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BuildingName
The Description of the Project
P00000000 0000

SPECIFICATION DIVISION 7

NUMBER SECTION DESCRIPTION

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DIVISION 07 THERMAL AND MOISTURE PROTECTION
SECTION 071025 – UTILITY TUNNEL WATERPROOFING

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section.

1.2 SUMMARY

A. This Section includes the furnishing and installation of waterproofing over concrete utility tunnel structures and related areas.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work ofthis Section shall comply with the following:

1. ASTM Standard Specifications, Methods, Test Methods and Classifications.
    a. C272 - Water Absorption of Core Materials for Structural Sandwich Construction.
    b. C719 - Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle).
    c. C794 - Adhesion-in-Peel of Elastomeric Joint Sealants.
    d. C836 - Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate WearingCourse.
    e. C898 - Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Separate Wearing Course.
    f. C920 - Elastomeric Joint Sealants.
    g. C1193 - Guide for Use of Joint Sealants.
    h. D412 - Test Methods for Rubber Properties in Tension.
    i. D570 - Test Method for Water Absorption of Plastics.
    j. D1621 - Compression Properties of Rigid Cellular Plastics.
    k. D1970 - Self Adhered Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection and Waterproofing.
    l. D4258 - Practice of Cleaning Concrete for Coatings.
    m. D4259 - Practice for Abrading Concrete.
    n. D4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
    o. D5385 - Hydrostatic pressure Resistance of Waterproofing Membranes.
    p. D5957 - Guide for Flood Testing Horizontal Waterproofing Installations.
    q. D6135 - Application of Self-Adhering Modified Bituminous Waterproofing.

r. E96 - Test Methods for Water Vapor Transmission of Materials.
s. E154 - Methods of Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.
t. G21 - Recommended Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.4 SUBMITTALS

A. Manufacturer's Literature: For waterproof membrane, vapor retardant andprotection board to include:

1. Technical data to demonstrate compliance with Specifications.
2. Manufacturer's recommended installation procedures, including detailsand dimensions.

B. Shop Drawings:

1. Show locations and extent of waterproofing.
2. Include details for substrate joints and cracks, sheet flashing, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:

1. Trained and experienced in the fabrication and installation of the materials and equipment.
2. Knowledgeable of the design and the reviewed Shop Drawings.
3. Authorized by Manufacturer to install Manufacturer’s products.

B. Manufacturer's Services: Provide Manufacturer's field service.

C. Source Limitation: Obtain waterproofing materials through one source from a single Manufacturer.

D. Submit warranty signed by Contractor, and officer of the applicator firm, and the materials Supplier, in which the signatories state and affirm:

1. The work of this Section was completed in accordance with the requirements of the Contract Documents.

E. Pre-Installation Conference:

1. Conduct conference at Project Site to comply with requirements of Division 01.
2. Review requirements for waterproofing, including surface preparationspecified under other Sections.
3. Review substrate condition and pre-treatment, minimum curing period,weather conditions, special details, sheet flashing, installation procedures, testing and inspection procedures, and protection and repair procedures.

1.6 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in accordance with Manufacturer's directions in a manner which will prevent deterioration or damage, contamination with foreign matter, and damage by weather or elements. Store rolls according to Manufacturer's written instructions. Protect stored materialfrom direct sunlight.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no addition cost to Owner.

1.7 WARRANTY

A. Upon completion of this portion of the work, and as a condition of acceptance, deliver to Owner 2 copies of a warranty signed by Contractor,and officer of the applicator firm, and the materials Supplier, in whichthe signatories state and affirm:

1. The work of this Section was completed in accordance with the requirements of the Contract Documents.
2. Should water penetrate through the work of this Section within 5 years following date of Substantial Completion of the Work, and promptly upon receipt of notice from Owner to that effect, the materials Supplier will provide such additional waterproofing and protection board materials as are required, and Contractor and applicator will provide such equipment, labor, and other materials as are required, to properly repair the area through which water penetrated.
3. Should the water penetration be due to faulty original workmanship or materials of this Section, the equipment, labor, and materials will be provided at no additional cost to Owner.
4. Should the water penetration not be due to faulty original workmanship or materials of this Section, the equipment, labor, and materials provided under this Article will be paid for promptly by Owner at the current rates of Contractor, applicator, and materials Supplier.

PART 2 - PART 2 - PRODUCTS

2.1 SELF ADHERED SHEET WATERPROOFING

A. Membrane shall be one of the following products or approved equivalent:

1. Bituthene by W.R. Grace and Company
2. Mel-Rol by W.R. Meadows, Inc.
3. CCW-701 by Carlisle Coatings and Waterproofing Div.
4. Duramem 700 SM by Pecora Corporation

B. Membrane:

1. 60-mil thick, self-adhering sheet consisting of 56 mils of rubberized laminated to 4-mil thick polyethylene film release liner on adhesive side.
2. Physical Properties:
   a. Tensile Strength: 250 psi minimum in accordance with ASTM D412, Die C, modified.

b. Elongation: 300% minimum in accordance with ASTM D412, Die C, modified.
c. Flexibility: Pass at minus 20 deg F in accordance with ASTM D1970.
d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement as tested by ASTM C836.
e. Puncture Resistance: 40 lbf minimum in accordance with ASTM E154.
f. Hydrostatic Head Resistance: 150 feet minimum in accordance withASTM D5385.
g. Water Absorption: 0.15% weight gain maximum after 48-hr immersion at 70 deg F in accordance with ASTM D570.
h. Vapor Permeance: 0.05 perms in accordance with ASTM E96, WaterMethod.

C. Auxiliary Materials:

1. Primer: Liquid primer recommended for substrate by sheet waterproofing Manufacturer.
2. Surface Conditioner: Liquid waterborne conditioner recommended for substrate by sheet waterproofing Manufacturer.
3. Concealed Strip Flashing: Self adhering, rubberized asphalt composite sheet of same material and thickness as waterproofing membrane.
4. Substrate Patching Membrane: Low viscosity, 2-component, asphalt modified coating.
5. Mastic, Adhesives, and Tape: Manufacturer's standard products compatible with membrane used.
6. Metal Termination Bars: Galvanized steel or aluminum bars 1-inch wide by 1/8-inch thick pre-drilled at 9-inch centers.
7. Protection Course: Fan-folded, with a core of extruded polystyrene board insulation sandwiched between 2 sheets of plastic film, Manufacturer's standard nominal thickness, with compressive strength of 15 psi in accordance with ASTM D1621 and maximum water absorption by volume of 0.4% in accordance with ASTM C272.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements and other conditions affecting performance:

1. Verify that concrete has cured and aged minimum of 7 days.
2. Verify that substrate is visibly dry and free of moisture: Test for capillary moisture by plastic sheet method according to ASTM D4263.

B. Environmental Limitations:

1. Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing Manufacturer.
2. Do not apply waterproofing in snow, rain, fog, or mist.

C. Maintain adequate ventilation during preparation and application of waterproofing materials.

3.2 PREPARATION

A. Substrate Preparation:

1. Clean and prepare substrate according to Manufacturer's written instructions:
2. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Protection:

1. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
2. Close off drains and other wall and floor penetrations to prevent spillage and migration of waterproofing fluids.

C. Cleaning:

1. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
2. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus.
3. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents.
4. Remove remaining loose material and clean surfaces according to ASTM D4258.

D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

E. Joints and Cracks:

1. Prepare, fill, prime, and treat joints and cracks in substrate.
2. Remove dust and dirt from joints and cracks according to ASTM D4258.
3. Install sheet strips and center over non-moving joints and cracks exceeding 1/16-inch in width.
4. Bridge and cover expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips:
   a. Invert and loosely lay first sheet strip over center of joint.
   b. Firmly adhere second sheet strip to first and overlap to substrate.

F. Corners:

1. Prepare, prime, and treat inside and outside corners according to ASTM D6135.
2. Install membrane strips centered over vertical inside corners.
3. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
   a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.

b. At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing, and at drains and protrusions according to ASTM D6135.

3.3 INSTALLATION OF SELF ADHERED SHEET WATERPROOFING

A. Install self-adhered sheets according to Manufacturer's written instructions and recommendations in ASTM D6135.

B. Primers:

1. Apply primer to walls or deck at required rate and allow to dry.
2. Limit priming to areas that will be covered by sheet waterproofing insame day.
3. Re-prime areas exposed for more than 24 hours.

C. Membrane Application:

1. Apply and firmly adhere sheets over area to receive waterproofing from low point up to high point to ensure that side laps shed water.
2. Accurately align sheets and maintain uniform 2-1/2-inch minimum lap widths and end laps.
3. Overlap and seal seams and stagger end laps to ensure watertight installation.
4. Apply continuous sheets over sheet strips bridging substrate cracks and construction joints.
5. Seal exposed edges of sheets with mastic or sealant at terminations not concealed by metal counter-flashing or ending in reglets.
6. If waterproofing ties into other waterproofing, install sheets and auxiliary materials so that systems are fully watertight.

D. Repairs:

1. Repair tears, voids, and lapped seams in waterproofing not complying with these Specifications.
2. Slit and flatten fishmouths and blisters, and cover with patches extending 6 inches beyond repaired areas in all directions.
3. Correct deficiencies in or remove waterproofing that does not meet requirements, repair substrates, reapply waterproofing, and repair sheet flashing.

E. Install protection course with butted joints over waterproofing before starting subsequent operations.

3.4 FIELD QUALITY CONTROL

A. Do not place backfill or concrete until Engineer has inspected finished waterproofing.

3.5 PROTECTING AND CLEANING

A. Cure waterproofing according to Manufacturer's written recommendations, taking care to prevent contamination and damage during application stagesand curing.

B. Do not permit foot or vehicular traffic on unprotected waterproofing.

C. Protect waterproofing from damage and wear during remainder of construction.

D. Protection of Insulation:

1. Protect installed board insulation from damage due to ultraviolet light, harmful weather exposure, physical abuse, and other causes.
2. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction afterinstallation.

E. Prior to acceptance of the work of this Section, thoroughly clean all related areas.

END OF SECTION 071025