TECHNICAL SPECIFICATIONS AND DRAWINGS

FOR

UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER – HOUSTON
CYCLOTRON FACILITY
ROOFING REPAIRS
HOUSTON, TX

WALTER P. MOORE AND ASSOCIATES, INC.

1301 McKinney, Suite 1100
Houston, TX 77010
713-630-7300

D03.12131.00

DOCUMENT 000001

TITLE/CERTIFICATION PAGE

PROJECT:	UTHSCH CYF Roofing Repairs
PROJECT NUMBER:	Walter P. Moore Project No. D03.12131.00
OWNER	University of Texas Health Science Center – Houston Mr. William Stewart 7000 Fannin, Suite M100 Houston, TX 77030
ENGINEER:	Walter P. Moore and Associates, Inc. 1301 McKinney, Suite 1100 Houston, TX 77010 Fax: 713-630-7396
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SECTION 000107

SEALS PAGE

I HEREBY CERTIFY THAT THESE PLANS AND TECHNICAL SPECIFICATIONS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF TEXAS.

_____

Kimani Augustine, P.E. TX#104981
Walter P Moore and Associates, Inc.
TBPE Firm Registration No. 1856

END OF SECTION 000107

SECTION 000110

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SPECIFICATIONS

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SECTION 011000

TASK ITEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section is for the convenience of the Contractor only and shall not be construed as a complete accounting of all work to be performed.

B. The extent of the Task Items is indicated on the drawings and by the requirements of each section of the specifications.

C. **Field Verification**: The Contractor shall examine the site and shall be responsible for verifying all existing construction, conditions, and dimensions. No extra payment will be considered for work additional to that shown or noted, if such work would have been apparent in an inspection of the premises.

D. **Coordination**: Coordinate the work throughout the duration of the project as to minimize disruption of facility operations.

a. As indicated in certain task items below which require Engineer review of existing conditions, provide Engineer minimum 7 working days notice to prevent delays to construction.

E. **Unit Price Work**: Several task items below include instructions for performing work per unit price. Contractor shall include in the Base Bid a cost for performing the number of units assumed in the Task Item. Contractor shall also provide an Add/Deduct cost for performing a single unit of the work. The Base Bid amount will be adjusted using this Add/Deduct cost according to actual work units completed.

PART 2 – PRODUCTS (See EXECUTION section)

PART 3 – EXECUTION

3.1 TASK ITEM (T.I.) – DESCRIPTION – **BASE BID**
UTHSCH CYF ROOFING REPAIRS

T.I. 1.1 PROJECT MOBILIZATION AND GENERAL CONDITIONS

A. Scope of Work

1. Work consists of coordinating, scheduling, obtaining and assembling at construction site all equipment, materials, permits, supplies, manpower and other essentials and incidentals necessary to perform Work.
2. Coordinate all aspects of work with Owner and all trades.
3. Provide protective measures in and around the building as directed by the Owner prior to beginning work. The Contractor shall take measures as necessary to keep access to the building free and clear of all hazards.
4. **Contractor is advised that the roof does not have OSHA compliant parapet walls or fall protection systems. Temporary fall protection must be installed prior to performing any work on the roof and must remain in place for the duration of the repairs.**
5. Perform disruptive or noisy work during times indicated by Owner. Coordinate with Owner if weekend or evening hours are required.
6. Salvage existing material which has been indicated for reinstallation according to work items below. Store salvaged materials in clean, dry locations and protect from moisture, extreme temperatures, and direct sunlight.
7. Properly dispose of all debris and waste construction materials in accordance with all applicable laws and regulations.

B. Materials

1. Not Applicable.

C. Repair Drawings and Specifications

1. Not Applicable

T.I. 2.1 DEMOLITION AND SUBSTRATE PREPARATION

A. Scope of Work

1. Work consists of coordinating, scheduling, obtaining and assembling at the construction site all equipment, materials, permits, supplies, manpower and other essentials and incidentals necessary to perform Work.
2. Coordinate all aspects of demolition work with Owner's Representative and all other trades.
3. Provide protective measures in and around the building as directed by the Owner's Representative prior to beginning roofing work. The building

will be in use throughout the project with public traffic in and out continuously. The contractor shall take measures as necessary to keep access to the building free and clear of all hazards.

4. Interior Protection: Contractor is to include in their bid all costs and equipment required to protect interior of building from water infiltration and debris that could enter the building during this work. This includes plastic drape dust protection and protection of all interior finishes and furniture. The contractor shall clean all areas affected by any interior operations. Where curbs are being removed and existing openings filled in, provide protection in the area below the work area and coordinate the work with the facilities management so that personnel in affected areas can be notified.

5. Existing roofing system:
   a. Hot-applied asphalt built-up roofing membrane
   b. 1-1/2" polyisocyanurate insulation
   c. Hot-applied asphalt built-up vapor barrier
   d. Concrete structural roof, sloped to drains

6. Remove all existing roofing and insulation down to the concrete structural roof. Tear off all base flashings. Remove all existing wood and fiber cants at base of curbs and walls.

7. Remove obsolete roof penetrations and curbs identified on the roof plan or as otherwise directed by Owner or Engineer. Where curbs and supports are removed, patch or fill in the metal deck as required. Contractor shall coordinate equipment removal with the Owner. Contractor shall perform all necessary service disconnects and relocations as may be required.

8. Contractor shall inspect the condition of the concrete structural roof. Where spalling or other distress or deterioration of the concrete is observed, contact the Engineer immediately for review. **Do not proceed with roofing work until provided further direction in writing by Engineer.**

9. Remove and dispose of existing sheet metal.

10. Remove all debris from roof area and properly dispose of all materials off site.

11. At the end of each day, ensure that all drains are in proper working order and that drain lines are clear to the first elbow and downspouts are completely clear. Implement any required corrective measures before leaving the job site that day.

B. Materials

1. Not Applicable.

C. Drawings and Specifications

1. Refer to Sheet S-2.1 for location of work.

2. Refer to specification section "Selective Demolition" for work requirements, materials, and procedures.

T.I 3.2 DECK REPAIR/REPLACEMENT – PATCH CONCRETE DECK

A. Scope of Work

1. Work consists of repair and/or replacement of damaged, spalled, or otherwise deteriorated concrete roof deck.
2. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Marking will be done with methods approved by Engineer and Owner. Contractor shall identify all critical repair work areas before starting the work.
3. Procedure for delaminated, spalled, and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching."
4. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods or other approved methods as specified in Section "Surface Preparation for Patching."
5. Exposed wire mesh with concrete cover less than 1-inch shall be removed. Consult with Engineer prior to any removal of reinforcement.
6. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
7. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
8. Patch installation procedures shall be in accordance with referenced specifications for selected material.
9. For bidding purposes, the contract price will include the following allowances for this task item repair, to be adjusted by unit costs listed in Owner's bid form:
    a. 100 SF

B. Materials

1. Epoxy coating material
2. Polymer modified cementitious patching mortar.

C. Drawings and Specifications

1. Refer to Detail 1/S-3.3 of Drawings for repair details.
2. Refer to specification sections "Surface Preparation for Patching" and "Concrete Repair Materials" for work requirements, materials, and procedures.

T.I. 5.1 CROSSOVER BRIDGES

A. Scope of Work

1. Work consists of the installation of new pre-engineered crossover bridge at elevated piping and mechanical equipment on the roof. Bridge shall be engineered to support the live load requirements provided on Sheet

S-0.1 of the Drawings in accordance with all relevant codes and regulations.

2. New bridge shall be 6 feet wide minimum and provide a minimum of 4 inches clearance above the elevated piping and mechanical equipment at the location show on the Plan Sheets. Field verify all dimensions prior to fabrication/purchase of bridge.

3. Submit shop drawings or product data to Engineer for review prior to fabrication/purchase of bridges.

4. Bridge shall be pre-fabricated and all tubular members shall be capped and fully sealed prior to installation. Field welding shall not be allowed.

5. Install new bridges and anchors in compliance with all OSHA and ADA requirements. See plans for locations of work.

6. New bridge supports shall not penetrate into the roofing system. Install sacrificial cap sheet where new bridge supports will bear on new roofing membrane.

B. Materials

1. Metal bridge assembly shall be hot-dipped galvanized steel. Refer to General Notes on Sheet S-0.1 of Drawings.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

T.I. 6.1 ROUGH CARPENTRY

A. Scope of Work

1. Work consists of installation of lumber nailers, sleepers, curbs, and edging as required for installation of new roofing system. For bidding purposes, assume 10% of all existing lumber will require replacement.

2. Install replacement nailers where deteriorated components were removed or new nailers as indicated by project details. Add nailers along roof edges to accommodate new insulation board.

3. Install new curbs and platforms as necessary to provide a minimum of 8 inch freeboard as required by the membrane manufacturer.

B. Materials

1. Lumber and plywood.

2. Fasteners, sealants, and other accessories.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

2. Refer to Sheets S-3.0 through S-3.2 for installation details.

3. Refer to specification section “Rough Carpentry” for work requirements, materials, and procedures.

T.I. 6.2 AIR BARRIER

A. Scope of Work

1. Work consists of installing an air barrier layer over the structural metal roof slab.
2. Install a continuous 1/4-inch thick cover board direct to the concrete roof. Cover board shall be adhered to the concrete.
3. Install a 120-mil modified bitumen base sheet on top of the cover board substrate in accordance with the membrane manufacturer's instructions. Nominal sheets will not be acceptable. Fully adhere in cold adhesive or, if acceptable to Owner, air barrier may be torch applied. Electric heat weld all seams.
6. Cover board and base sheet attachment to substrate shall be designed to resist the following wind uplift pressures based on ASCE 7:
   a. Interior (Zone 1): - 20 psf
   b. Edge (Zone 2): - 24 psf
   c. Corner (Zone 3): - 24 psf
   d. Perimeter and Corner width is 6-feet
4. Seal base sheet at all penetrations, edges, and terminations to form a continuous air barrier layer.

B. Materials

1. 1/4-inch thick cover board.
2. Air barrier membrane.
3. Fasteners, adhesives, and other accessories.

C. Drawings and Specifications

1. Refer to Sheets S-2.0 and S-2.2 for location of work.
2. Refer to Sheets S-3.0 through S-3.2 for installation details.
3. Refer to specification section "APP Modified Bituminous Membrane Roofing" for work requirements, materials, and procedures.

T.I. 7.1 ROOFING INSULATION – FLAT POLYISO WITH COVER BOARD

A. Scope of Work

1. Work consists of providing flat polyisocyanurate insulation for insulating purposes and to introduce slope for positive drainage.
2. Install two continuous layers of polyisocyanurate insulation. Stagger joints between layers of insulation.
   a. Fully adhere all layers of insulation.

3. Install 1/4-inch thick cover board on top of new insulation. Fully adhere in cold adhesive to substrate.

4. Install tapered insulation crickets at:
   a. The high side of the rooftop curbs.
   b. Other areas as indicated on the project plans.

6. Insulation attachment to substrate shall be designed to resist the following wind uplift pressures based on ASCE 7:
   a. Interior (Zone 1): - 20 psf
   b. Edge (Zone 2): - 24 psf
   c. Corner (Zone 3): - 24 psf
   d. Perimeter and Corner width is 6-feet

7. Provide tapered sumps to the drains.

B. Materials

1. Flat polyisocyanurate insulation board.

2. Tapered polyisocyanurate insulation board for crickets.

3. 1/2-inch thick cover board.

4. Fasteners, adhesives, and other accessories.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

2. Refer to Sheets S-3.0 through S-3.2 for installation details.

3. Refer to specification section “APP Modified Bituminous Membrane Roofing” for work requirements, materials, and procedures.

T.I. 7.2 LOW SLOPE ROOFING MEMBRANE – 2-PLY APP MODIFIED BITUMEN

A. Scope of Work

1. Work consists of installation of a 2-ply APP modified bitumen roofing membrane, all membrane flashings, and other accessories.

2. Install a 120-mil modified bitumen base sheet on top of the cover board substrate in accordance with the membrane manufacturer’s instructions. Nominal sheets will not be acceptable. Fully adhere in cold adhesive. Electric heat weld all seams.

3. Install a 140-mil modified bitumen highly reflective cap sheet in accordance with the membrane manufacturer’s instructions. Nominal sheets will not be acceptable. Fully adhere in cold adhesive to substrate. Electric heat-weld all seams.

   Cap sheet shall meet the following cool roofing requirements:
   Minimum initial total solar reflectance: 0.70
   Minimum initial thermal emittance: 0.75

4. Install base flashing per manufacturer's specifications.

5. Install sacrificial sheet membrane under all pipe, duct, and conduit supports.

6. Where indicated, install liquid resin flashing around penetrations. Apply a primer, a two part resin, woven fleece membrane and a second coat of the two part resin.

7. Install walkway pad and/or sacrificial caps sheets at areas indicated.

8. Membrane attachment to substrate shall be designed to resist the following wind uplift pressures based on ASCE 7-05:
   a. Interior (Zone 1): - 20 psf
   b. Edge (Zone 2): - 24 psf
   c. Corner (Zone 3): - 24 psf
   d. Perimeter and Corner width is 6-feet

B. Materials

1. Modified bitumen base and cap sheets.
2. Base flashings, adhesive, sealants, fasteners, and other accessories.

C. Drawings and Specifications

1. Refer to Sheets S-2.0 and S-2.2 for location of work.
2. Refer to Sheets S-3.0 through S-3.2 for installation details.
3. Refer to specification section "APP Modified Bituminous Membrane Roofing" for roofing system performance requirements, work requirements, materials, and procedures.

T.I. 7.3 FLASHING AND SHEET METAL TRIM

A. Scope of Work

1. Work consists of installation of all sheet metal flashing and trim as indicated on project drawings and specifications.
2. Install new edge metal and flashing.
3. Install new counter-flashings.
4. Install new metal pitch pans, filler and collars. Bonnets shall be installed on all pitch pans.
5. Install new continuous sheet metal caps for all new curbs. Provide a minimum vertical lip of 4" on the cap.
6. Install new formed metal flashings at flues, pipes, etc.
7. Install new soil pipe lead flashings.
8. Install reinforced resin flashing where indicated.

9. Provide gooseneck hoods at all HVAC line penetrations to eliminate gang pitch pans. All hoods shall extend above the finished roof system a minimum of 8".

10. Provide all necessary sealants, sealant tapes, and fasteners to ensure a watertight installation.

B. Materials

1. Base flashings, adhesive, sealants, fasteners, and other accessories.

2. Prefinished sheet metal flashing and trim. Color shall be per Owner's selection from Manufacturer's standard colors.

3. Stainless steel sheet metal flashing and trim.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

2. Refer to Sheets S-3.0 through S-3.2 for installation details.

3. Refer to specification section "APP Modified Bituminous Membrane Roofing" and "Flashing and Sheet Metal Trim" for work requirements, materials, and procedures.

T.I. 7.4 ROOFING SYSTEM WARRANTY

A. Scope of Work

1. Work consists of providing a manufacturer and contractor warranties for new roofing system.

2. Provide a 20 Year "Roof System/Labor Guaranty" material and labor warranty for the new roofing system, including the membrane, insulation, overlay board, and other accessories.

3. Warranty shall be the shared responsibility of the Roofing Contractor and the Roofing Membrane Manufacturer for the first **five (5)** years. The contactor shall provide a standard NRCA warranty form.

4. The Contractor shall make all necessary notices for warranty purposes to the primary roofing manufacturer, to secure timely inspections and issuance of the warranty.

B. Materials

1. Not applicable.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

2. Refer to specification section "APP Modified Bituminous Membrane Roofing" and "Product Warranties" for work requirements, materials, and procedures.

T.I. 7.5 JOINT SEALANT REPLACEMENT

A. Scope of Work

1. Work consists of removal and replacement of sealant joints.
2. Remove existing sealant from joints.
3. All joints shall be thoroughly cleaned by either abrasive methods or grinding to remove all laitance, unsound substrate, and curing compounds which may interfere with adhesion. Joint shall be air blasted to remove remaining debris.
4. Prime joint surfaces as needed.
5. Install backer rod or bond breaker in strict accordance with manufacturer's instructions.
6. Install sealant with concave profile and overall dimensions to conform with manufacturer's recommendations for best practice for sealant installation.
7. Do not allow sealant to ooze or sag.
8. Where double sealant joints are indicated, allow the inner sealant joint to fully cure before installation of the outer sealant joint.

B. Materials

1. Joint sealants shall be as specified in Specification Section "Joint Sealants."

C. Repair Drawings and Specifications

1. Refer to Sheet S2.2 for location of work.
2. Refer to 2/S-3.3 for repair details.
3. Refer to Specification Section "Joint Sealants" for work requirements, materials, and procedures.

T.I. 22.1 PLUMBING WORK

A. Scope of Work

1. Work consists of cleaning existing drain lines, repairing damaged drains, and other drain related work items.
2. Clean and rod out all drains.
3. **Check drain bowl to deck connection to ensure watertight connection prior to roofing tear-off.** Check drain bowl to interior downspout connection to ensure watertight connection prior to roofing tear-off. Contact Engineer prior to roofing tear-off if existing interior drain connections may lead to interior water leakage.
4. Reuse existing drain bowls and deck plates. Reuse existing clamping rings, fasteners, and strainers. Report missing or damaged drain bowls and clamping rings to the Engineer. Clean and coat steel if required.
5. Install new metal strainers at all drains where strainer is missing or damaged.
6. Install piping extensions as required to raise curbs, vents, stacks, and soil pipes to a minimum of 8-inches above the finished roof surface.

7. Install new pipe supports on top of new roofing membrane with sacrificial pad.

B. Materials

1. Roof drain strainer; Contractor to submit product.
2. Anti-corrosion coating for drain bowl.
3. Piping extensions and accessories, as needed; Contractor to submit products.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

T.I. 23.1 MECHANICAL WORK

A. Scope of Work

1. Work consists of raising equipment curbs, conduits, gas lines, ducts, and pipes to accommodate and protect new roofing system.
2. Remove abandoned curbs and rooftop equipment as indicated in project drawings.
3. Raise all curbs and platforms to a minimum of 8 inches or as indicated in project details above the finished roof surface and flash over the tops of the curbs to install proper counter-flashing.
4. Raise all gas lines as necessary to provide 8 inches clearance above finished roofing for new insulation thicknesses.
5. Install new gas line supports on top of new roofing membrane with sacrificial pad.

B. Materials

1. Pipe supports, fasteners, and other accessories, as needed.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

T.I. 26.1 ELECTRICAL WORK

A. Scope of Work

1. Work consists of removing and reinstalling conduits, wiring, cameras, lights, and other electrical work (except the existing lightning protection system) during installation of new roofing system.
2. All electrical work shall be performed by a licensed and experienced electrician and shall be performed according to current code.
3. Raise existing electrical conduit to a minimum of 8 inches above the finished roof surface. Provide extensions of services to allow for

goosenecks to be installed.

4. Install new conduit supports on top of new roofing membrane with sacrificial pads of modified bitumen cap sheet.

B. Materials

1. Conduit supports, fasteners, and other accessories, as needed.

C. Drawings and Specifications

1. Refer to Sheet S-2.2 for location of work.

END OF SECTION 011000

SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including conditions included by Owner.

1.2 GENERAL DESCRIPTION OF WORK:

A. The Work of this Contract will be performed in the facility as shown on Drawings.

B. Contractor shall furnish all material, labor, tools, plant, supplies, permits, equipment, transportation, superintendence, barricades, temporary construction of every nature, insurance, taxes, contributions and all services and facilities, unless specifically excepted, and install all materials, items, and equipment required to complete the construction of the Project, as set forth in the Contract Documents.

C. Refer to Section “Task Items” for a description of work. Task Item specifications, details, and drawings shall govern all repair operations. Locations where Task Items apply are shown on Drawings as symbols.

D. Final Payment shall be made on basis of actual approved Work performed as measured in place.

1.3 MEASUREMENTS:

A. Before ordering any material or doing any Work, Contractor shall verify all measurements at Project Site and shall be responsible for correctness of same.

B. Before proceeding with each Task Item, Contractor shall locate, mark, and measure quantity of each item and report quantities to Engineer. If measured quantities exceed Engineer’s estimate, Contractor shall obtain written authorization to proceed from Owner before executing Work required for that Task Item.

C. Cost of Work included in each Task Item for quantities as indicated in Contract Documents shall be included in Base Bid.

1.4 WORK SEQUENCE:

A. Prior to commencement of Work, meet with Engineer and Owner representatives to establish sequence and schedule of Work. Contractor shall give Owner notice of areas to be cleared at least 7 working days in advance of actual Work.

B. Contractor shall notify Owner’s representative at least 24 hrs. prior to commencing any abrasive blasting such as sandblasting, etc. operations.

C. Work will be conducted in phases to provide least possible interference to activities of Owner’s personnel and facility users.

1. Contractor's work hours shall be limited to comply with noise ordinances. Contractor is allowed to work as necessary to complete work within Owner's time schedule and conditions conducive to temperature sensitive materials.

D. Contractor shall remove debris from Work area on daily basis and dispose of same at authorized sites.

E. Contractor shall remove dust and air transported material from remainder of facility at conclusion of operations in Work area.

1.5 CONTRACTOR'S USE OF PREMISES:

A. Contractor shall limit his use of adjacent premises for Work, construction operations and for storage to allow for:

1. Public use, including parking.

2. Owner Occupancy:

a. Where it is necessary for the Contractor to use portions of existing buildings and/or grounds for operations, such use shall be strictly in accordance with requirements and approval of the Owner.

b. Contractor shall organize his work in order that inconvenience to the people in the facility is minimized.

c. Keep driveways and entrances serving the premises clear and available to the Owner and Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

d. Unless otherwise indicated or specified, or unless otherwise directed by Owner; water, gas, lighting, power and telephone conduits and wires, sewer lines, and other surface and subsurface structures and lines, shall be maintained by Contractor and shall not be disturbed, disconnected or damaged by him during progress of Work; provided that should Contractor in performance of Work disturb, disconnect or damage any of above, expenses arising from disturbance or in replacing or repair shall be borne by Contractor.

e. Elevators shall not be used for transfer of materials or equipment.

3. Contractor shall:

a. Not unreasonably encumber Site with materials and equipment.

b. Not load structure with weight that will endanger structure.

c. Assume full responsibility for protection and safekeeping of stored products.

d. Move stored products which interfere with operations of Owner.

e. Obtain and pay for use of additional storage and work areas needed for operations.

4. Contractor Parking:

a. Contractor’s personal vehicles shall park outside of construction area. Only vehicles equipment or delivering materials should be in zone. Coordinate with owner’s representative.

1.6 OWNER OCCUPANCY:

A. Cooperate with the Owner's Representative in all construction operations to minimize conflict and to facilitate Owner usage.

B. Contractor shall at all times conduct his operations as to ensure the least inconvenience to the general public.

1.7 SURVEY OF EXISTING CONDITIONS:

A. Contractor acknowledges by submitting a Bid, that he has visited and inspected the Project Site in which the Work is to be performed, that he has satisfied himself as to the nature and location of the Work, including any obstructions, amount of work, actual levels, the equipment and facilities needed preliminary to and during the prosecution of the Work, and all other matters which can in any way affect the Work or the cost thereof under this Contract.

B. Failure by Contractor to have acquainted himself with available information concerning Site conditions, including factors affecting costs and liabilities, shall not relieve Contractor of responsibility for performance of Work in accordance with requirements of Contract Documents, and for amount of consideration named or otherwise determined.

1.8 INFORMATION OR CLARIFICATION OF CONDITIONS

A. When Contractor encounters a condition requiring further information or a clarification, Contractor shall submit to Walter P. Moore and Associates a written Request For Information (R.F.I.) numbered sequentially. Walter P. Moore and Associates will respond in writing to all R.F.I.'s.

END OF SECTION 011100

SECTION 017836

PRODUCT WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by Contract Documents, including manufacturers' standard warranties on products and special warranties.

1. Refer to General Conditions for terms of Contractor's period for correction of Work.

B. Related Sections: Following Sections contain requirements that relate to this Section:

1. Division 01 Section "Submittal Procedures" specifies procedures for submitting warranties.
2. Division 01 Section "Closeout Procedures" specifies contract closeout procedures.
3. Divisions 02 through 09 Sections for specific requirements for warranties on products and installations specified to be warranted.
4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in Contract Documents.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on Work that incorporates products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by warranty has failed and been corrected by replacement or rebuilding, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty with equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by warranty has failed replace or rebuild Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for cost of replacing or rebuilding defective Work regardless of

whether Owner has benefited from use of Work through portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: Owner reserves right to reject warranties and to limit selection to products with warranties not in conflict with requirements of Contract Documents.

E. Where Contract Documents require a special warranty, or similar commitment on Work or part of Work, Owner reserves the right to refuse to accept Work, until Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.4 SUBMITTALS

A. Submit written warranties to Engineer prior to date certified for Substantial Completion. If Engineer's Certificate of Substantial Completion designates commencement date for warranties other than date of Substantial Completion for Work, or designated portion of Work, submit written warranties upon request of Engineer.

B. When designated portion of Work is completed and occupied or used by Owner, by separate agreement with Contractor during construction period, submit properly executed warranties to Engineer within 15 days of completion of that designated portion of Work.

1. When Contract Documents require Contractor, or Contractor and subcontractor, supplier or manufacturer to execute a special warranty, prepare written document that contains appropriate terms and identification, ready for execution by required parties. Submit draft to Owner through Engineer for approval prior to final execution.

C. Forms for special warranties may be obtained from the Engineer. Prepare written document utilizing appropriate form, ready for execution by Contractor, or by Contractor and subcontractor, supplier or manufacturer. Submit draft to Owner through Engineer for approval prior to final execution.

1. Refer to Divisions 02 through 09 Sections for specific content requirements and particular requirements for submittal of special warranties

D. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8.5 in. by 11in. paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product, and name, address, and telephone number of Installer.
2. Identify each binder on front and spine with typed or printed title "WARRANTIES," Project title or name, and name of Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION 017836

SECTION 02 07 00

SELECTIVE DEMOLITION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including all sections incorporate in the Project Manual apply to the work of this Section.

1.2 SUMMARY

A. This Section requires the selective removal and subsequent reinstallation or off site disposal of the following:

1. Removal and disposal of existing roofing membranes, metal flashings and trim, fiber cants, wood nailers, and miscellaneous hardware and accessories.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Schedule indicating proposed sequence of operations for selective demolition work, location of trash collection containers, and method of removal from the site to Owner's Representative for review prior to start of work. Include coordination of operations together with details for dust and noise control protection.

2. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

B. **Coordinate with Owner's continuing occupation of the existing building**.

1.4 JOB CONDITIONS

A. Occupancy: Owner's staff and visitors will occupy all of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. **Provide minimum of 1 week advance notice to Owner of demolition activities that will affect Owner's normal operations**.

B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's operations prior to start of selective demolition work.

C. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public to occupied portions of building.

1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public from injury due to selective demolition work.
2. Erect temporary covered passageways at each entrance and other areas of high traffic.
3. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
4. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building. Temporary weather protection shall be provided at the building openings that is weather-tight and secured in place and capable of withstanding wind and rain forces normally encountered in this region.
5. Safety: Provide safety measures for workmen as required by OSHA, the Owner, and other authorities having jurisdiction.
6. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
7. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.

    a. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

8. Environmentally Controlled Substances: It is the Contractor's responsibility to determine if controlled substances are contained in any of the materials to be removed and to dispose of any material containing controlled substances in accordance to the rules and regulation of the local municipality and government. Contractor shall contact Owner if environmentally controlled substances are uncovered.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 DEMOLITION

A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

B. If unanticipated structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's Representative in written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.

1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

3.3 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from the site.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work at no cost to the Owner.

END OF SECTION 020700

SECTION 030101

SURFACE PREPARATION FOR PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the provisions of all labor, materials, supervision and incidentals required to locate and remove all delaminated and unsound concrete, including preparation of cavities created by removal to receive patching material and preparation of existing surface spalls to receive patching material.

B. Related Sections include the following:

1. Division 03 Section “Concrete Repair Materials.”

C. Contractor shall fully acquaint himself with the existing job site conditions and discuss the accessibility of the work areas with the Owner.

D. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.

E. Contractor shall provide all traffic cones or barriers to direct traffic during the repair of the facility. This work shall be done in consultation with the Owner.

1.2 REFERENCES

A. Applicable Standards:

1. American Concrete Institute (ACI), latest version:

ACI 301	Specifications for Structural Concrete
ACI 546.1R	Guide for Repair of Concrete Bridge Structures
ACI 546R	Concrete Repair Guide

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Epoxy Coating for existing exposed non-prestressed steel reinforcement:

1. BASF: Emaco P24
2. Sika Chemical Corporation: Armatec 110
3. Duralprep A.C. by Euclid Chemical

Substitutions may be considered provided complete technical information and job references are furnished to the Owner/Engineer and approved prior to commencement of work.

Changes in products required to suit temperature and environmental conditions at the time of material application shall be specified as separate line items by the Contractor showing credit or additions to the price for the various tasks.

In using the above products, follow strictly the manufacturer's specifications and directions for mixing and application. Also heed all label warnings by manufacturer. Make application in accordance with applicable safety laws.

PART 3 - EXECUTION

3.1 INSPECTION

A. Spalls: Contractor shall locate spalls by visual inspection, and mark boundaries.

B. Engineer may mark additional unsound concrete for removal.

C. Areas to be removed shall be rectangular to provide adequate appearance.

D. Contractor shall locate and determine the depth of all embedded reinforcement, electrical conduit, post-tensioned tendons, in repair area and mark these locations for reference during concrete removal. Do not cut any embeds unless approved by Engineer.

3.2 REPAIR PREPARATION

A. Contractor shall review all marked removal and preparation areas.

B. All delaminated, spalled and unsound concrete shall be removed from within marked boundary to minimum depth of ¾" using 15 to 30 lb air hammers equipped with chisel point bits. When directed by Engineer, chipping hammers less than 15 lb shall be used to minimize damage to sound concrete. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

C. Where embedded reinforcement, anchorages, or electrical conduit is exposed by concrete removal, proceed with caution to avoid damaging it during removal of unsound concrete. If bond between exposed embedded reinforcement/anchorages and adjacent concrete is impaired by Contractor's removal operation, Contractor shall perform additional removal around and beyond perimeter of reinforcement for minimum of ¾" along entire length affected at no cost to owner.

D. Necessary approvals shall be obtained by the Contractor from authorizing governmental or other agencies prior to abrasive-blasting. Abrasive-blasting operations shall comply with the requirements of OSHA and NIOSH (National Institute for Occupational Safety and Health) Standard PB-246-697.

E. If rust is present on embedded reinforcement where it enters sound concrete, additional removal of concrete along and beneath reinforcement will be required. Additional removal shall continue until non-rusted reinforcement is exposed, or may be terminated per Engineer's instructions.

F. Removal of concrete for repair requires saw cutting ¾" into floor slab of the perimeter of the removal, unless a more stringent criteria applies. For vertical and overhead surfaces marked areas may be saw-cut, ground, or chipped to depth of ½" to existing concrete, measured from original surface.

G. Edges of patch areas shall be dressed perpendicular to member face to eliminate feather edges. All edges shall be straight and patch areas square or rectangular-shaped.

H. Contractor shall exercise extra caution during saw cutting to avoid damaging existing reinforcement particularly post-tensioned tendons, sheathing, electrical conduit and any other embedded items near surface of concrete. Any damage to existing embedded items shall be repaired by Contractor with Engineer's approved methods at no additional cost to Owner.

3.3 INSPECTION OF REPAIR PREPARATION

A. After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer for compliance with requirements of this Section.

B. Contractor shall inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations. Contractor shall notify Engineer of all defective and damaged reinforcement or conduits. Replacement of damaged or defective reinforcement/conduits shall be performed in accordance to the requirements of this Section.

3.4 CLEANING OF REINFORCEMENT

A. All exposed reinforcing steel shall be cleaned and free of rust and other contaminants. Cleaning shall be accomplished by abrasive methods. Cleaning shall be completed immediately before patch placement to insure that base metal is not exposed to elements and further rusting for extended periods of time. Use powered wire brushes in locations where reinforcing steel cannot be cleaned by abrasive-blasting or water-blasting.

B. All exposed reinforcing steel shall be coated with a corrosion inhibiting product specified in the Section "Products" in this specification prior to mortar application. Protect prepared surfaces from damage prior to and during patch placement.

3.5 REINFORCEMENT IN REPAIR AREAS

A. All embedded reinforcement exposed during surface preparation that has lost more than 10**%** of original cross-sectional area due to corrosion shall be considered defective. Defective reinforcement shall be supplemented in accordance to Engineer's instructions and shall be paid for by Owner.

B. Damaged reinforcement caused during removals made by Contractor shall be supplemented in accordance to Engineer's instructions and shall be paid for by Contractor.

C. Supplement defective or damaged embedded reinforcement of equal diameter with a Class B splice in accordance to ACI–318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with approved anchors. Supplemental steel shall be A615 Grade 60 steel except where more stringent requirements apply in drawings and/or details.

D. Loose reinforcement exposed during surface preparation shall be securely anchored prior to patch placement. Loose reinforcement shall be adequately secured with wire ties to bonded reinforcement or with drilled-in anchors. Drilled-in anchors shall be TW-1400 anchors by ITW Ramset/Red Head, Tie-Wire Wedge-All anchors by Simpson Strong-Tie, or approved equal. Engineer will determine adequacy of wire ties and anchors. Securing loose reinforcement is incidental to surface preparation.

E. Minimum of 1 ½" concrete cover shall be provided over all new/existing reinforcement except where more stringent requirements apply in drawings and/or details.

3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

A. Cavities will be examined prior to commencement of patching operations. Sounding surface shall be part of examination. Delaminations noted during sounding shall be removed as specified in this Section.

B. All debris shall be removed from site prior to commencement of patching.

END OF SECTION 030101

SECTION 030105

CONCRETE REPAIR MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the provisions of all labor, materials, supervision and incidentals required to prepare deteriorated or damaged concrete surfaces and install patching materials to restore original surface condition and integrity.

B. Related Sections include the following:

1. Division 03 Section “Surface Preparation for Patching.”

C. Contractor shall fully acquaint himself with the existing job site conditions and discuss the accessibility of the work areas with the Owner.

D. Contractor shall ensure that there is adequate ventilation in areas where repair work is being performed and that no work results in nauseating, annoying or toxic fumes and odors from entering occupied areas. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.

E. Contractor shall provide all traffic cones or barriers to direct traffic during the repair of the facility. This work shall be done in consultation with the Owner.

1.3 SUBMITTALS

A. Make submittals in accordance with requirements of Division 1 and as specified in this Section.

B. At the preconstruction meeting, contractor shall submit procedures to protect fresh patches from weather and traffic (if applicable).

1.4 QUALITY ASSURANCE

A. Work shall conform to requirements of the American Concrete Institute (ACI) as applicable except where more stringent requirements are shown on Drawings or specified in this Section.

B. Manufacturer's Qualifications: Companies furnishing the repair materials shall have a proven track record of at least five years. Furthermore, they shall have in existence a program of training, certifying, and supporting a nationally organized program of approved contractors. Evidence of this shall be made available to the Engineer/Owner upon request.

C. Contractor's Qualifications: Contractor performing the work shall be an approved contractor by the manufacturer furnishing the repair materials, and shall have no less than five years experience in the various types of polymer related work required in this project. Upon request by the Engineer, a notarized certification from the manufacturer attesting to the training shall be submitted to the Engineer/Owner.

1.5 REFERENCES

A. Applicable Standards:

1. American Concrete Institute (ACI), latest version:

ACI 301R	Specifications for Structural Concrete
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to Curing Concrete
ACI 318R	Building Code Requirements for Structural Concrete
ACI 548.1R	Guide for Use of Polymers in Concrete

2. American Society for Testing and Materials (ASTM):

ASTM C109	Test Method for Compressive Strength of Hydraulic Cement Mortars

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR POLYMER MODIFIED CEMENTITIOUS MORTARS

A. Mortar used for bonding, patching, and resurfacing in exposed or exterior environmental conditions with large cyclic temperature changes shall have the following properties:

1. Mortar shall be non-sagging.

2. Acceptable materials shall have minimum 3-day compressive strength of 3,000 psi, and 5,000 psi at 28 days as certified by manufacturer.

3. Coefficient of thermal expansion shall be comparable with that of concrete (5.5 x 10^{-6} in/in/°F).

4. Sand used in preparing mortar shall be graded oven dry quartzite furnished in bags.

5. The mortar patch material shall match the existing texture and color of existing exposed/cured concrete without giving a blotchy appearance. A test patch shall be applied for approval prior to final acceptance of the mortar. Size of test patch shall be approximately equal to the size of the average mortar patch to be used on the project.

2.2 PRODUCTS AND MANUFACTURERS

A. Acceptable materials for this Work are:

1. EMACO R300 CI, EMACO R310 Cl by BASF

2. Sika 222 with Latex R by Sika

3. Eucocrete Supreme by Euclid Chemical Company

NOTE: Concrete patches must be allowed to cure fully prior to placement of roofing materials.

B. At Contractor's option, the following high early strength products may be used in order to achieve faster curing times:

1. EMACO T415 OR EMACO T430 by BASF

2. 10-60 Rapid Mortar or 10-61 Rapid Mortar by BASF

3. SikaQuick 1000 or SikaQuick 2500 by Sika

Substitutions may be considered provided complete technical information and job references are furnished to the Owner/Engineer and approved prior to commencement of work.

Changes in products required to suit temperature and environmental conditions at the time of material application shall be specified as separate line items by the Contractor showing credit or additions to the price for the various tasks.

In using the above products, follow strictly the manufacturer's specifications and directions for mixing and application. Also read all label warnings by manufacturer. Make application in accordance with applicable safety laws.

PART 3 - EXECUTION

3.1 POLYMER MODIFIED AND NON-POLYMER MODIFIED CEMENTITIOUS MORTAR PATCH

A. Applicator's Qualifications

1. Mortar repair work shall only be performed by contractors who have successfully used this process on at least three similar structural repairs of equal scope which have performed successfully for a minimum period of five years.

2. Only adequately trained and experienced personnel shall be used on the job.

B. Surface Preparation

1. Concrete surface to which the mortar is to be applied shall be exposed parent concrete free of loose and unsound materials. Preparation of cavity to receive new mortar shall be in accordance to Section "Surface Preparation for Patching" and manufacturer's instructions.

C. Concrete Surface Inspection: Ensure that the surface and ambient temperature is at least 45°F and rising at the time of application.

D. Bonding Grout

1. Apply bonding grout in strict accordance with manufacturer's recommendations.

2. If bonding grout dries, cavity shall not be patched until it has been re-cleaned and prepared as indicated in Section “Surface Preparation for Patching.” Grout shall not be applied to more cavities than can be patched within 15 min. by available manpower.

3. Patching materials shall be placed immediately following grout application in strict accordance with manufacturer’s instructions.

E. Mortar Application

1. Condition polymer mortar material to 65°F-80°F unless otherwise recommended by the manufacturer. Materials beyond this range of temperature shall not be used.

2. Mix the two components in a clean container free of contaminants as recommended by the manufacturer.

3. Thoroughly blend components and aggregates with Jiffy mixers (made by The Jiffy Mixer Co., Irvine, California) to a uniform and homogenous mixture. Small batches of one quart or less may be mixed by spatulas, palette knives or similar devices.

4. Mixing should be accomplished within three minutes when using Jiffy mixer or five minutes when mixed by hand.

5. Apply mortar by means suitable for the consistency of the mortar mix.

6. Use appropriate forms as required for retaining mortar if mixed to a flowable consistency.

7. Consolidate the mortar thoroughly to remove entrapped air.

8. Supplemental wire mesh shall be required for delamination and spall repairs greater than 2” in depth. Fresh bonding grout is required between successive lifts of patching material.

9. Finish surface of mortar to match the texture and contours of existing concrete.

F. Curing

1. Immediately after finishing, keep patch material continually moist for at least 24 hrs. Continue curing for first 7 days after patch placement. During initial and final curing periods maintain patch material above 50 °F.

2. Prevent rapid drying at end of curing period.

3. Provide additional curing as required by manufacturer’s recommendations.

G. Cleanup

1. Protect surfaces surrounding the work areas against spillage.

2. Material spillage shall be cleaned before they set and become difficult to remove.

3. Cleanup all portions of the existing structure that are soiled or stained in the process of mortar repair work.

3.2 ACCEPTANCE OF REPAIRS

A. Acceptance of completed concrete repair will be in accordance to ACI 301.

B. Patched areas shall be sounded by Engineer and Contractor after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no cost to Owner.

C. If shrinkage cracks appear in patch area after the initial curing period is concluded, the patch in question shall be considered unacceptable, and it shall be removed and replaced by Contractor at no cost to Owner.

END OF SECTION 030105

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Definition: Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated. Types of work in this section include rough carpentry for:

1. Wood grounds, nailers, blocking and sleepers.

1.3 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Lumber Standards: Comply with PS 20 and with applicable rules of the respective grading and inspecting agencies for species and products indicated.

B. Plywood Product Standards: Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.

C. Source Inspection: Lumber of the specified species furnished under this section shall be inspected and comply with the grading rules of the appropriate following associations:

1. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
2. Southern Pine Inspection Bureau (SPIB).
3. West Coast Lumber55 Inspection Bureau (WCLIB).
4. Western Wood Products Association (WWPA).
5. Redwood Inspection Service (RIS).

D. Factory-mark each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for materials listed below:

1. Wood grounds, nailers, blocking and sleepers

B. Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form

of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

C. Wood Treatment Data: Submit treatment manufacturer's instructions for proper use of each type of treated material.

1. Pressure Treatment: For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
2. Water-Borne Preservatives: Include statement that moisture content of treated materials was reduced to a maximum of 15% prior to shipment to project site.
3. Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with governing ordinances and that treatment will not bleed through finished surfaces.

1.5 PRODUCT HANDLING

A. Delivery and Storage: Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation within stacks.

1.6 JOB CONDITIONS

A. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of nailers, blocking, and similar supports to allow proper attachment of other work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Lumber, General:

1. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

a. Provide dressed lumber, S4S, unless otherwise indicated.
b. Provide seasoned lumber with 19% maximum moisture content at time of dressing.
c. Provide unseasoned lumber with moisture content in excess of 19% allowed at time of dressing.

B. Framing Lumber (2" through 4" thick) (Wd-Frm):

1. For light framing (less than 6" wide), provide "Stud" grade lumber for stud framing and "Standard" grade for other light framing, any species.
2. For structural light framing (less than 6" wide), provide the following grade and species:

a. Construction grade, any species.
b. Standard grade, any species.
c. Utility grade, any species.

3. Any species and grade which meets or exceeds the following values:

a. Fb (minimum extreme fiber stress in bending); 1500 psi.
b. E (minimum modulus of elasticity); 1,500,000.

C. Boards (less than 2" thick):

1. Concealed Boards: Where boards will be concealed by other work, provide lumber of 19% maximum moisture content (S-DRY) and of following species and grade:

Redwood Construction Common (RIS), Southern Pine No. 2 boards (SPIB), or any species graded construction boards (WCLIB or WWPA).

Redwood Merchantable (RIS), Southern Pine No. 3 boards (SPIB), or any species graded standard boards (WCLIB or WWPA).

2. Board Sizes: Provide sizes indicated or, if not indicated (for sheathing, subflooring and similar uses), provide 1" x 8" boards.

D. Miscellaneous Lumber: Provide wood for support or attachment of other work including cant strips, bucks, nails, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, with a moisture content of 15% maximum for lumber items not specified to receive wood preservative treatment.

1. Grade: Construction Grade light framing size lumber of any species or board size lumber as required. Provide construction grade boards (RIS or WCLIB) or No. 2 boards (SPIB or WWPA).

E. Plywood (PWD):

1. Trademark: Identify each plywood panel with appropriate American Plywood Association (APA) trademark.

2. Concealed Performance-Rated Plywood: Where plywood panels will be used for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposure durability classification, edge detail (where applicable) and thickness.

a. Roof Sheathing: APA RATED SHEATHING.
(1) Exposure Durability Classification: EXTERIOR.
(2) Exposure Durability Classification: EXPOSURE 1.
(3) Exposure Durability Classification: EXPOSURE 2.
(4) Span Rating: As required to suit rafter spacing indicated.
(5) Span Rating: 16/0.
(6) Span Rating: 24/0.
(7) Span Rating: 24/16.
(8) Span Rating: 32/16.
(9) Span Rating: 48/24.

F. Miscellaneous Materials:

1. Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

   Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153).

2.7 WOOD TREATMENT

A. Preservative Treatment: Where lumber or plywood is indicated as "Trt-Wd" or "Treated," or is specified herein to be treated, comply with applicable requirements of American Wood Preservers Association (AWPA) Standards C2 (Lumber) and C9 (Plywood) and of American Wood Preservers Bureau (AWPB) Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

   1. Pressure-treat above-ground items with water-borne preservatives complying with AWPB LP-2. After treatment, kiln-dry to a maximum moisture content of 15%. Treat indicated items and the following:

      a. Wood cants, nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.
      b. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
      c. Wood framing members less than 18" above grade.

   2. Pressure-treat the following with water-borne preservatives for ground contact use complying with AWPB LP-22:

      a. Wood members in contact with ground.
      b. Wood members in contact with fresh water.

   2. Complete all fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

B. Fire-Retardant Treatment: Where "FR-S" lumber or plywood is specified or otherwise indicated provide materials which comply with AWPA standards for pressure impregnation with fire-retardant chemicals, and which have a flame spread rating of not more than 25 when tested in accordance with UL Subject 723 or ASTM E 84, and show no increase in flame spread and significant progressive combustion upon continuation of test for additional 20 minutes.

   Where treated items are exposed to exterior or to high humidities or are to have a transparent finish in form of stain or sealer, provide materials which show no change in fire-hazard classification when subjected to standard rain test (UL Subject 790 or ASTM D 2898).

   Use fire-retardant treatment which will not bleed through or adversely affect type of finish indicated and which does not require brush treatment of field-made end cuts to maintain fire-hazard classification.

1. Where transparent finish is indicated use type of treatment and species which permits milling of lumber after treatment without altering indicated fire-hazard classification, as determined by fire testing.

Kiln-dry treated items to maximum moisture content of 19%.

Provide UL label on each piece of fire-retardant lumber or plywood.

C. Inspection: Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
2. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.
3. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes.
4. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

B. Wood Grounds, Nailers, Blocking and Sleepers:

1. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
2. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise show. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
3. Provide permanent grounds of dressed, preservative treated, key-bevelled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

C. Installation of Plywood:

1. General: Comply with applicable recommendations contained in Form No. E 30G, "APA Design/Construction Guide - Residential & Commercial", for types of plywood products and applications indicated.

END OF SECTION 061000

SECTION 075213

APP MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. APP Modified Bituminous Roof Systems.

B. Roof Insulation.

C. Roof Flashing and Accessory Application

1.2 RELATED SECTIONS

A. Division 01 Specifications.

B. Section 061000 - Rough Carpentry: Roof blocking installation and requirements.

C. Section 076200 - Sheet Metal Flashing and Trim: Metal flashing and counter flashing scuppers and downspouts installation and requirements.

D. Section 079200 - Joint Sealants: joint sealant material and installation requirements.

1.3 REFERENCES.

References in these specifications to standards, test methods, codes etc., are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout these specifications.

ASTM	American Society for Testing and Materials, Philadelphia, PA
FM	Factory Mutual Engineering Research Corp., Norwood, MA
NRCA	National Roofing Contractors Association, Rosemont, IL
CERTA	Certified Roofing Torch Applicator, Rosemont, IL
OSHA	Occupational Safety and Health Administration, Washington, DC
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Chantilly, VA
UL	Underwriters Laboratories, Northbrook, IL

The following is a specific list of references that apply to this specification, but is not necessarily all applicable standards.

A. American Society of Civil Engineers (ASCE).
   1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures.
   2. ASTM International (ASTM) – Annual Book of ASTM Standards.
   3. ASTM C 728 – Standard Specification for Perlite Thermal Insulation Board.
   4. ASTM C 1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   5. ASTM D 41 – Standard Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.
   6. ASTM D 312 – Standard Specification for Asphalt Used in Roofing.
   7. ASTM D 4586 – Standard Specification for Asphalt Roof Cement, Asbestos-

Free.

8. ASTM D 4601 – Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
9. ASTM D 5147 – Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
10. ASTM D 6223 – Standard specifications for APP modified bitumen sheet materials using a combination of polyester and fiberglass reinforcements.
11. ASTM D 6509 – Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Base Sheet Materials Using Glass Fiber Reinforcements.
12. ASTM E 408 – Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.

B. Federal Specification # HH-I-1972: Faced polyisocyanurate roof insulation board.

C. Membrane Immersion Test: Modified Bitumen Membrane Asphaltic Impregnation Evaluation, as published in the "Proceedings of the Fourth International Symposium on Roofing Technology".

D. National Roofing Contractors Association (NRCA) - Low Slope Roofing and Waterproofing Manual, Current Edition.

E. NBS-BSS #55: Tensile strength for fully adhered, asphalt based roof systems.

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

G. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TGFU).

1.4 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

1.5 PERFORMANCE REQUIREMENTS

A. Provide an installed roofing membrane and base flashing system that does not permit the passage of water, and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.

1.6 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Manufacturer's published specifications, base flashing details, and installation instructions for the specified system.
5. Submit Material Safety Data Sheets on all roofing materials to be used.

C. Shop Drawings: Provide plan, section, elevation and perspective drawings as necessary to depict all flashing and project conditions on the project, including but not limited to the

following:

1. Roof system and base flashing configuration.
2. Penetration details.
3. Termination details.
4. Fastening patterns.
5. Tapered insulation design.

D. Submit written proof of contractor's approval by specified roof system manufacturer including written confirmation that the manufacturer has reviewed the project documents and that the roof system as specified meets the requirements for the manufacturers guaranty.

E. Submit copies of proposed manufacturer's guaranty.

F. Selection Samples: For each product specified, two samples representing manufacturer's full range of available colors and types.

G. Verification Samples: For each finish product specified, two samples representing actual product, color, and finish.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

1. ISO 9000 Certification: The manufacturer must provide documentation showing the manufacturer has current ISO 9001:2000 certification for the specific manufacturing plant where the modified bitumen membrane products are produced.
2. ISO 14000 Certification: The manufacturer must provide documentation showing current ISO 14001:1996 certification for the specific manufacturing plant where the modified bitumen membrane products are produced.

B. Product Performance Requirements:

1. Minimum Solar Reflectance: Initial Value – See Article 1.8
   3-Year Aged Value (un-cleaned surface) – 0.68

2. Minimum Thermal Emittance: Initial Value – See Article 1.8
   3-Year Aged Value (un-cleaned surface) – 0.75

3. Solar Reflective Index: Initial Value – 0.92
   3-Year Aged Value (un-cleaned surface) – 0.82

4. Reflective Cap Sheet products are required to have a minimum of 10 years of performance and manufacturing track record in the United States.

5. Laminated or post-manufacturing coated Cap Sheet products will not be accepted.

6. Reflective Cap Sheet products must be PH neutral and are required to have been tested as having no impact on the quality of water run-off.

7. Reflective Cap Sheet products must be grease and fungus resistant.

C. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products

of the same type and scope as specified.

D. A pre-installation conference will be held approximately two weeks prior to commencing Work specified in this section. Representatives of the owner, engineer/specifier, roofing contractor, sub-contractors, and manufacturer must be present.
   1. Review installation procedures, materials to be used, submittals, schedules, and all related work required under this section. Finalize construction schedule and confirm availability of materials, equipment, contractor's personnel, and facilities needed to complete work as planned.
   2. Review forecasted weather conditions and procedures for coping with unfavorable conditions, and maintaining the water tightness of the roof system.
   3. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, penetrations, curbs, and any work performed by other trades.
   4. Review structural loading limitations of deck and inspect deck for acceptability as roof substrate.
   5. Review inspection and quality control procedures to be used.
   6. The contractor shall record discussions of conference, including decisions and agreements reached. Furnish copy of record minutes to each party attending. If disagreements exist at the conclusion of the conference, determine how disagreements will be resolved, and set a date for reconvening conference.

E. The roofing systems manufacturer will provide qualified company personnel to attend pre-construction and in-progress meetings, and to perform periodic job site visits as necessary. The manufacturer will also provide non-sales related field auditors for the purpose of performing quality assurance inspections, both in-progress and final inspections. Provide copies of the manufacturer's field auditor inspection report to the contractor, engineer/specifier, and building owner.

F. Project Acceptance: Submit a completed manufacturer's application for roof guarantee form along with shop drawings of the roofs showing all dimensions, penetrations, and details. The form shall contain all the technical information applicable to the project including deck types, roof slopes, base sheet and/or insulation assemblies (with method of attachment, and fastener type), and manufacturer's membrane assembly proposed for installation. The form shall also contain accurate and complete information requested including proper names, addresses, zip codes and telephone numbers. The project must receive approval, through this process, prior to shipment of materials to the project site.

1.8 REGULATORY REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Provide a roofing system achieving a UL Class rating for roof slopes indicated on the Contract Drawings.
   1. UL Class A rating.

C. Windstorm Classification: Provide a roofing system which will achieve the required uplift resistance as calculated in accordance with the most current revision of ASCE 7 or as listed in the current FM Approval Guide.
   1. Wind Loads at Main Roof Area:
      a. -20 psf of uplift resistance in the Interior (Zone 1)
      b. -24 psf of uplift resistance at the Edges (Zone 2)
      c. -24 psf of uplift resistance at the Corners (Zone 3)
      d. Edge and Corner width is 6-feet

D. Energy Star – Roof system shall meet or exceed the initial and aged reflectivity required by the U.S. Federal Government's Energy Star Program.

E. "Cool Roofing" – The roof system shall meet or exceed the reflectivity and emissivity criteria to qualify for local "cool" roofing requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.

B. Storage: Store materials out of direct exposure to the elements. Store roll goods on a clean, flat and dry surface. All material stored on the roof overnight shall be stored on pallets. Do not double stack. Rolls of roofing must be stored on ends. Store materials on the roof in a manner so as to preclude overloading of deck and building structure. Store pail materials such as solvents, adhesives and asphalt cutback products in their original undamaged containers in clean dry protected locations away from open flames, sparks or excessive heat and within their specified temperature range. Cover all material using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.

C. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Handle rolled goods to prevent damage to edges or ends.

D. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above will be automatically rejected, removed and replaced at the Contractor's expense.

1.10 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Notification: Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.

C. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

D. Environmental Requirements
   1. Precipitation: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and building interiors are protected from possible moisture damage or contamination.
   2. Temperature Restrictions - cold adhesive: At low temperatures, the specified cold adhesive becomes more viscous, making even distribution more difficult. The optimal temperature of the adhesive at point of application is 70°F (21°C). To facilitate application when ambient temperatures are below 50°F (10°C), store the adhesive and roll goods in a warm place immediately prior to use. Roll or broom the sheets to ensure contact with the underlying adhesive. Suspend application in situations where the adhesive cannot be kept at

temperatures allowing for even distribution.

E. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

F. Protection Requirements
   1. Membrane Protection: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
   2. Torch Safety: Crew members handling torches shall be trained by an Authorized Certified Roofing Torch Applicator (CERTA) Trainer, be certified according to CERTA torch safety guidelines as published by the National Roofing Contractor's Association (NRCA), and follow torch safety practices as required by the contractor's insurance carrier. Designate one person on each crew to perform a daily fire watch. The designated crew member shall watch for fires or smoldering materials on all areas during roof construction activity, and for the minimum period required by CERTA guidelines after roofing material application has been suspended for the day.
   3. Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.
   4. Site Condition: Complete, to the owner's satisfaction, all job site clean-up including building interior, exterior and landscaping where affected by the construction.

1.11 WARRANTY

A. Provide manufacturer's roof system guaranty with single source coverage and no monetary limitation (NDL) where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.
   1. Duration: Twenty (20) years from the date of completion.
   2. The guarantee must have unlimited dollar coverage for the entire guaranty period.
   3. Perimeter metal fascias and copings shall be guaranteed for wind speed coverage up to 150 mph. Counterflashings shall be guaranteed for wind speed coverage up to 110 mph for a maximum of 15 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers
   1. Derbigum, Kansas City, MO
   2. Approved equal based on roofing membrane performance requirements specified herein. Requests to use equivalent products of other manufacturers shall be submitted minimum **five (5) working days (one calendar week) prior to the bid due date** for review and approval/rejection by Engineer and Owner. Requests for substitutions not submitted for approval during the bidding process will NOT be considered.

2.2 SCOPE / APPLICATION

A. Install a roof specification consisting of one ply of APP modified ply sheets and one ply of APP surfaced cap sheet qualifying for the specified warranty.

B. Where located on the Contract Drawings, remove and properly dispose of the existing roof membrane, base flashings, roof insulation, and sheet metal flashing and trim.

C. Install a new roof system consisting of new rigid roof insulation, a multiple ply modified bitumen membrane system installed in cold adhesive, and new sheet metal flashing & trim.

2.3 INSULATION AND SUBSTRATE MATERIALS

A. Rigid Board Insulation: Rigid polyisocyanurate board with a glass fiber facer. Meets or exceeds the requirements of ASTM C 1289 and Fed. Spec. # HH-I-1972.
   1. Dimensions: 48 inch by 48 inch (1219mm x 1219mm) for fully adhered boards. 48 inch by 96 inc (1219mm x 2438mm) for mechanically fastened boards only.
   2. Minimum Thickness: 2 inches continuous thickness, with additional thickness as needed to create slope to drains.
   3. Average Thermal Resistance (LTTR value): 9 per 1-1/2 inch thick board.
   4. Available Products: Derbiboard and Derbiboard Tapered.

B. Cover Board: 1/4-inch fiber reinforced cementitious roof board. Thickness: 1/4 inch (6mm).
   1. Dimensions: 48 inch by 48 inch (1219mm x 1219mm) for fully adhered boards. 48 inch by 96 inch (1219mm x 2438mm) for mechanically fastened boards only.
   2. Available products: Securock.

C. Modified Bitumen cant Strip: Atactic Polypropylene (APP) cant strip cut at angles to provide a 45 degree angle between horizontal and vertical surfaces.

D. Perlite Tapered Edge Strip: Tapered expanded perlite edge strips meeting or exceeding the requirements of Fed. Spec. HH-I-529b and ASTM C 728.

2.4 AIR BARRIER PLY

A. Base Sheets: Smooth, fiberglass reinforced, Atactic Polypropylene (APP) base ply. Waterproof when side and end laps are welded.
   1. Thickness: 120 mils (3mm).
   2. Tensile Strength at 77 F (MD/XD): 90 lbf/in / 80 lbf/in.
   3. Available Products: Derbibase Ultra.

2.5 BASE PLY

A. Base Sheets: Smooth, fiberglass reinforced, Atactic Polypropylene (APP) base ply. Waterproof when side and end laps are welded.
   1. Thickness: 120 mils (3mm).
   2. Tensile Strength at 77 F (MD/XD): 90 lbf/in / 80 lbf/in.
   3. Available Products: Derbibase Ultra

2.6 MODIFIED BITUMINOUS CAP PLY

A. Cap Sheet: ASTM D 6223 Type II dual reinforced, Atactic Polypropylene (APP) membrane with fiberglass and polyester dual reinforced mat.
   1. Thickness: 140 mils (3.5mm).
   2. Tensile Strength at 77 F (MD/XD): 85 lbf / 85 lbf

3. Elongation at 77 F (MD/XD): 5.50 percent / 5.50 percent.
4. Tear Resistance at 77 F (MD/XD): 130 / 130
5. Low Temperature Flex: -20 C.
6. Available Products: Derbibrite

2.7 WALKWAY PLY

A. Walkway Ply: Where indicated on roof plans, provide a fully-adhered walkway ply. Walkway pad material shall be the same as the modified bituminous cap ply, unless directed otherwise by manufacturer.

2.8 ISOLATION PLY

A. Isolation Ply: Where indicated on roof plans, provide a fully-adhered ply to isolate equipment supports, sleepers, lightning protection systems, and other rooftop equipment from the cap ply. Isolation pad material shall be the same as the modified bituminous cap ply, unless directed otherwise by manufacturer.

2.9 ADHESIVES, COATINGS AND PRIMERS

A. Cold Applied Roofing Adhesive: Cold applied adhesive for use with modified bitumen membranes and base sheets.

1. Application Rate: 1.5 to 2.5 gallons per 100 square feet, depending on substrate (0.6 – 0.8 l/sm).
2. Volatile Organic Compound (VOC) limits: 200 g/l.
3. Available Products: Permastic.

B. Cold Applied Roofing Isolation Adhesive: Cold applied adhesive for use with roofing insulation boards and cover boards.

1. Application Rate: 1/4-inch to 1/2 –inch beads of adhesive at 12-inches on center, unless recommended otherwise by manufacturer.
2. Available Products: Derbibond LR.

C. Cold Applied Flashing Cement: Cold applied asphalt flashing cement for adhering modified bitumen membranes to vertical surfaces and flashing modified bituminous membranes to metal components.
1. Application Rate: 7.5 gallons per 100 square feet (3.0 l/sm) at a 1/8 inch (3mm) bed.
2. Volatile Organic Compound (VOC) limits: 165 g/l.
3. Available Products: Perflash

D. Cold Applied Liquid Flashing Resin: Cold applied, seamless, self-terminating flashing resin that is reinforced and UV stable, specifically formulated for use on atypical and/or rigid roof penetrations.
1. Available Products: Derbiflash

E. Reflective Tough-Up Coating: Water-based, white, reflective, high-performance roof coating specifically formulated to touch-up edges and seams of reflective cap sheets.
1. Available Products: Permacool

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Structural Concrete Decks:

1. Minimum deck thickness for structural concrete is 4 inches (102 mm).

2. When insulation or roofing is to be adhered with hot asphalt, prime the deck with ASTM D 41 primer, at one (1) gallon per 100 square feet (0.4 l/sm). Allow the primer to dry prior to the application of the roofing system.

3.3 AIR BARRIER INSTALLATION

A. The cover board and air barrier must be securely attached to the roof deck. Verify attachment requirements in the codes and FM manual.

1. The cover board shall be ahdered to the deck.
2. The air barrier membrane shall be fully adhered or, if acceptable to Owner, torch applied to the cover board, sealed around all penetrations, and sealed at all terminations and perimeters.

3.4 INSULATION INSTALLATION

A. Do not apply roof insulation until all other Work which requires foot equipment traffic on the roof.

B. The insulation must be securely attached to the roof deck using the required fastener density and pattern as listed in the current FM Specifications and Details Guide. Verify attachment requirements in the codes and FM manual.

1. Insulation board shall be fully adhered,
2. Final cover board shall be fully adhered to insulation.

C. Do not install wet, damaged or warped insulation boards.

D. Install insulation boards with staggered board joints in one direction (unless taping joint).

E. Install insulation boards snug. Gaps between board joints must be less than 1/4 inch (6 mm). Fill all gaps in excess of 1/4 inch (6 mm) with insulation material of the same type.

F. Wood Nailers: Install minimum 3 1/2 inches (89 mm) wide nailers at all locations noted in the Construction Drawings. Nailers must be of equal thickness as the insulation with a minimum 1 inch (25 mm) and securely fastened to the deck.

G. Install cant strips at the transition between roof deck and wall/curb surfaces in all membrane flashing applications. Where necessary to accommodate differential movement between the wall and roof deck, vertical wood nailers, of sufficient height to provide a minimum 8 inch (203mm) base flashing height, may be mechanically fastened to the insulation stops in accordance with NRCA recommendations and the Contract Drawings.

H. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.

I. Do not install insulation over old lightweight insulating concrete decks without the use of a vapor retarder.

J. Do not install any more insulation than will be completely waterproofed each day.

3.5 BASE PLY INSTALLATION

A. Apply approved base sheets over insulation or deck surfaces using methods approved by the manufacturer for the specified roof system.

B. Strap and backnail base and interply sheets where roof slopes exceed 2 inches per foot (2:12).

3.6 MEMBRANE INSTALLATION

A. Apply roof system in strict accordance with manufacturer's published recommendations.

B. Unroll membranes and allow them to relax prior to application. Application of sheet materials directly from the factory roll may increase the incidence of wrinkling during or subsequent to application.

C. Starting at the low point of the roof area, unroll membrane into position with 3 inch (76mm) side laps and 4 inch (102mm) end laps staggered a minimum of 18 inches (455mm).

D. Cold Process Membrane Application:
   1. Plan Work and foot traffic so adhesive is not tracked across the top of the finished base ply membrane.
   2. Starting at the low point of the roof area, rolls of modified cap sheet shall be unrolled into position with 3 inch (76mm) side laps and 4 inch (102mm) end laps staggered a minimum of 18 inches (455mm).
   3. Pull the end of each sheet straight back onto itself so that the sheet is folded approximately in half, maintaining alignment of the individual sheets and uniformity of the side laps.
   4. Apply adhesive uniformly over the previously marked area with a 1/4 inch notched squeegee at the minimum rate of 1 1/2 to 2 gallons per 100 SF at membrane-to-membrane applications, keeping the adhesive from the side and end lap areas of adjacent rolls. At membrane-to-insulation or coverboard installations, apply adhesive uniformly over the previously marked area with a 3/8 inch notched squeegee at the minimum rate of 2 to 2 ½ gallons per 100 SF.
   5. Roll the sheet into the adhesive commencing with the first roll in the gang, maintaining alignment of the roll and uniformity of the side laps. Broom the membrane as necessary to insure embedment of the membrane into the adhesive.

6. Repeat the procedure on the opposite end of the rolls of the membrane. Side and end laps must be left clean and fee of adhesive.
7. Provide heat welded or finishing of membrane edged and laps as required by manufacturer.

3.7 MEMBRANE BASE FLASHING

A. Maximum flashing length is 10 ft. (3.05m) when the membrane flashings are between 8 inches (203mm) and 14 inches (356mm) high.

B. Priming: Prime all metal surfaces with asphalt primer and allow them to dry prior to application of the flashing membrane.

C. Sequence of Base Flashing Membrane:
1. Install the first base flashing ply after completing the field base ply.
2. At the conclusion of the field top ply, install the second ply of base flashing membrane. This will result in "lacing" of the field and base flashing membranes.

D. Stripping Plies:
1. At metal flanges, install a stripping ply over the field base ply, extending a minimum of four (4) inches (102mm) beyond the flange of the metal.
2. Set the metal flange over the stripping ply in a bed of flashing cement and mechanically anchor.
3. Apply top ply over the primed metal flange.
4. Where the edge of stripping plies meets the metal detail (i.e., outside edge of perimeter metal or against vent pipes), apply a bead of flashing cement to provide a continuous seal and fill in any gaps that may allow standing water at this point.

E. High Wall Flashings: When flashing vertical surfaces above 14 inches (356mm) high, the membrane must be installed the width of the roll and pre-cut to the desired height.

F. Seal the top edges of all base flashings with asphalt flashing cement and reinforcing fabric to provide protection until metal counter flashing is installed.

G. Curb and Corner Flashings:
1. All inside and outside corners require a boot to provide weather protection at the lap joint. Boot must be a minimum 2 inch (51mm) radius beyond all intersecting surfaces, and have a maximum of 1/4 inch (6mm) follow of modified bitumen beyond all edges.
2. Install boots at the inside and outside corners (underneath) prior to installing the flashing membrane.
3. In lieu of membrane boots, the corners may be reinforced with a five-course treatment, consisting of alternating layers of flashing cement and glass fabric mesh.

H. Mechanically fasten the top of all vertical base flashing membranes. Install fasteners appropriate to the substrate 8 inches (203mm) on center. A minimum of 3 coarse is required before covering with counterflashing.

I. Metal Counter Flashing: All vertical base flashings must be covered by metal counter flashing to form a continuous water shedding surface over the top of membrane flashing. Extend metal counter flashing a minimum of 3 inches (76mm) over the top of the membrane flashing.

J. Metal Face Securement: Install Hook strips (cleats) on all metal extending over roof edges (coping metal, gravel stop/eave strip, perimeter curb metal, etc.) in accordance with recommendations in the NRCA Roofing and Waterproofing Manual. Appropriate provision must be made in accessory metal to allow for expansion and contraction of the metal sections without interrupting the integrity of the waterproofing assembly.

K. Roof Drains:
1. All roof drains must be sumped and free of all rust, debris and dirt. Drain targets must be free of wrinkles or folds.
2. Install the base ply and cut so that the base ply stops short of the clamping ring.
3. Install a 36 inch square piece of smooth membrane over the drain opening, in accordance with manufacturers recommendations for the roof system specified. Cut a hole to the inside edge of the drain base.
4. Thoroughly clean the drain bowl flange, and primed to receive the membrane. Apply flashing cement to the clamping ring area.
5. Install a 30 inch (762mm) square, 4 lb (1.81 kg) lead flashing over the membrane into a bed of flashing cement and install the top layer of field membrane extending to the inside edge of the drain bowl.
6. The field membrane, the new drain lead, and stripping membrane are to extend under the properly secured and tightened compression clamping ring assembly. Cut holes in the membrane to align with the clamping bolts, install the clamping ring and tighten the bolts to provide uniform compression of the flashing membrane at the drain.

L. Pitch Pockets:
1. Fabricate and install new pitch pockets from galvanized steel in accordance with NRCA recommendations.
2. Fill the pocket halfway to the top with non-shrink grout and the remainder with pourable sealer.
3. Slope fill away from the penetration to the edge of the pocket.
4. Install metal rain collars with drawbands that cover and overlap the entire pocket and caulk the top of the drawband with sealant.
5. Strip in the metal flanges of the pitch pocket per the sequence described above for stripping plies.

3.8 INSPECTION AND QUALITY CONTROL

A. The primary manufacturer will provide a qualified, trained auditor to perform a final inspection to insure the roof system has been installed properly and according to the manufacturer's recommendations and guaranty requirements. Upon completion of the inspection, copies of the inspection report will be provided to the Owner and Contractor. Any corrective action deemed necessary to comply with the manufacturer's specifications must be completed by the contractor prior to final close-out.

3.9 PROTECTION AND CLEANING

A. Protect new roof system during remainder of construction period. Plan work so traffic over new roof system is kept to a minimum. Where traffic must continue over new roof system, provide protection for the finished roof.

B. Provide protection for masonry and other building surfaces against damage of staining from roofing operations. Any surfaces damaged or stained as a result of roofing operations shall be cleaned, repaired or replaced as necessary by the roofing contractor.

C. Job site shall be maintained in a clean, orderly fashion, and free of debris. Store materials and equipment so operations of building are not interrupted.

END OF SECTION 075213

SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:
   1. Formed low-slope roof flashing and trim.

B. Related Sections include the following:
   1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
   2. Division 07 Section "APP Modified Bituminous Membrane Roofing" for installation of new roofing membrane.
   3. Division 07 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
   1. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches (300 mm) long. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim: 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Accessories: Full-size Sample.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Approval of mockups is for other material and construction qualities specifically approved by Engineer in writing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Engineer in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Meet with Owner, Engineer, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including

installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Stainless-Steel: Type 304 Austentic stainless steel in minimum 24-gauge, or as recommended by SMACNA for sheet metal flashing installations.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
1. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
2. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

2.3 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.4 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.

1. Fabricate parapet scuppers from the following material:
   a. Stainless Steel: 0.0187 inch (0.5 mm) thick.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Base Flashing: Fabricate from the following material:

1. Stainless Steel.

B. Counterflashing: Fabricate from the following material:

1. Stainless Steel.

C. Roof-Drain Flashing: Fabricate from the following material:

1. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.
2. Copper Sheet: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

1. Coat side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

a. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric sealant.

1. Secure in a waterproof manner by means of anchor and washer at 36-inch (900-mm) centers.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each joint sealant product required, including instructions for joint preparation and joint sealant application.

B. Certificates: Submit certificates from manufacturers of joint sealants attesting that their products comply with Specification requirements and are suitable for the use indicated.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required. Provide one year warranty on installation and materials.

B. Review and approve joint details before construction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original unopened containers, or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials.

B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturers.
2. When joint substrates are wet due to rain, frost, condensation or other causes.
3. Joint Width Conditions: Do not proceed with installation of joint sealants when joint widths are less than allowed by sealant manufacturer for application indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

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

2.2 SEALANT FOR JOINTS:

A. Products: Acceptable joint sealants:

1. “Sonolastic NP-2” by BASF
2. “Sikaflex-2c NS” by Sika

B. Compound used for sealants shall not stain concrete or masonry. Aluminum pigmented compounds not acceptable.

C. The color of sealants shall match adjacent surfaces.

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Flexible, non-gassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back surface of joint. Provide self-adhesive taper where applicable.

E. Acceptable Backer Rods:

1. “Sof Rod” by Momaco Inc.
2. “ITP Soft Type Backer Rod” by Industrial Thermo Polymers Limited

2.4 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 INSPECTION

A. Require installer to inspect joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealant performance. Obtain installer's written report listing any condition detrimental to performance of joint sealant work. Do not allow joint sealant work to proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust; paint, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellants; water; surface dirt and frost.
2. Clean concrete, substrate surfaces, by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance from concrete.

B. Joint Priming: Prime all joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primers to areas of joint sealant bond. Do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
2. Do not leave gaps between ends of joint-fillers.
3. Do not stretch, twist, puncture or tear joint-fillers.
4. Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.
5. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joint where required to prevent third-side adhesion of sealant to back of joint.

D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability. Do not smear sealant onto adjacent surfaces.

E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants in concave joint configuration per ASTM C 962, unless otherwise indicated to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

F. Contractor and Engineer shall verify sealant profile as follows:

1. Contractor, at Engineer's direction, shall cut out lesser of 1% of total linear footage placed of total 100 linear ft of joint sealant at random locations for Engineer and Manufacturer's representative inspection of sealant profile.

2. Contractor to repair all random joint sealant cut out sections at no cost to Owner.

3.4 PROTECTION AND CLEANING

A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and reseal joints with new materials to produce sealant installations with repaired areas indistinguishable from original work.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by the manufacturer of the sealants and of the products used in the joints.

END OF SECTION 079200