completion of heat-fusing installation methods. Contractor to utilize an infrared-sensing thermometer or similar equipment that can provide instant detection of elevated and/or different temperatures of roofing materials. If elevated or suspect temperatures or underlying conditions are detected, contractor to remove necessary materials and perform necessary actions to alleviate the noted condition.

3.04 FIELD QUALITY CONTROL:
A. Inspections:
   1. During installation, provide for on-site inspections by a technical representative of roof membrane manufacturer.
   2. Upon completion of installation, provide final inspection by a technical representative of roof membrane manufacturer.

3.05 CLEANING:
A. Remove debris, adhesives, and sealants from surfaces.
B. Remove debris and material waste from Project site.

END OF SECTION 07 52 50
SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART ONE - GENERAL

1.01 SECTION INCLUDES:
   A. Shop or field-formed sheet metal work for moisture protection.
   B. Types of work specified in this Section include:
      1. Counter flashing.
      2. Sanitary vent pipes.
      3. Metal edge flashing.
      4. Gutter and downspouts.
      5. Miscellaneous sheet metal accessories.

1.02 RELATED SECTIONS:
   A. 02 07 20 - Minor Demolition and Renovation Work.
   B. 07 22 00 - Roof and Deck Insulation.
   C. 07 52 50 - Modified Bitumen Membrane Roofing.

1.03 REFERENCES:
   B. Federal Specifications (FS).
   E. ANSI/SPRI ES-1: Fabricate and install sheet metal edge flashings to comply with requirements of ANSI/SPRI ES-1 for 150 mph wind speed and 200 psf pressure.

1.04 WARRANTY:
   A. Contractor's Warranty: Provide Owner a written warranty which shall warrant sheet metal work to be free of leaks and defects in materials and workmanship for two years after date of final acceptance by Owner.
   B. For pre-finished metal, provide manufacturer's twenty-year guarantee covering deterioration or failure of the fluoropolymer finish.
PART TWO - PRODUCTS

2.01 MANUFACTURERS:
   A. Acceptable Pre-finished Sheet Metal Manufacturers:
      2. Peterson Aluminum Corporation (PAC CLAD).
      5. Firestone Metal Co (Una-Clad).
      6. Or approved equal.

2.02 SHEET METAL MATERIAL:
   A. Pre-finished Metal: "Kynar 500" or "Hylar 5000" fluoropolymer pre-finished G90 galvanized/galvalume sheet metal, minimum 24 gauge. "Kynar 500" or "Hylar 5000" finish shall consist of a two coat Polyvinyladine flouride, minimum 70 percent by weight in coatings, dry film thickness 1 mil, factory applied by metal manufacturer or supplier. Color selected by Owner from manufacturer's standard color chart.
   B. Zinc-coated (Galvanized) Sheet Metal: Commercial quality with 0.20 percent copper, in accordance with ASTM A 526 except ASTM A 527 for lock forming; coating designation G90 hot-dip galvanized, and mill phosphatized for painting in accordance with ASTM A 525 (paint-grip type), 24 gauge minimum.
   C. Sheet Lead: FS QQ-L-201, Grade B; 2-1/2 pounds per square foot (120n/m²) 0.0391-inches (1mm) thick minimum as used for sanitary vent flashing.
   D. Stainless Steel Sheet Metal: ASTM A 240, Type 304, ASTM A 480, No. 2B/2D Mill Finish, gauge as scheduled.

2.03 FASTENERS:
   A. Fasteners shall be same metal as flashing and sheet metal being joined.
   B. Exposed fasteners shall be self-sealing or gasketed for watertight installation.
   C. Heads of fasteners, including but not limited to, rivets, screws, and bolts, that are exposed or visible shall have same manufactured finishes as item being secured; color to match when applicable.
   D. Mechanical Fasteners:
      1. Refer to Section 02 07 20 – Minor Demolition and Renovation Work.
      2. Washers: Steel washers with bonded rubber sealing gasket.
      4. Rivets: Stainless steel material for the head and stem, closed end, color to match sheet metal items being adjoined.

2.04 RELATED MATERIALS:
   A. Solder:
      1. ASTM B 32, alloy grade 58, 50 percent tin, 50 percent lead.
      2. For Use with Stainless Steel: 60-40 tin/lead solder, ASTM B 32.
B. Flux:
   1. Phosphoric acid type, manufacturer’s standard.
   2. For Use with Steel or Copper: Rosin flux.
   3. For Use with Stainless Steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Adhesives: Type recommended by flashing sheet manufacturer for waterproof and weather resistant seaming and adhesive application of flashing sheet.

D. Metal Accessories: Sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.

E. Sealant:
   1. Type A: One component polyurethane sealant, ASTM C-920, Type S, Grade NS,
      Class 35 such as "SikaFlex-1a" by Sika Corp. or "MasterSeal Sonolastic NP1" by BASF, color to match finish of adjoining surface.
   2. Type B: One-part low modulus neutral-curing silicone sealant, ASTM C-920,
      Type S, Grade NS, Class 50 such as "Sikasil WS 290" or "WS 295" by Sika Corp.,
      "795 Silicone Building Sealant" or "790 Silicone Building Sealant" by Dow Corning,
      or "GE Silpruf SCS 2000" by Momentive Performance Technologies; color to match finish of adjoining surface.
   3. Type C: One-component, moisture cure polymer sealant available in over 175 standard colors to match sheet metal flashings in exposed applications such as "Tite Bond Weather Master Sealant" by Franklin International.
   4. Type D: Self-adhering preformed 100% solids elastomeric butyl tape, 1/4-inch thick by 3/4-inch wide, such as "TremPro 691" by Tremco.
   5. Type E: One-part gun grade butyl rubber sealant such as "TremPro 651" by Tremco.

F. Termination Bar: 1/8-inch (3mm) thick, 1-inch (25mm) wide extruded aluminum bar with flat profile, factory punched oval holes (1/4-inch by 3/8-inch [6mm by 9mm]) spaced 6-inches (150mm) on-center, such as "TB 125" by The TruFast Corp. or "Heavy Flat Bar" by Olympic.

G. Stainless Steel Clamp: Stainless steel banding with worm-drive tightening, sized for application such as "Make-A-Clamp Kit" by Dynamic Fastener, 800/821-5448.

2.05 FABRICATION - GENERAL:
A. Fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings.
B. Comply with material manufacturer's instructions and recommendations for forming material.
C. Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps. Fabricate corners with equal length legs, minimum 2 feet (1.2m).
D. Fabricate for waterproof and weather resistant performance with expansion provisions for running work sufficient to permanently prevent leakage, damage, or deterioration of work. Form work to fit substrates.
E. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
F. Form materials with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

G. Fold back edges on concealed side of exposed edge to form hem.

H. Lap joints 1-inch (25mm) minimum. Rivet and solder joints on parts that are to be permanently and rigidly assembled for copper, stainless, aluminum, and galvanized steel sheet metal. Install rivets, spaced 1-inch (25mm) on-center and apply solder to secure and seal exposed edge of sheet metal in a uniform continuous bead with smooth top finish. Clean residue upon completion of soldering process. Fabricate sheet metal assemblies so that adjoining sections are nested to achieve continuous metal-to-metal contact.

I. Seams:
1. Fabricate non-moving seams in sheet metal with flat-lock seams.
2. Pre-finished Galvanized Steel: Seal pre-finished metal seams with rivets, spaced 1-inch (25mm) on-center, and silicone sealant, color to match metal finish.
3. Metal Other than Aluminum: Tin edges to be seamed, form seams, and solder.

J. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant concealed within joints.

K. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards.

2.06 FABRICATED ITEMS:
A. Counter flashings: Minimum 24 gauge prefinished sheet metal formed in maximum 10 foot (3m) lengths fabricate “S”-shaped receiver to engage counter flashing a minimum of 1-inch; fabricate counter flashing with broken fascia of length to extend over top edge of base flashing a minimum of 4-inches with ½-inch hemmed drip edge. Utilize two piece configuration at walls.

B. Wind Clips: Minimum 24 gauge prefinished sheet metal, 1-inch (25mm) wide, length to engage counter flashing a minimum of 1/2-inch (13mm).

C. Cleats/Clips:
1. Concealed Cleats/Clips: Continuous strips, 22 gauge prefinished sheet metal, same fascia profile as adjacent metal item with 3/4-inch drip edge formed at a 30 degree angle with vertical wall.
2. Exposed Cleats/Clips: 24 gauge prefinished sheet metal.

D. Angle Termination Bar: 1-inch by 1-inch (25mm by 25mm) 24 gauge galvanized sheet metal.

E. Sanitary Vent Pipe: 2-1/2 pound lead with 4-inch flanges. Provide proper size to fold down inside of pipe a minimum of 1-inch (25mm).
F. Gutter: 24 gauge pre-finished sheet metal 4-inch (100mm) face height; 5-inch (125mm) width; 7-inch (175mm) back. Downspout shall be 4-inches (100mm) by 4-inches (100mm) with seam located on back of downspout. Bracket shall be 1-inch (25mm) wide and 1/8-inch (3mm) thick galvanized steel wrapped with 24 gauge pre-finished metal cover. Downspout straps and gutter spacers shall be 1-inch wide double-hemmed pre-finished sheet metal. Provide downspout straps with rounded corners.

G. Metal Edge:
   1. Pre-manufactured Option: Continuous 24 gauge pre-finished Kynar 500 coated galvanized sheet metal canted gravel stop with fascia extender meeting ANSI/SPRI ES-1 for 150mph wind speed and 200 psf pressure such as “MBED Style G” by Hickman, "EdgeSystem One Gravel Stop" by Metal Era, or approved equal.
   2. Shop-fabricated Option: Minimum 24 gauge prefinished sheet metal formed in maximum 10 foot (3m) lengths, with 6-inch (150mm) wide cover plates of same profile, 4-inch (100mm) wide horizontal flange, and fascia length as noted on drawings or as necessary to extend beyond top of exterior wall finish a minimum of 1-inch and meeting ANSI/SPRI ES-1 for 150mph wind speed and 200 psf pressure.

PART THREE - EXECUTION

3.01 EXAMINATION:
   A. Verify that substrates are smooth and clean to extent needed for sheet metal work.
   B. Verify that reglets, nails, cants, and blocking to receive sheet metal are installed and free of concrete and soil.
   C. Do not start sheet metal work until conditions are satisfactory.

3.02 INSTALLATION:
   A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4-inch (6mm) hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Install prefabricated corners or transitions at changes in direction, elevation or plane, and at intersections. Locate field joints not less than 12-inches (300mm), nor more than 3 feet (1m) from actual corner. Laps for all metals, except for prefinished metal, shall be 1-inch (25mm) wide, fastened with rivets spaced 1-inch (25mm) on-center and soldered.
   B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners where possible; and set units true to line and level as indicated. Install work with laps, joints, and seams permanently watertight and weatherproof.
   C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.
D. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials incompatible with roofing system.

E. Continuous Cleat: At exposed edges of gravel guards, fascias, cap flashings, and where required, attach continuous cleat at 6-inches (150mm) on-center with appropriate fasteners positioned on the vertical face and fastened into 2X blocking, and concrete/masonry substrate or metal or steel. At a distance of 10 feet (3m) from each direction of corner, install fasteners 3-inches (75mm) on-center. Install cleat so fascia extends a minimum of 1-inch (25mm) below top of exterior wall finish.

F. Counter flashings:
1. Install new counter flashings under equipment housing flanges and new receivers along rise or parapet walls to extend a minimum of 4-inches below top edge of base flashing. Secure counter flashing at 6-inches (150mm) on-center with self-tapping screws.
2. Secure 2-piece surface-mounted receiver and counter flashing assemblies along concrete substrates. Install sealant tape, Type C, between receiver and substrate. Secure receiver to substrate with termination bar and appropriate fasteners spaced 12-inches o.c. Install a continuous bead of sealant, Type B, along caulk trough/top edge of receiver and tool sealant to provide outward sloping finished surface. Secure counter flashing to receiver utilizing grommetted self-tapping screws spaced 6-inches (150mm) on-center. Install new receivers extending behind wall finish and secure vertical flange of receive 6-inches on-center and extend underlayment over vertical flange.
3. Lap adjacent sections of receivers and counter flashings a minimum of 4-inches (100mm). Apply a continuous bead of sealant, Type A, in lap.
4. Trim existing counter flashings to remain to receive new flashing.
5. Secure new counter flashing to new receiver or trimmed existing flashing utilizing self-tapping screws spaced 6-inches (150mm) on-center.
6. Install wind clips to termination bar spaced 24-inches (600mm) on-center.
7. Fabricate the counter flashing to form an integral closure at terminations.

G. Sanitary Vent/Plumbing Vent Pipe:
1. Prime top and bottom flanges of lead flashing sleeve. Set flange in heat-softened APP membrane or uniform troweling of plastic roof cement on SBS membrane. Prime top side of flange to receive strip-in membrane.
2. Fold lead sleeve down inside pipe a minimum of 1-inch (25mm). Apply a continuous bead of sealant on inside of pipe prior to folding lead sleeve.
3. After installation of lead flashing, install screen over top of vent pipe and secure with adjustable strap.

H. Metal Edge:
1. Install pre-manufactured or shop-fabricated metal edge in accordance with installation requirements to meet specified criteria.
2. Extend modified bitumen sheet to minimum 1-inch (25mm) below bottom edge of nailer or top of exterior wall finish.
3. Prime bottom side of metal edge and set in bed of plastic roof cement on SBS base ply or heat softened APP membrane base ply and lock to cleat. Install adjacent sections of metal edge with approximate 1/4-inch (6mm) space between sections.

4. Secure horizontal flange of metal edge to wood nailer with appropriate fasteners spaced 3-inches (75mm) on-center, staggered.

5. Install covers at joints, locking onto cleat. Embed flange into plastic roof cement and install continuous beads of sealant, Type B, placed on each side of joint on fascia. Fasten joint cover with appropriate fastener centered in joint.


I. Gutter

1. Secure gutter to substrate with appropriate fastener spaced 6-inches on-center.

2. Install gutter spacer spaced 3 feet (1m) on-center attached to front and back of gutter with pop rivets.

3. Lap joints in gutters 2-inches (50mm). Apply a continuous bead of sealant, Type A, between lap and install two rows of rivets spaced on 1-inch (25mm) centers, staggered. Lap joints in direction of flow of water within gutter.

4. Install downspouts at designated locations.

5. Install new downspouts plumb and level and secure to wall with straps located at bottom of downspout.

6. Install splash blocks under downspouts that discharge onto roof surface. Install splash block over a protection pad for downspouts located at roof level.

3.03 CLEANING:

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean and free of stains, scrap, and debris.

B. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration/damage of finishes. Paint (color to match) areas of prefinished metal where finish is damaged. Replace sheet metal items when damaged finish can not be repaired to an acceptable condition.

C. Prime soldered area of phosphatized metal after cleaning to prevent rusting.

D. Paint metal flashings that have been soiled. Use medium nap roller to apply paint to surfaces to achieve monolithic finished color.

END OF SECTION 07 62 00
SECTION 26 41 00

LIGHTNING PROTECTION SYSTEM

PART ONE - GENERAL

1.01 SECTION INCLUDES:
A. Removal and reinstallation of existing lightning protection system.
B. Furnish all labor, materials, and items of service required for completion of a functional and unobtrusive lightning protection system.
C. System furnished shall be the standard product of manufacturer's regularly engaged in the production of lightning protection equipment.
D. Lightning protection system shall be as approved by Owner's Representative.
E. Cooperate with the roofing contractor and roofing material manufacturer to maintain roofing warranties.

1.02 RELATED SECTIONS:
A. 02 07 20 - Minor Demolition and Renovation Work.
B. 07 52 50 - Modified Bitumen Membrane Roofing
C. 07 62 00 - Sheet Metal Flashing and Trim

1.03 STANDARDS:
A. Lightning Protection Institute Installation Standard, LPI 175.
B. Underwriters Laboratories, Inc. Installation Requirement, UL96A.
D. National Electrical Code (NEC).

1.04 SUBMITTALS:
A. Product Data: Submit manufacturer's data sheets for each product to be used.
B. Shop Drawings:
   1. Submit shop drawings.
   2. Prepare scaled roof plan locating and identifying all required details.
   3. Show type, size, and location of all grounding, down conductors, through roof/through wall assemblies, and roof conductors.
C. Certificates:
   1. Underwriters Laboratories Inc. Master Label.
   2. Lightning Protection Institute Certification.
   3. Field-applied certification plates.

1.05 QUALITY ASSURANCE:
A. Applicator:
   1. Employees Certified Master Installers.
   2. Company is UL listed.
   3. Member of Lightning Protection Institute.
B. Regulatory Requirements: The lightning protection system shall conform to the requirements of the LPI, UL, NFPA, and NEC.
C. Inspection: Contractor shall apply to Underwriters Laboratories Inc. for inspection and certification.

PART TWO - PRODUCTS

2.01 MATERIALS:

A. Bolt type connectors and splicers shall be utilized.
B. All mounting hardware shall be stainless steel.
C. Ground rods shall be stainless steel of appropriate diameter.
D. Air Terminals: Blunt end aluminum units.
E. Braided Cable: Aluminum braided cable.
F. Sealant Adhesive: Non-slump moisture curing structural sealant, gray in color, such as "M-1 Structural Sealant" by ChemLink, Inc.

PART THREE - EXECUTION

3.01 GENERAL INSTALLATION:

A. The installation shall be accomplished by an experienced installation company that is UL listed, a member of the Lightning Protection Institute, United Lightning Protection Association qualified, and an employer of Certified Master Installers of lightning protection systems.
B. A Certified Master Installer shall directly supervise the work.
C. All equipment shall be installed in a neat, workmanlike manner.
D. The system shall consist of a complete conductor network at the roof and include air terminals, connectors, splicers, bonds, copper downleads, and proper ground terminals.
E. Lightning Protection System:
   1. Temporarily disconnect, remove, and salvage the lightning protection system including, but not limited to, cables, holders, clamps, and clips.
   2. Reinstall the lightning protection system so that, upon completion, system can be re-certified by UL.
   3. Install equipment in a neat, workmanlike manner.
   4. System shall consist of a complete conductor network at the roof and include air terminals, connectors, splicers, bonds, and other associated hardware.
   5. Secure bases of air terminals and cable holders to inside vertical face of coping or parapet walls with grommeted screws. Install cut section of EPDM rubber or rubber gasket between coping and secured hardware.
   6. Set air terminal bases and metal cable holders in bed of sealant adhesive on top of cut section of modified bitumen protection pad installed on top of capsheet.
   7. Install aluminum cables where cable is to be in full contact with roof membrane.
3.02 COORDINATION:
   A. The lightning protection installer will work with other trades to ensure a correct, neat, and unobtrusive installation.
   B. It shall be the responsibility of the lightning protection installer to assure a sound bond to the main water service and to assure interconnection with other ground systems.

3.03 CLEANING:
   A. Remove trash, debris, equipment, and parts from the jobsite.
   B. Clean exposed metal surfaces, removing substances that might cause corrosion of metal components.

END OF SECTION 26 41 00
UT HEALTH
THE UNIVERSITY OF TEXAS
HEALTH SCIENCE CENTER OF HOUSTON

ROOF REPLACEMENT
for
UCT DATA CENTER
7000 FANNIN
HOUSTON, TX

PREPARED BY
PRICE CONSULTING, INCORPORATED
211 HIGHLAND CROSS, SUITE 220
HOUSTON, TEXAS 77073
(281) 209-1724
TX P.E. FIRM F-3814

INDEX TO DRAWINGS
R1.00 COVER SHEET
R1.01 GENERAL NOTES
R2.00 EXISTING ROOF PLAN
R2.01 NEW ROOF PLAN
R5.01 DETAILS

KEY PLAN

DATA CENTER

VICINITY MAP

PROJECT SITE

PROJECT SITE

AERIAL - SITE PLAN

PRICE CONSULTING, INC.
211 HIGHLAND CROSS, SUITE 220
HOUSTON, TEXAS 77073
PHONE: (281)209-1724 FAX: (281)209-2724

PROJECT:
UCT DATA CENTER
7000 FANNIN
HOUSTON, TX

OWNER/CLIENT
UT HEALTH SCIENCE CENTER AT HOUSTON
7000 FANNIN, UCT M135
HOUSTON, TEXAS 77030

REVISIONS
COVER SHEET
PEI PROJECT NO: 11320.17
PEI FILE NAME R1.00
SCALE: AS NOTED

DRAWN BY
DATE: 09/30/18
SHEET: R1.00
NORTH
GENERAL NOTES: ROOF REPLACEMENT

1. All dimensions, equipment, and penetration locations presented on the drawings are considered approximate. Contractor shall verify all conditions.

2. These drawings and details accompany specifications and documents that comprise a project manual.

3. Details are designated at representative locations. Each location and similar conditions are to be treated accordingly.

4. Typical detail designation:
   - JOI = Deck Number
   - S = Sheet Number

5. Unless indicated by the term "Existing," items presented on detail drawings are considered to be new and furnished by contractor.

6. Existing roof construction observed at PCI core locations consists of the following:
   - Two single-PLY membrane, polyisocyanurate insulation and fluted steel deck.
   - Remove existing roofing, insulation, and sheet metal flashings down to deck.

7. Typical new roof construction:
   - Two layers of 2-inch thick and 1/2-inch thick polyisocyanurate insulation complying with IRC Section 1508 and Table 1508.2, to achieve minimum total R-value of R-25, with roof cover board, and a two-PLY modified bitumen roof membrane consisting one ply of smooth surfaced base PLY & one ply of cap sheet with white reflective surfacing complying with IRC Section 1507.15, Section 1505.2, Class A fire classification and to have minimum solar reflectance of 0.70 as tested per ASTM C1549, E843, E1175, or E1918 and a minimum thermal emittance of 0.75 as tested per ASTM C496, C1571, or C468.

8. Repair any damaged or corroded areas of steel deck. Secure steel deck at supports with self-drilling screws at 6-inches on center, where necessary.


10. Provide new wood blocking/nailers as designated on drawings. Blocking/nailers, A/Or combination with plywood/OSB sheathing to match thickness of insulation at respective locations, and width to extend beyond edge of metal flange (min. 1-inch) where applicable.

11. Remove and replace gutters and downspouts.

12. Install new roof system tested in accordance with FM 4470/4474 to meet specified wind uplift pressures as follows:

<table>
<thead>
<tr>
<th>ROOF SYSTEM WIND UPLIFT CRITERIA</th>
<th>WIND SPEED: 150 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Category: II-A</td>
<td>Exposure: E</td>
</tr>
<tr>
<td>Building Category: Enclosed</td>
<td>Safety Factor: 1.2</td>
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<tr>
<td>Field</td>
<td>90 PSF</td>
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<tr>
<td>Perimeter (4' x 4')</td>
<td>105 PSF</td>
</tr>
<tr>
<td>Corner (8' x 8')</td>
<td>107.5 PSF</td>
</tr>
</tbody>
</table>

CONSTRUCTION MATERIAL SYMBOLS LEGEND

- Brick
- Asphalt Shingle
- Steel
- Sheet Metal
- Wood Block
- Mortar/Chatt
- Plywood
- Wood Framing
- Concrete
- Polyurethane Insulation
- EPDM Roofing
- Cement Board
- Gutter Strips
- CMU