

SECTION 07 10 00

Dampproofing and Waterproofing

This specification is a "guide specification" intended to be edited for a specific project. For best results during editing, set word processor options so that the "hidden" notes to specifier are visible. Delete this paragraph from final edited version.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Below grade waterproofing.
- B. Below grade drainage sheets.
- C. Plaza deck and planter drainage sheets.
- D. Underflooring vapor barrier.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry: Subflooring/underlayment to be installed over underflooring vapor barrier.
- B. Section 07 11 13 - Bituminous Dampproofing.
- C. Section 07 12 00 - Built-Up Bituminous Waterproofing.
- D. Section 07 13 00 - Sheet Waterproofing.
- E. Section 07 14 00 - Fluid-Applied Waterproofing.
- F. Section 07 16 13 - Polymer Modified Cement Waterproofing.
- G. Section 07 16 16 - Crystalline Waterproofing.
- H. Section 07 16 19 - Metal Oxide Waterproofing.
- I. Section 07 17 13 - Bentonite Panel Waterproofing.
- J. Section 31 223 16 - Excavation.
- K. Section 31 23 23 - Fill: Backfilling.
- L. Section 33 46 00 - Subdrainage: Foundation perimeter drainage.

1.3 ALTERNATIVES

- A. See Section 01230 - Alternatives, for product alternatives affecting this section.

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- B. This section describes a base bid product; refer to Section [_____] for an alternative product.
- C. This section describes an alternative product; refer to Section [_____] for the base bid product.

1.4 REFERENCES

- A. AATC 127 - Water Resistance: Hydrostatic Pressure Test; 1998.
- B. ASTM C 1311 - Standard Specification for Solvent Release Sealants; 2002.
- C. ASTM D 1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2004a.
- D. ASTM D 1777 - Standard Test Method for Thickness of Textile Materials; 1996 (Reapproved 2002).
- E. ASTM D 3776 - Standard Test Methods for Mass Per Unit Area (Weight) of Fabric; 1996 (Reapproved 2002).
- F. ASTM D 3786 - Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method; 2006.
- G. ASTM D 4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus; 2005.
- H. ASTM D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2004).
- I. ASTM D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2004.
- J. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 1991 (Reapproved 2003).
- K. ASTM D 4716 - Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head; 2004.
- L. ASTM D 4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2004.
- M. ASTM D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products; 2000.
- N. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
- O. CCMC Technical Guide for Foundation Wall Drainage Systems – Dimpled Membranes. Master Format Section 02622.1; (Oct. 11, 2006).
- P. CCMC Technical Guide for Rigid Polyethylene or Polystyrene Dampproofing Membrane. Master Format Section 07111; (Oct. 11, 2001).

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- Q. CGSB 19-GP-14M - Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing; 1984.
- R. ICC-ES – Evaluation Guidelines for Rigid Polyethylene Below Grade, Dampproofing and Wall Waterproofing Material EG 114; (Mar. 1, 2004)

1.5 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- 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. Specimen warranty.
- C. Samples: 12 by 12 inch (300 by 300 mm) piece of each type of sheet; minimum 12 inch (300 mm) long piece of each type of strip; each type of fastener.
- D. Test Reports: Evaluation service reports or other independent testing agency reports showing compliance with specified requirements.
- E. Installer Qualifications: Include minimum of 5 project references.
- F. Executed warranty.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of this type and approved by the membrane manufacturer.
- B. Manufacturer's Field Services: Provide the services of a representative accredited by the sheet manufacturer to examine substrates before starting installation, periodically review installation procedures, and review final installed systems.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to project site in original packaging with labels intact.
- B. Store products in manner acceptable to membrane manufacturer.
- C. When products must be stored for extended periods, keep out of direct sunlight and at temperatures above minus 24 degrees F (minus 30 degrees C).
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 WARRANTY

- A. Waterproofing: Provide manufacturer's 20 year product warranty and 5 year limited leakage warranty.

PART 2 PRODUCTS

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2.1 MANUFACTURERS

- A. All Products of This Section:
1. Cosella-Dörken Products Inc: www.cosella-corken.com.
 2. Substitutions: [[See Section 01600 - Product Requirements]][Not permitted]].

2.2 APPLICATIONS

- A. Foundation Wall Waterproofing: Install waterproofing membrane to all walls below grade, from bottom of wall to grade level, and in locations indicated on the drawings.
- B. Foundation Wall Drainage Sheet: Install drainage sheet over [[waterproofing] [dampproofing]] installed by others, from bottom of wall to grade level, and in locations indicated on the drawings.
- C. Basement Floor: Install horizontal application drainage sheet between mud slab and finish slab.
- D. Planters: Install drainage sheet inside planters, over waterproofing by others.
- E. Lagging Walls: Install drainage sheet on entire surface of walls prior to installation of foundation wall.
- F. Utility Tunnels and Similar Applications: Install horizontal application drainage sheet over waterproofing membrane by others at top and sides.
- G. Plaza Decks: Install horizontal application drainage sheet over waterproofing membrane by others.
- H. Underslab Vapor Retarder: Install waterproofing membrane sheet under entire slab on grade.
- I. Underflooring Vapor Barrier: Install on top of floor slabs on grade, to be covered with underlayment and finish flooring indicated on drawings by others.

2.3 MATERIALS

- A. Waterproofing Membrane: High density polyethylene sheet, dimpled throughout field of sheet, with flat flanges on manufactured edges.
1. Product: Cosella-Dörken DELTA-MS or DELTA-MS Underslab; brown.
 2. Product: Cosella-Dörken DELTA-MS Clear; transparent.
 3. Dimpled Thickness: 5/16 inch (8 mm) dimpled thickness.
 4. Flange Width: 3 inches (75 mm).
 5. Sheet Width: As required to result in as few seams as possible.
 6. Working Temperature Range: Minus 22 degrees F (minus 30 degrees C) to 176 degrees F (80 degrees C).
 7. Compressive Strength: Approximately 5200 psf (250 kN/sq m), when tested in accordance with ASTM D 1621.
 8. Water Flow Rate in Horizontal Orientation: 3.5 gal/min/ft (44 L/min/m), when tested in accordance with ASTM D 4716

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9. Water Flow Rate in Vertical Orientation: 12 gal/min/ft (149 L/min/m), when tested in accordance with ASTM D 4716
 10. UV Stability: Good, when tested in accordance with ?????
 11. Material Quality: Meeting minimum requirements of CCMC Technical Guide for Rigid Polyethylene or Polystyrene Dampproofing Membrane. ?????
- B. Waterproofing Membrane: High density polyethylene sheet, dimpled throughout field of sheet, with flat flanges on manufactured edges.
1. Product: Cosella-Dörken DELTA-MS 20; brown.
 2. Dimpled Thickness: 3/4 inch (20 mm) dimpled thickness.
 3. Flange Width: 3 inches (75 mm).
 4. Sheet Width: As required to result in as few seams as possible.
 5. Working Temperature Range: Minus 22 degrees F (minus 30 degrees C) to 176 degrees F (80 degrees C).
 6. Compressive Strength: Approximately 3200 psf (150 kN/sq m), when tested in accordance with ASTM D 1621.
 7. Water Flow Rate in Horizontal Orientation: ___ gal/min/ft (___ L/min/m), when tested in accordance with ASTM D 4716
 8. Water Flow Rate in Vertical Orientation: 48 gal/min/ft (600 L/min/m), when tested in accordance with ASTM D 4716
- C. Drainage Sheet for Vertical Installation: High density polyethylene sheet, dimpled throughout field of sheet, with flat flanges on manufactured edges; polypropylene filter fabric heat bonded to top of dimples.
1. Product: Cosella-Dörken Delta-Drain.
 2. Dimpled Thickness: 5/16 inch (8 mm).
 3. Water Flow Rate in Vertical Orientation: 6 gal/min/ft (1.25 L/min/m), when tested in accordance with ASTM D 4716.
 4. Compressive Strength: Approximately 5,200 psf (250 kN/sq m), when tested in accordance with ASTM D 1621.
 5. Sheet Width: As required to result in as few seams as possible.
 6. Color: Brown.
 7. Working Temperature Range: Minus 22 degrees F (minus 30 degrees C) to 176 degrees F (80 degrees C).
- D. Drainage Sheet for Vertical Installation: High density polyethylene sheet, dimpled throughout field of sheet, with flat flanges on manufactured edges; polypropylene filter fabric heat bonded to top of dimples.
1. Product: Cosella-Dörken Delta-Drain 2000.
 2. Product: Cosella-Dörken Delta-Drain 6000.
 3. Product: Cosella-Dörken Delta-Drain 6200; with factory-installed protection sheet adhered to side in contact with waterproofing.
 4. Dimpled Thickness: 0.40 inch (10 mm).
 5. Water Flow Rate in Vertical Orientation: 18 gal/min/ft (233 L/min/m), when tested in accordance with ASTM D 4716.
 6. Compressive Strength: Approximately 11,000 psf (550 kN/sq m), when tested in accordance with ASTM D 1621.
 7. Dimpled Sheet Weight: 2.45 oz/sq ft (750 g/sq m), when tested in accordance with ASTM D 3776.
 8. Compressive Strength: Approximately 15,100 psf (723 kN/sq m), when tested in accordance with ASTM D 1621.

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9. Dimpled Sheet Weight: 2.75 oz/sq ft (830 g/sq m), when tested in accordance with ASTM D 3776.
 10. Flange Width: 3 inches (75 mm).
 11. Sheet Width: As required to result in as few seams as possible.
 12. Color: Black.
 13. Working Temperature Range: Minus 22 degrees F (minus 30 degrees C) to 176 degrees F (80 degrees C).
 14. Filter Fabric: Non-woven polypropylene.
 - a. Apparent Opening Size: 70 sieve (0.21 mm), when tested in accordance with ASTM D 4751.
 - b. Permittivity: 2.0/second, when tested in accordance with ASTM D 4491.
 - c. Water Flow Rate: 140 gpm/sq ft (5690 L/min/m), when tested in accordance with ASTM D 4491.
 - d. Ultraviolet Resistance: 70 percent (500 hr), when tested in accordance with ASTM D 4355.
 - e. Breaking Load Strength: 110 lb (0.49 N) when tested in accordance with ASTM D 4632.
 - f. Elongation at Breaking Load: 50 percent, when tested in accordance with ASTM D 4632.
 - g. Tear Strength: 50 lbf (0.22 N), when tested in accordance with ASTM D 4533.
 - h. Puncture Strength: 65 lb (0.29 N), when tested in accordance with ASTM D 4833.
 - i. Burst Strength: 215 psi (1482 kPa), when tested in accordance with ASTM D 3786.
 - j. Weight, Nominal: 4 oz/sq yd (135 g/sq m), when tested in accordance with ASTM D 5261.
- E. Drainage Sheet for Horizontal Installation: High density polyethylene sheet, dimpled throughout field of sheet, with flat flanges on manufactured edges; polypropylene filter fabric heat bonded to top of dimples.
1. Product: Cosella-Dörken Delta-Drain 9000.
 2. Dimpled Thickness: 0.40 inch (10 mm).
 3. Water Flow Rate in Horizontal Orientation: 5.4 gal/min/ft (67 L/min/m), when tested in accordance with ASTM D 4716.
 4. Compressive Strength: Approximately 18,000 psf (862 kN/sq m), when tested in accordance with ASTM D 1621.
 5. Dimpled Sheet Weight: 3.05 oz/sq ft (930 g/sq m), when tested in accordance with ASTM D 3776.
 6. Flange Width: 3 inches (75 mm).
 7. Sheet Width: As required to result in as few seams as possible.
 8. Color: Black.
 9. Working Temperature Range: Minus 22 degrees F (minus 30 degrees C) to 176 degrees F (80 degrees C).
 10. Filter Fabric: Woven polypropylene.
 - a. Apparent Opening Size: 40 sieve (0.42 mm), when tested in accordance with ASTM D 4751.
 - b. Permittivity: 1.36/second, when tested in accordance with ASTM D 4491.
 - c. Water Flow Rate: 100 gpm/sq ft (4074 L/min/m), when tested in accordance with ASTM D 4491.
 - d. Ultraviolet Resistance: 70 percent (500 hr), when tested in accordance with ASTM D 4355.

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- e. Breaking Load Strength: 365 lb (1.62 N) when tested in accordance with ASTM D 4632.
 - f. Elongation at Breaking Load: 24 percent, when tested in accordance with ASTM D 4632.
 - g. Tear Strength: 115 lbf (0.511 N), when tested in accordance with ASTM D 4533.
 - h. Puncture Strength: 105 lb (0.47 N), when tested in accordance with ASTM D 4833.
 - i. Burst Strength: 480 psi (3304 kPa), when tested in accordance with ASTM D 3786.
 - j. Weight, Nominal: 6.5 oz/sq yd (216 g/sq m), when tested in accordance with ASTM D 5261.
- F. Underflooring Vapor Barrier: High density polyethylene sheet, dimpled throughout field of sheet.
- 1. Product: Cosella-Dörken Delta-FL.
 - 2. Dimpled Thickness: 5/16 inch (8 mm), nominal.
 - 3. Compressive Strength: 6000 psf (300 kN/sq m), when tested in accordance with ASTM D 1621.
 - 4. Air Gap Volume: 0.06 gal/sq ft (2.25 L/sq m).
 - 5. Weight: 2.2 oz/sq ft (700 g/sq m), nominal, when tested in accordance with ASTM D 3776.
 - 6. Sheet Width: As required to result in as few seams as possible.
 - 7. Color: Grey.
- G. Termination Bars: High density polyethylene strips for securing flange edges of dimpled sheet.
- H. Flashing Strip: Z-shaped high density polyethylene strip for securing and flashing top edge of sheet to substrate.
- I. C-Molding Strip: C-shaped, high density polyethylene strip for securing and enclosing drainage sheet top edge.
- J. Dimpled Sheet Fasteners: Corrosion resistant, high strength concrete nails or equivalent; plastic washer dimpled to fit membrane sheet, with at least four dimples per washer, not counting center nail hole.
- K. Sealant: Butyl-polyisobutylene joint sealant complying with ASTM C 1311 or CGSB 19-GP-14M; or other sealant compatible with membrane sheet; and approved by sheet manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrates are sound enough to retain fasteners and suitable for bonding of sealant.
- B. Verify that there are no active leaks within area to be waterproofed.

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- C. Verify that subdrainage system has been properly installed.
- D. Verify that finish grade elevations are clearly marked.
- E. Do not begin installation until substrates have been properly prepared.
- F. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces "broom clean" 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.
 - 1. Remove projections larger than 1/4 inch (6 mm); remove sharp edges.
 - 2. In concrete and masonry, patch cracks and holes so that they provide suitable substrate as recommended by membrane manufacturer.
- C. Footings: Dampproof top of footing and form sealant cove bead at intersection of footing and wall.
- D. Mark installation locations on walls prior to starting installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Do not install when:
 - 1. Ambient temperature is below minus 24 degrees F (minus 30 degrees C).
 - 2. Concrete has been cured for less than 3 days.
 - 3. Standing water is present.
- C. General Sheet Installation: Start at lowest point and work to top, running length of sheets horizontally and overlapping upper sheets in shingle fashion at least 4 inches (100 mm); lap vertical joints at least 6 inches (150 mm).
 - 1. Install sheets without gaps, wrinkles, creases, or tears.
 - 2. Align and interlock overlapping layers.
 - 3. Secure to substrate at edges and in the field of the sheet using fasteners and methods recommended by sheet manufacturer; stagger fasteners in alternate rows.
 - 4. Flash and seal top edges, around openings and penetrations, and other locations recommended by manufacturer, in manner recommended by manufacturer.
- D. Waterproofing: In addition to general sheet installation specified above:
 - 1. Install with protruding dimples on side facing substrate.
 - 2. Unless otherwise indicated, fasten dimpled sheets using specified fasteners with dimpled washers interlocked with sheet at not more than 12 inches (305 mm) on center.

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3. At top, install with flat edge secured with continuous termination bar, covered by flashing strip. Fasten at not more than 8 inches (200 mm) on center.
 4. At all joints, apply continuous bead of sealant between layers and fasten through both layers with specified fasteners with dimpled washers.
 5. At vertical joints, overlap sheets at least 6 inches (150 mm) and interlock dimples, making full contact with sealant.
 6. At horizontal joints, apply continuous sealant bead between wall and top flange of lower sheet and fasten lower sheet along top edge; overlap upper sheet over flat flange of lower sheet and fasten through both sheets at lower edge of upper sheet.
 7. At interruptions and penetrations, apply continuous bead of sealant between sheet and substrate, fasten sheet around entire opening at not more than 8 inches (100 mm) on center, and cover cut edge with flashing strip sealed to wall and fastened at not more than 8 inches (100 mm) on center.
 8. At inside and outside corners, install sheet as close to substrate as possible without breaking and fasten along both sides entire length of corner, not closer than 5 inches (125 mm) to corner.
 9. At bottom of walls, extend a single sheet from wall over footing and drainage pipe, if any.
- E. Drainage Sheets: In addition to general sheet installation above:
1. Install with protruding dimples and filter fabric on side facing away from substrate, unless otherwise indicated.
 2. On lagging, pile, or earth forms, and other "blind" wall construction, install drainage sheet with filter fabric in contact with form; seal joints in dimpled sheet continuously with tape; anchorage to forms may be by adhesive if necessary.
 3. On low-slope split slab installations, install with filter fabric side up; seal dimpled sheet overlaps; anchor sheets sufficiently to prevent movement prior to and during installation of cover.
 4. At plaza deck where pavers are to be installed directly on the drainage sheet, install with filter fabric side up with butt joints rather than overlap joints.
 5. Use C-molding to enclose edges of drainage sheets; in fine silty clay soils, wrap exposed edges with filter fabric before installing C-molding.
 6. Cover sheet laps with filter fabric and do not leave dimpled sheet exposed.
 7. At bottom of walls, extend a single sheet from wall over footing and drainage pipe, if any.
- F. Underslab Vapor Retarder: In addition to general sheet installation specified above, install with dimples down, seal joints with tape, and turn up edges and seal to perimeter walls.
- G. Underflooring Vapor Barrier: Lay sheets on top of slab, butt edges tightly, and tape seams. Secure to slab with fasteners recommended by sheet manufacturer. Perimeter placement shall be as close as possible to the substrate (ie: concrete walls, stud walls, etc.).
- H. Repairs to Dimpled Sheet: Apply patch made of same material interlocked, with continuous sealant bead around tear or penetration.
- I. Repairs to Filter Fabric: Tape matching material over damaged area.
- J. After installation of reinforcing bars, inspect drainage sheet and repair damaged sheet and fabric.

3.4 FIELD QUALITY CONTROL

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- A. Provide the services of a manufacturer's representative to inspect substrates for suitability for installation, to review procedures during construction, and to review the finished work.

3.5 PROTECTION

- A. Do not leave installed membrane exposed to sunlight for more than 30 days after installation; to cover, complete backfill operation or cover with protection board.
- B. Prior to backfilling, inspect waterproofing for tears and other damage and repair.
- C. Take care when backfilling to avoid damage to membrane; replace membrane damaged during backfilling.
- D. Protect installed products until completion of project.
- E. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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COORDINATION NOTES - 07 10 00 - WATERPROOFING AND DAMPROOFING**DRAWING COORDINATION**

- A. Identifying the location of the sheet in each wall section or cross-section helps the installer understand the installation conditions. This is especially helpful in unusual situations where the orientation of the sheet may be in doubt -- read the specification carefully to understand which side of the sheet (dimpled side or flat side) should face which direction.
- B. If unusual penetration conditions occur, which are not covered by the manufacturer's standard details, it may be necessary to draw details to explain to the installer.

SPECIFICATION COORDINATION

- C. Alternates: If the Alternates article is included, be sure to specify the alternative products in other sections.
- A. Waterproofing: If this is specified:
 - 1. Taking Care in Backfilling: For best results, the manufacturer recommends that backfill be pushed into the excavation at a maximum 45 degree slope and gradually filled. Dumping large quantities against drainage sheet will tear the filter fabric. Dumping rocky fill can tear the dimpled sheets. This can be specified in Section 31 23 23 - Fill.
 - 2. For best results, a subdrainage system should be installed at base of foundation walls, at or below the level of the basement floor, and sloping to drain out at grade or to a sump, to be pumped. This can be specified in Section 33 46 00 - Subdrainage.
 - 3. The treatment of the condition where the waterproofing meets the footing may need to be detailed on the drawings.
- B. Drainage Sheet: If this is specified,
 - 1. If the drainage sheet is to be installed over dampproofing or waterproofing provided by others, specify the dampproofing or waterproofing another section, such as one of the following:
 - a. Section 07 11 13 - Bituminous Dampproofing.
 - b. Section 07 12 00 - Built-Up Bituminous Waterproofing.
 - c. Section 07 13 00 - Sheet Waterproofing.
 - d. Section 07 14 00 - Fluid-Applied Waterproofing.
 - e. Section 07 16 13 - Polymer Modified Cement Waterproofing.
 - f. Section 07 16 16 - Crystalline Waterproofing.
 - g. Section 07 16 19 - Metal Oxide Waterproofing.
 - h. Section 07 17 13 - Bentonite Panel Waterproofing.
 - 2. For best results, a subdrainage system should be installed at base of foundation walls, at or below the level of the basement floor, and sloping to drain out at grade or to a sump, to be pumped. This can be specified in Section 33 46 00 - Subdrainage.
- C. Underslab Vapor Retarder: If this is specified, coordination with the installation of the concrete and its reinforcing is required:
 - 1. The concrete section is usually Section 03 30 00 - Cast-In-Place Concrete.

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2. Verify that the concrete section does not include a specification for the underslab vapor barrier, which would result in a confusing, contradictory specification.
 3. In a "mud slab" configuration, reinforcing bars or their supports will be set directly on the drainage sheet. To minimize damage, specify spread foot type chairs or plastic bar holders in the concrete section.
- D. Underflooring Vapor Barrier: If this is specified, panel type subflooring or underlayment is required, to be installed over the vapor barrier as a rigid substrate for the finish flooring material. Plywood, oriented strand board, or medium density fiberboard can be specified in Section 06 10 00 - Rough Carpentry.

END OF COORDINATION NOTES

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