

SECTION 07170 - BENTONITE WATERPROOFING

PART 1 GENERAL

1.01 WORK SUMMARY

- A. The work of this section includes, but is not limited to the furnishing and installing of the following materials, on all surfaces of elevator pits and escalators and for bottom/sides of forcemain tunnel base slab per project Specifications and Drawings, or as directed by bentonite waterproofing manufacturer:

1. Sodium bentonite geotextile sheet waterproofing membrane with all applicable accessory products.

1.02 RELATED SECTIONS

- A. Other specification Sections, which directly relate to the work of this section include, but are not limited to, the following:

1. Cast-In-Place Concrete, Structural Precast and Water-stops: Refer to Division 3.
2. Masonry: Refer to Division 4.
3. Expansion Joint Cover Assemblies: Refer to Division 5.
4. Joint Treatment/ Sealants, Flashing and sheet metal, and Insulation: Refer to Division 7.
5. Conveying Systems: Refer to Division 14.
6. Floor Drains and other Mechanical: Refer to Division 15.
7. Conduit and other Electrical: Refer to Division 16.

1.03 SYSTEM DESCRIPTION

- A. Provide bentonite-waterproofing system to prevent the passage of liquid water under hydrostatic pressure and install without defects, damage or failure. Waterproofing shall be two high strength geotextiles interlocked encapsulating minimum 1.10 lbs. (0.5 kg) per square foot (0.1 sq m) of dry, granular Volclay sodium bentonite.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, with complete general and specific installation instructions, recommendations, and limitations.

- B. Product Samples: Submit representative samples of the following for approval:

1. Bentonite geotextile membrane waterproofing.

- C. Material Certificates: Submit certificate(s) signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements. Submit

certification that waterproofing system and components, drainage and protection materials are supplied by a single-source manufacturer.

- D. Contractor Certificate: Submit written certification that installer has current Approved Applicator status with waterproofing material manufacturer.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installing company should have at least five (5) years experience in work of the type required by this section, who can comply with manufacturer's warranty requirements, and who is an Approved Applicator as determined by waterproofing / drainage system manufacturer.
- B. Manufacturer Qualifications: Bentonite geotextile waterproofing and all accessory products shall be provided by a single manufacturer with a minimum of 30 years experience in the direct production and sales of bentonite waterproofing systems. Manufacturer shall be capable of providing field service representation during construction, approving an acceptable installer, recommending appropriate installation methods, and conducting a final inspection of the bentonite waterproofing and prefabricated drainage system applied.
- C. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field installation to establish procedures to maintain required working conditions and to coordinate this work with related and adjacent work. Verify that final waterproofing details comply with waterproofing manufacturer's current installation requirements and recommendations.
- D. Materials: Obtain bentonite geotextile waterproofing and prefabricated drainage materials from a single manufacturer to assure material compatibility.
- E. Inspection: Manufacturer's representative shall inspect waterproofing installation periodically during application to verify that waterproofing has been installed in accordance with manufacturer's guidelines and recommendations.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage, as well as, damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.
- B. Storage: Do not double-stack pallets during shipping or storage. Protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides, for materials stored on-site, allowing for adequate ventilation.

1.07 PROJECT CONDITIONS

- A. Substrate Condition: Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system.
- B. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the waterproofing materials. Do not apply waterproofing materials into standing or ponding water conditions.

1.08 WARRANTY

- A. Waterproofing Warranty: Upon completion and acceptance of the work required by this section, the waterproofing materials manufacturer will provide a written five (5) year system warranty covering both materials and labor.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Provide Voltex bentonite geotextile waterproofing with applicable accessories as manufactured by Colloid Environmental Technologies Company (CETCO), 1500 West Shure Drive, Arlington Heights, Illinois 60004-1440, USA. Phone: (847)392-5800; Fax: (847)506-6195; Web-site: <http://www.cetco.com>.
- B. Systems of other manufacturers, which meet requirements of the Drawings and this Section, will be considered for approval.

2.02 MATERIALS

- A. Sodium Bentonite: Specially selected Wyoming granular bentonite containing approximately 90% montmorillonite with 10% maximum unaltered volcanic ash and other native sediments. Free Swell Rating: 2 grams sifted into deionized water swells to occupy a minimum volume of 16 cc. Grading: Granular bentonite passes 90% through a 20-mesh sieve and less than 10% through a 200-mesh sieve.
- B. Voltex Bentonite Geotextile Waterproofing:
 - 1. Volclay Voltex: 4' x 15' (1.2 x 4.5m) roll of interlocked geotextiles encapsulating a minimum of 1.10 pound (0.5 kg) per square foot (0.1 sq m) of granular sodium bentonite. Composite shall consist of one woven and one non-woven polypropylene geotextile, interlocked using a needle-punching process. The non-woven geotextile fibers shall pass through the bentonite layer and integrate into the woven geotextile to produce several interlocks each square inch (6.45 sq. cm) over the entire surface area of product. Water sample test required to determine if Voltex CR is required.

- C. Accessory Waterproofing Products: All accessory waterproofing materials shall be provided by the bentonite waterproofing manufacturer or shall have manufacturer's written approval for substitution.
 - 1. Volclay Bentoseal: Trowel grade sodium bentonite compound used as detailing mastic around penetrations, corner transitions and grade terminations.
 - 2. Volclay Hydrobar Tubes: 2"(5 cm) diameter x 2'0" (60 cm) long, water-soluble tube container filled with granular sodium bentonite; 3 lbs. (1.36 kg) per tube total weight.
 - 3. Volclay Waterstoppage: 50 lbs. (22.7 kg) bag of specially processed dry granular sodium bentonite.

PART 3 EXECUTION

3.01 GENERAL

- A. Comply with manufacturer's product data, including product application and installation instructions, as well as, manufacturer's shipping and storage recommendations.

3.02 INSPECTION

- A. The installer shall examine conditions of substrates and other conditions under which this section work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected and are acceptable for compliance with manufacturer's warranty requirements.

3.03 SURFACE PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage or contamination from waterproofing products during installation operations.
- B. Soil Substrates: Site conditions allowing, Voltex applications do not require a mud-working slab. Grade substrates should consist of well-leveled soils without voids and debris, and compacted to a minimum of 85% Modified Proctor density for uniform support and containment of waterproofing sheets. If substrate consists of large aggregate, place a high-strength geotextile layer over the aggregate and then provide several inches of compacted soil or sand for uniform support and containment of waterproofing sheets.
- C. Concrete Substrates: Concrete to receive waterproofing shall be of sound structural grade with a smooth finish, free of debris, oil, grease, laitance, dirt, dust, or other foreign matter which will impair the performance of the Waterproofing System and which do not comply with manufacturer's warranty requirements. The Waterproofing System can be installed on green structural concrete as soon as the forms are removed. There is no

product limitation regarding a minimum concrete curing time requirement. Do not apply waterproofing over lightweight insulating concrete.

3.04 GENERAL INSTALLATION GUIDELINES

- A. Install Waterproofing System with the woven side (dark gray) of the geotextile liner facing the concrete to be waterproofed in both horizontal and vertical applications.
- B. Prevent bentonite waterproofing products from hydrating before material is contained with overburden or backfill. When threat of rain is imminent, installed bentonite products not already contained by overburden or backfill should be covered with polyethylene sheeting to decrease the chance of hydration. Remove polyethylene prior to overburden or backfill operations.
- C. Expansion Joints: The specified Waterproofing System is not an expansion joint filler or sealant, but may be used as an expansion joint cover over properly installed expansion joint material placed during substrate preparation. Refer to manufacturer's specifications if Waterproofing System is to be used as an expansion joint cover.

3.05 UNDER SLAB INSTALLATION

- A. Reinforced structural foundation slabs should be a minimum of 8" (20 cm) thick when placed on a working mud slab. Reinforced concrete slab(s) on compacted grade shall be a minimum of 4" (10 cm) thick. When hydrostatic conditions exist, install Waterproofing System under all footings, elevator pits and grade beams.
- B. Detail all penetrations and pile caps with a 1/2" (1.2 cm) layer of Waterstoppage (granular bentonite) extending around each a minimum radius of 6" (15 cm).
- C. Place Waterproofing System directly on properly prepared substrate (dark gray woven geotextile side up facing installer) with adjoining edges overlapped a minimum of 4" (10 cm). Stagger sheet end seams a minimum of 24" (60 cm). Mechanically fasten or staple Waterproofing System as required to prevent movement from construction operations or concrete placement. When the slab is poured in sections, extend Waterproofing System a minimum 12" (30 cm) beyond the slab edge to enable proper overlapping.
- D. Cut Waterproofing System to fit snugly around penetrations and pile caps. (Do not extend over pile cap.) Around base of penetrations trowel 3/4" (1.8 cm) thick fillet of detailing mastic and extend onto waterproofing. Around base of pile caps trowel 2" (5 cm) thick fillet of detailing mastic and extend onto waterproofing.
- E. Provide a minimum of 12" (30 cm) overlap between underslab and vertical wall waterproofing by either extending the Waterproofing System beyond the form or turning it up in the form and securing.

- F. Inspect finished Waterproofing System installation and repair any damaged material prior to concrete placement. Assure that waterproofing is not displaced during concrete placement.

3.06 BACKFILLED POURED-IN-PLACE CONCRETE WALLS

- A. Place Hydrobar Tubes along the wall/footing intersection with ends “buted” together to form a continuous installation.
- B. Trowel 3/4" (1.8 cm) thick detailing mastic fillet at all inside corner transitions.
- C. Starting at the base of the wall, install Waterproofing System sheet horizontally (dark gray woven geotextile against the wall) covering the Hydrobar Tubes and extending onto the footing a minimum of 6” (15 cm). For hydrostatic conditions, cover the entire footing and overlap under slab waterproofing a minimum of 6” (15 cm). Attach waterproofing using washer-headed mechanical fasteners centered 24" (60 cm) around the edge. Stagger all vertical overlap seams a minimum of 24” (60 cm).
- D. Detail around all penetrations with 3/4” (1.8 cm) cant of detailing mastic and extend 1/4" (0.6 cm) thick over substrate a minimum radius of 6" (15 cm) around penetration. Cut waterproofing to fit snugly around penetrations.
- E. Terminate at grade with metal termination bar fastened 12” (30 cm) on center. Cover top edge of waterproofing with 1/2" (1.2 cm) thick, 2” (5 cm) wide layer of detailing mastic.
- F. Inspect finished Waterproofing System installation and repair any damaged material prior to backfill placement. Assure that waterproofing is not displaced during backfill placement or soil compaction.

3.07 BACKFILL

- A. Closely coordinate Waterproofing System installation with Backfill conducted under Division 2 work. Care should be used during backfill operation to avoid damage to the waterproofing system. At grade line and other areas that cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

3.08 CLEAN UP

- A. In areas where adjacent finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their recommendations and instructions. Remove all tools, equipment and remaining product on-site. Dispose of section work debris and damaged product following all applicable regulations.

END OF SECTION