

SECTION 07 17 13

BENTONITE PANEL WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

The general provision of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.

1.2 DESCRIPTION OF WORK

The extent of Geotextile/Bentonite Clay waterproofing membrane is shown on the drawing and/or as specified herein.

1.3 RELATED SECTIONS

- A. Division 03 - Concrete
- B. Division 04 - Masonry
- C. Division 30 - Backfill
- D. Section 03 15 00 – Concrete Accessories/Expansion Joints

1.4 QUALITY ASSURANCE

- A. Manufacturer: Provide Geotextile/Bentonite Clay waterproofing membrane produced by a manufacturer with a minimum of 5 years experience in the waterproofing industry.
- B. Installer: A firm with a minimum of 2 years experience in installing bentonite clay or other related waterproofing products.
- C. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Carlisle and Carlisle shall not be responsible for any claims, repairs, restoration, or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.
- D. Shotcrete installations should have an independent inspector to record and monitor the shotcrete installation.

1.5 SUBMITTALS

- A. Manufacturer: Submit six copies of product data sheets, specifications, installation instructions and general recommendations for each type of product specified.
- B. Installer: Submit detail drawings for installation of product specified.
- C. Water Sample Test Result: A water sample (2 liters) is required on projects that have ground water and should be submitted to the waterproofing manufacturer to test for contamination and compatibility with waterproofing membrane. Submit to architect a letter of compatibility recommending which formulation to use.
- D. Warranty: Submit specimen of manufacturers' standard warranty.

1.6 WARRANTY

- A. Upon completion and acceptance of the work required by this section, the manufacturer will issue a warranty agreeing to promptly replace defective materials for a period of 5 years.
- B. The formation or presence of mold or fungi in a building is dependent upon a broad range of factors including, but not limited to, the presence of spores and nutrient sources, moisture, temperatures, climatic conditions, relative humidity, and heating/ventilating systems and their maintenance and operating capabilities. These factors are beyond the control of Carlisle and Carlisle shall not be responsible for any claims, repairs, restoration, or damages relating to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in any building or in the air, land, or water serving the building.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original manufacturer's packaging and store materials in strict accordance with manufacturer's instructions.
- B. Remove and replace products that have been prematurely exposed to moisture.

1.8 PROJECT CONDITIONS

- A. Install materials in accordance with all safety and weather conditions required by the manufacturer.
- B. Install materials only after work on the applicable substrate is complete.
- C. Complete cast-in-place reinforced columns prior to membrane installation.

PART 2 - PRODUCTS

2.1 WATERPROOFING SYSTEM

- A. The Geotextile/Bentonite clay waterproofing membrane shall be CCW MiraCLAY supplied by Carlisle Coatings & Waterproofing Incorporated, 900 Hensley Lane, Wylie, Texas 75098, Phone (800) 527-7092 Fax: (972) 442-0076.
- B. Physical Properties for Geotextile/Bentonite Clay Waterproofing Membrane:

CCW MiraCLAY Physical Properties:

Property	Test Method	Value
Bentonite Content	—	1.0 lb/ft ² (.488 kg/m ²)*
Nominal Dry Thickness	—	0.25 in (6.4 mm)
Weight	—	75 lb (34.05 kg)
Permeability	ASTM D 5084	5 x 10 ⁻⁹ cm/sec
Grab Tensile Strength	ASTM D 4632	95 lb (422 N)
Grab Elongation	ASTM D 4632	150%
Puncture Resistance	ASTM D 4833	120 psi (828 kPa)
Hydrated Internal Shear	ASTM D 5321	500 psf (24 kPa)
Swell Index	ASTM D 5890	2g (24 ml) min.
Fluid Loss	ASTM D 5891	18 ml max.
Dimensions		5.12 ft x 13.62 ft (69.75 ft ²)
Hydrostatic Head Pressure	ASTM D751	228 ft (69.49 meter)
Adhesion to Concrete	ASTM D903	17.7 lb/in (8 kg/cm)

*@ 12% moisture content

- C. Waterproofing system accessories supplied by waterproofing membrane manufacturer:

Mastic: CCW MiraCLAY Mastic is used for detailing at terminations and penetrations. Also used to fill minor voids in concrete and as a fillet in angle changes.

Granules: CCW MiraCLAY Granules used for horizontal to vertical transitions and for detailing at seams and slab penetrations.

Waterstop: CCW MiraSTOP used as a waterstop at cold concrete pours and between pre-cast concrete panels.

- D. Membrane to Substrate Fasteners: Fasteners, of the type and length suitable for the substrate, shall be used in conjunction with washers, of at least 1" diameter to attach the geotextile/bentonite clay waterproofing membrane to the substrate.
- E. Membrane to Membrane Fasteners: Mechanically fasten membrane sheets together with a box stapler or similar device for horizontal applications.
- F. The Geotextile/Bentonite membrane shall consist of geotextile panels of sodium bentonite clay sandwiched between two layers of needle-punched woven and non-woven polypropylene fabrics.
- G. Drainage Composite: Shall be CCW MiraDRAIN[®] as recommended by the manufacturer for each condition.
- H. Perimeter Drainage System: Where required shall be CCW QuickDRAIN[™].

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrate and condition under which waterproofing will be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Lagging, Concrete Closures, Shotcrete or Guniting Applications:
 - 1. Fill all spaces that are over 1" (25 mm) in width with grout or concrete to a smooth and uniform surface. Cover large gaps with 1/2" (12 mm) plywood or CCW MiraDRAIN 6000 or 6000XL.
 - 2. Trowel CCW MiraCLAY Mastic around all tieback plates and soldier beams a minimum of 1 1/2" (39 mm) thick and extend a minimum of 4" (10 cm) beyond the flange.
 - 3. Remove projections from the wall surface in excess of 3/4" (20 mm).
- B. Grade Substrates: Shall be level and uniform that is compacted to a minimum of 85% modified proctor.
- C. Concrete Application:
 - 1. Apply CCW MiraCLAY Mastic to all construction joints at a minimum of 1/4" (7 mm) thickness and a 3" (8 cm) minimum width.
 - 2. Remove projections from the wall surface in excess of 3/4" (20 mm).
- D. Honeycombing, voids and aggregate pockets exceeding 1" in diameter or have a depth greater than 3/4" should be filled with a non-shrink cementitious grout. Fill tie-rod holes with a non-shrink cementitious grout.

3.3 INSTALLATION

- A. Prevent geotextile/bentonite clay waterproofing membrane from hydrating before being covered with overburden. When threat of rain is imminent or backfill is not immediate, geotextile/bentonite clay waterproofing membrane should be covered with polyethylene sheeting.
- B. Lagging Application
 - 1. Install a stripping piece of CCW MiraCLAY over each soldier beam that extends a minimum of 8" (20 cm) beyond either side of the beam. Each soldier beam shall have a double layer of CCW MiraCLAY Membrane.
 - 2. Install CCW MiraCLAY with the white non-woven side out, facing the installer.

3. Starting at the bottom of the wall, unroll CCW MiraCLAY and nail across top of panel one nail per 12" (31cm) on center. Allow sheet to hang down, nailing only as required to stabilize.
 4. Install adjacent membrane by overlapping edges a minimum of 4" (10 cm).
 5. Fasten membrane once every 18" (45 cm) on seams or as required to prevent blousing.
 6. Extend waterproofing membrane to or above grade and fasten membrane once every 12" (30 cm).
 7. Install CCW MiraSTOP at all pour joints and exterior perimeter of tie-back box outs.
- C. Underslab Application: (Concrete slab shall have a minimum thickness of 4" if reinforced or 5" if not reinforced).
1. Install CCW MiraCLAY with the white non-woven side up, facing the installer.
 2. Overlap edges a minimum of 4" (10 cm).
 3. Protect CCW MiraCLAY from damage caused by chairs with sharp edges or points by placing a patch of CCW MiraCLAY under the chair.
 4. Staple joints often enough to prevent excessive movement.
 5. Pour CCW MiraCLAY Granules or trowel CCW MiraCLAY Mastic around all penetrations and press in "cut-to-fit" collars of CCW MiraCLAY.
 6. Extend the installation of CCW MiraCLAY 12" (31 cm) up or beyond the perimeter slab forms.
 7. Inspect and repair any damaged material before concrete pour.
- D. Concrete Wall Application:
1. Install CCW MiraCLAY with the white non-woven side out, facing the installer.
 2. Starting at the bottom of the wall, unroll CCW MiraCLAY and nail across top of panel one nail per 12" (31 cm) on center. Allow sheet to hang down nailing only as required to stabilize.
 3. Install adjacent membrane by overlapping edges a minimum of 4" (10cm).
 4. Fasten membrane once every 18" (45 cm) on seams or as required to prevent blousing with 3/4" (20 mm) to 1" (25mm) concrete nails with washers.
 5. Extend waterproofing membrane to 6" below grade and fasten membrane to the substrate to maintain constant compression using a 1/8" X 1" (3 X 25 mm) minimum termination bar. Trowel a 1/2" (12 mm) thick and 2" (5cm) wide bead of CCW MiraCLAY Mastic at top edge of membrane and cover termination bar.
 6. Create a cant at any vertical to horizontal transition by applying a 1.5" to 2" (4 cm to 5 cm) cant of CCW MiraCLAY Granules or CCW MiraCLAY Mastic.
 7. Strip in all outside corners and transitions with a min. 12" (30) piece of CCW MiraCLAY membrane to double cover these areas.
 8. Make a min. 1" cant at all inside corners with CCW MiraCLAY Mastic.
 9. Backfill must be compactible soils free of construction debris and must be uniformly compacted to a minimum 85% Modified Proctor density on each lift.
- E. Concrete Caissons, Shotcrete or Guniting Application
1. Conform CCW MiraCLAY to the change in planes.
 2. Install CCW MiraCLAY with the white non-woven side out, facing the installer.
 3. Starting at the bottom of the wall, unroll CCW MiraCLAY and nail across top of panel one nail per 12" (31 cm) on center. Allow sheet to hang down nailing only as required to stabilize.

4. Install adjacent membrane by overlapping edges a minimum of 4" (10 cm).
5. Fasten membrane once every 12" (30 cm) on seams or as required to prevent blousing with 3/4" (19 mm) to 1" (25 mm) concrete nails with 1" (25 mm) washers.

3.4 SHOTCRETE PLACEMENT

1. Apply shotcrete in strict accordance with ACI 506.2-95 Specification for Shotcrete.
2. Moisten the MiraCLAY non-woven surface to improve adhesion.
3. Commence spraying from the bottom to the top at a pressure not to vibrate or move the CCW MiraCLAY.
4. Install to the designed thickness in lifts not to exceed 4 feet (1.2 m).
5. Protect adjacent CCW MiraCLAY from overspray and remove rebound and sand pockets.

3.5 PROTECTION AND DRAINAGE

1. Protect the geotextile/bentonite clay waterproofing membrane with CCW MiraDRAIN Drainage Composite.
2. Install the CCW MiraDRAIN Drainage Composite according to the detailed drawings for the specific installation requirements of the project.

3.6 BACKFILL

Backfill with smooth and uniform material with no sharp projections or stones larger than 3/4". Compact backfill to an 85% Modified Proctor density. Ensure backfill material is not contaminated with salt or other materials that could prevent the CCW MiraCLAY from hydrating.