



**GUIDE SPECIFICATIONS FOR CIVIL RETAINING WALL DRAINAGE
PREFABRICATED DRAINAGE SYSTEM
FOR BACKFILLED WALL, FULL COVERAGE, WITH PERIMETER DRAIN**

Includes but is not limited to retaining walls, structural walls, vertical walls, and bridge abutments.

Section 33 46 33 – Retaining Wall Drainage

{NOTE TO SPECIFIER: These specifications were current at the time of publication but are subject to change at any time without notice. Please confirm the accuracy of these specifications with the manufacturer and/or distributor prior to installation.}

{NOTE TO SPECIFIER: This specification is recommended for backfilled wall applications requiring full wall drainage where water is to be collected and transported at the base of the wall using a perimeter drain.}

PART I GENERAL

1.01 SECTION INCLUDES

- A. Civil retaining wall drainage.

1.02 RELATED SECTIONS

- A. Section 02 70 00 – Water Remediation
- B. Section 31 00 00 – Earthwork
- C. Section 31 23 16 – Excavation
- D. Section 31 23 23 – Fill: Backfilling & Compaction
- E. Section 32 32 00 – Retaining Walls
- F. Section 33 46 00 – Subdrainage

1.03 REFERENCES

- A. American Standard Testing Methods (ASTM)
 - 1. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - 2. ASTM D1777 - Standard Test Method for Thickness of Textile Materials
 - 3. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
 - 4. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - 5. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 - 6. ASTM D4716 - Standard Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
 - 7. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile
 - 8. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- B. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M 288 Geotextile Specifications for Highway Applications

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- 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 instructions.
 - 4. Product warranty.

{NOTE TO SPECIFIER: Delete or modify shop drawing requirement as appropriate. If no project specific shop drawings are required, delete 1.04 C. in its entirety.}

- C. Shop Drawings: Submit shop drawings showing product information, installation details including project conditions that are not covered by manufacturer's standard details.
- D. Samples: Submit samples of each component of retaining wall drainage system to owner or owner's representative.
- E. Warranty: Supply owner with executed warranty.

{NOTE TO SPECIFIER: Delete or modify LEED submittal requirement as appropriate. If no LEED submittals are required, delete 1.04 F. in its entirety.}

- F. LEED Submittals: Provide documentation of how the requirements of credit will be met.

1.05 QUALITY ASSURANCE

- A. Installation shall be performed by a company specializing in performing work of this type and approved by the manufacturer.
- B. Prior to installation, a meeting shall be held to clarify and coordinate installation procedures.
 - 1. Attendees shall include:
 - a. Contractor
 - b. Representatives from related trades or trades with work adjacent to retaining wall drainage system.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery
 - 1. Materials shall be delivered in original, unopened, undamaged packing containers bearing manufacturer's name and product identification.
- B. Storage and Protection
 - 1. Material shall remain in original packaging until time of installation.
 - 2. Store materials in protected environment.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Protect material from exposure to direct sunlight during storage.
- B. Limit material UV exposure to less than 14 days during installation.
- C. Do not install during high wind events.
- D. Do not install when ambient temperatures are below 20 degrees Fahrenheit or above 100 degrees Fahrenheit.
- E. Store and dispose of solvent-based material, or materials used with solvents in accordance with local jurisdiction requirements.

1.08 WARRANTY

- A. American Wick Drain Corporation ("AWD") warrants that the products shall be free from defects and in conformity, within normal manufacturing variations, with AWD's physical specifications. No other portion of AWD's published literature shall be incorporated herein except for such physical

specifications. AWD shall be responsible for such defects only if the same is noted, in writing, within one (1) year from delivery of the products.

Buyer's remedies shall be limited exclusively to the repayment of the purchase price (in which event buyer shall return any nonconforming products to AWD) or resupply of the product manufactured by AWD in a quantity equal to that of the nonconforming product (in which event buyer shall return any nonconforming products to AWD). AWD's distributor, agents, salespersons, or other independent representatives have no authority to waive or alter the limitation of liability and remedies. AWD may provide limited information regarding product installation and such information relates only to past experience and is no warranty of future performance.

Other than the warranty immediately above, all implied warranties of merchant ability and fitness for a particular purpose are excluded. The remedies provided hereunder shall be exclusive; AWD shall not be liable for any personal injury, other direct, indirect, consequential, incidental, or special damages of any kind (including cost of installation, removal or repair of the product or loss of use or profit).

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. All products of this section:
1. **American Wick Drain Corp.:** 1209 Airport Rd., Monroe, NC 28110. Tel: (800) 242-9425 or +1 (704) 238-9200. Fax: (704) 238-0220. Email: info@awd-usa.com, Website: www.awd-usa.com
 2. Substitutions: Not permitted.

2.02 MATERIALS

{NOTE TO SPECIFIER: Articles below meet proprietary specification method. Edit product attributes, performance characteristics, material standards and descriptions as applicable. Use of "or equal", "or approved equal", or similar terminology may result in ambiguity in specifications and should be avoided unless required.}

{NOTE TO SPECIFIER: Edit / Add / Delete products from the sections below as appropriate for the project.}

{NOTE TO SPECIFIER: Additional products are available to meet specific project requirements. Please contact American Wick Drain at (800) 242-9425 for product selection assistance.}

- A. PREFABRICATED DRAINAGE SYSTEM FOR BACKFILLED WALL, FULL COVERAGE, WITH PERIMETER DRAIN

{NOTE TO SPECIFIER: Select SITEDRAIN Sheet 180 Series products for retaining wall applications requiring a high compressive strength and a high flow capacity. The core side is placed against the wall surface of the structure.}

{NOTE TO SPECIFIER: SITEDRAIN Sheet 180 Series prefabricated drainage products are designed for subsurface, single-sided drainage applications requiring a high compressive strength and high flow capacity. SITEDRAIN Sheet 180 Series products are constructed by attaching a geotextile filter fabric to a high-strength, high flow capacity, formed polystyrene drainage core. The filter fabric is bonded to each dimple and prevents soil intrusion into the flow channels while allowing water to freely enter the drain core from one side. SITEDRAIN Sheet 180 Series products are available with filter fabrics meeting AASHTO M 288 specifications.}

{NOTE TO SPECIFIER: RECOMMENDED DEFAULT PRODUCT IS SITEDRAIN SHEET 186. SITEDRAIN SHEET 186 FABRIC MEETS DEFAULT (CLASS 2) AASHTO M 288 SURVIVABILITY REQUIREMENTS.}

1. Sheet Drain for Wall Drain System

{NOTE TO SPECIFIER: Typical values unless otherwise noted}

a. Core Material for SITEDRAIN Sheet 180 Series

- 1) Material: High Impact Polystyrene
- 2) Thickness: 0.44 in (11 mm)
- 3) Compressive Strength: 18,000 psf (862 kPa)
- 4) Flow Rate: 21 gpm/ft (261 Lpm/m)
- a) In-plane flow rate @ compressive load = 3,600 psf and hydraulic gradient = 1.0

{NOTE TO SPECIFIER: Select the default fabric material OR one lead fabric material, delete all others.}

a) Default Fabric Material for SITEDRAIN Sheet 180 Series

- A. SITEDRAIN Sheet 186
 - i. Survivability (AASHTO M 288): Class 2
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 110 gpm/ft² (4,483 Lpm/m²)
 - iv. Grab Tensile Strength: 160 lbs (712 N)
 - v. Puncture Resistance: 90 lbs (400 N)
 - vi. Apparent Opening Size: 70 sieve (0.21 mm)
 - vii. Permittivity: 1.8 sec⁻¹
 - viii. Grab Elongation: 70%
 - ix. UV Resistance: 70% after 500 Hrs

b) Lead Fabric Material for SITEDRAIN Sheet 180 Series

- A. SITEDRAIN Sheet 183
 - i. Survivability (AASHTO M 288): n/a
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 190 gpm/ft² (7,743 Lpm/m²)
 - iv. Grab Tensile Strength: 90 lbs (400 N)
 - v. Puncture Resistance: 35 lbs (156 N)
 - vi. Apparent Opening Size: 50 sieve (0.297 mm)
 - vii. Permittivity: 2.8 sec⁻¹
 - viii. Grab Elongation: 65%
 - ix. UV Resistance: 70% after 500 Hrs
- B. SITEDRAIN Sheet 184
 - i. Survivability (AASHTO M 288): Class 3
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 150 gpm/ft² (6,113 Lpm/m²)
 - iv. Grab Tensile Strength: 130 lbs (578 N)
 - v. Puncture Resistance: 75 lbs (334 N)
 - vi. Apparent Opening Size: 70 sieve (0.21 mm)
 - vii. Permittivity: 2.1 sec⁻¹
 - viii. Grab Elongation: 70%
 - ix. UV Resistance: 70% after 500 Hrs
- C. SITEDRAIN Sheet 184-T
 - i. Survivability (AASHTO M 288): Class 3
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 80 gpm/ft² (3,260 Lpm/m²)
 - iv. Grab Tensile Strength: 145 lbs (645 N)

- v. Puncture Resistance: 50 lbs (222 N)
 - vi. Apparent Opening Size: 80 sieve (0.177 mm)
 - vii. Permittivity: 1.0 sec⁻¹
 - viii. Grab Elongation: 60%
 - ix. UV Resistance: 70% after 500 Hrs
- D. SITEDRAIN Sheet 188
- i. Survivability (AASHTO M 288): Class 1
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 90 gpm/ft² (3,668 Lpm/m²)
 - iv. Grab Tensile Strength: 205 lbs (912 N)
 - v. Puncture Resistance: 120 lbs (534 N)
 - vi. Apparent Opening Size: 80 sieve (0.177 mm)
 - vii. Permittivity: 1.3 sec⁻¹
 - viii. Grab Elongation: 70%
 - ix. UV Resistance: 70% after 500 Hrs

{NOTE TO SPECIFIER: Additional sheet drain products are available to meet specific project requirements.}

{NOTE TO SPECIFIER: Upon selection of a sheet drain product (above), select a perimeter drain system (below).}

{NOTE TO SPECIFIER: Select SITEDRAIN HQ Series products to function as a high-flow perimeter drain system for SITEDRAIN Sheet products. This patented design combines a low and high profile core with a unique core flange designed to connect directly to the sheet drain. Designed to collect and transport high volumes of water capable of collection by sheet drains, SITEDRAIN HQ is a performance driven, sustainable solution to ensure the most efficient drainage system. SITEDRAIN HQ Series products are designed as a direct replacement for perforated pipe and stone perimeter drain systems.}

{NOTE TO SPECIFIER: RECOMMENDED DEFAULT PRODUCT IS SITEDRAIN HQ 246. SITEDRAIN HQ 246 FABRIC MEETS DEFAULT (CLASS 2) AASHTO M 288 SURVIVABILITY REQUIREMENTS.}

2. Combination Drain for Perimeter Drain System

a. Core Material for SITEDRAIN HQ 240 Series

- 1) Material: High Impact Polystyrene
- 2) Thickness: 0.44 in (11 mm) / 1.0 in (25.4 mm)
- 3) Compressive Strength: 9,000 psf (431 kPa)
- 4) Flow Rate: 21 gpm/ft (261 Lpm/m)

{NOTE TO SPECIFIER: Select the default fabric material OR one lead fabric material, delete all others.}

a) Default Fabric Material for SITEDRAIN HQ 240 Series

- A. SITEDRAIN HQ 246
- i. Survivability (AASHTO M 288): Class 2
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 110 gpm/ft² (4,483 Lpm/m²)
 - iv. Grab Tensile Strength: 160 lbs (712 N)
 - v. Puncture Resistance: 90 lbs (400 N)
 - vi. Apparent Opening Size: 70 sieve (0.21 mm)
 - vii. Permittivity: 1.8 sec⁻¹
 - viii. Grab Elongation: 70%
 - ix. UV Resistance: 70% after 500 Hrs

b) Lead Fabric Material for SITEDRAIN HQ 240 Series

- A. SITEDRAIN HQ 244
 - i. Survivability (AASHTO M 288): Class 3
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 150 gpm/ft² (6,113 Lpm/m²)
 - iv. Grab Tensile Strength: 130 lbs (578 N)
 - v. Puncture Resistance: 75 lbs (334 N)
 - vi. Apparent Opening Size: 70 sieve (0.21 mm)
 - vii. Permittivity: 2.1 sec⁻¹
 - viii. Grab Elongation: 70%
 - ix. UV Resistance: 70% after 500 Hrs
 - x.
- B. SITEDRAIN HQ 248
 - i. Survivability (AASHTO M 288): Class 1
 - ii. Material: Polypropylene
 - iii. Water Flow Rate: 90 gpm/ft² (3,668 Lpm/m²)
 - iv. Grab Tensile Strength: 205 lbs (912 N)
 - v. Puncture Resistance: 120 lbs (534 N)
 - vi. Apparent Opening Size: 80 sieve (0.177 mm)
 - vii. Permittivity: 1.3 sec⁻¹
 - viii. Grab Elongation: 70%
 - ix. UV Resistance: 70% after 500 Hrs

c) Alternate Products

- A. Perforated pipe and aggregate perimeter drain system (provided by others).

{NOTE TO SPECIFIER: Select fittings and accessories required for project.}

3. Fittings & Accessories

- a. Universal End Outlet: Fitting for in-line connection of SITEDRAIN HQ to 4" smooth or corrugated outlet pipe.
- b. Universal Tee Outlet: Fitting for tee connection of SITEDRAIN HQ to 4" smooth or corrugated outlet pipe.
- c. 12" Corner Guard: Fitting for maintaining secure flow path of SITEDRAIN HQ around outside corners.
- d. 4" Wide Underground-Rated Tape: For securing fittings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Ensure the retaining wall foundation is clean at the grade level.
- B. Clear off the footing.
- C. Ensure adequate drainage at the footing.
- D. Do not begin installation until substrates have been properly prepared.
- E. If substrate preparation is the responsibility of another trade, notify the owner or Architect of unsatisfactory preparation before proceeding.

{NOTE TO SPECIFIER: Select appropriate installation method for project. Edit/Delete installation requirements as needed. Please contact American Wick Drain for installation method assistance.}

3.02 PRODUCT INSTALLATION

- A. Refer to manufacturer's instructions for detailed installation procedures.

{NOTE TO SPECIFIER: Delete or modify shop drawing requirement as appropriate. If no project specific shop drawings are required, delete 3.02 B in its entirety.}

- B. Refer to shop drawings for project specific installation instructions procedures as required in 1.04 C above.

{NOTE TO SPECIFIER: Delete installation instructions that do not apply.}

{NOTE TO SPECIFIER: During Sheet Drain installation in vertical and near-vertical applications it is necessary to temporarily secure Sheet Drain in place prior to soil backfill or wall formation. Common attachment methods include construction adhesives, mechanical fasteners (typically using nail gun), double-sided tapes, insulation anchors, and nails through washers or wood lathing.

Construction adhesives with high solvent contents should be avoided as they may damage Sheet Drain products. Acceptable attachment methods are dependent upon substrate being attached to, and are discussed below.

For attaching Sheet Drain to concrete or wood, the most common methods are construction adhesives, double-sided tape, or mechanical fasteners.

For attaching Sheet Drain to waterproofing membranes, the most common methods are construction adhesives, double-sided tape, or insulation anchors. Check with the waterproofing manufacturer for compatibility before using construction adhesives in conjunction with waterproofing materials.

For attaching Sheet Drain to soil, the most common method is the use of 4-inch to 8-inch long galvanized nails on approximately 4-foot spacing. Nail length will vary depending upon the surface to which the Sheet Drain is being attached. Nails should have flat heads, and washers or wood lathing may be used to prevent the nail head from being driven through the Sheet Drain.

Please contact American Wick Drain at (800) 242-9425 with questions.}

3.03 INSTALLATION OF PREFABRICATED DRAINAGE SYSTEM FOR BACKFILLED WALL, FULL COVERAGE, WITH PERIMETER DRAIN

- A. Installation of combination drain for perimeter drain system
1. Unroll combination drain and place at base of wall with fabric side toward soil. The edge of core with flange shall be at top.
 2. Attach combination drain to wall using manufacturer recommended practices.
 3. Connect rolls of combination drain end-to-end by interlocking core and securing joint with tape per manufacturer's recommended practices.
 4. Secure fabric over exposed ends of combination drain at termination points to prevent soil intrusion.
- B. Installation of first row of sheet drain for wall drain system
1. Fold combination drain fabric flap down to expose flange.
 2. Unroll sheet drain and place first row of sheet drain over flange of combination drain, insuring edge of sheet drain core with flange is at top.
 3. Attach sheet drain to wall using manufacturer recommended practices.
 4. Fold fabric flap from combination drain up over joint and secure flap to sheet drain using tape or spray adhesive to prevent soil intrusion.
- C. Installation of additional rolls of sheet drain (length)
1. Attach each additional roll of sheet drain end-to-end by butting the beginning of second roll against the end of the first roll.

2. Tape joints to prevent soil intrusion.
 3. Secure fabric over exposed edges of sheet drain at termination points to prevent soil intrusion.
- D. Installation of additional rows of sheet drain (height)
1. Fold down fabric flap of lower sheet drain to expose flange.
 2. Place bottom edge of upper sheet drain over flange of lower sheet drain, ensuring edge of sheet drain core with flange is at top.
 3. Fold fabric flap from lower sheet drain up over joint and secure flap to upper sheet drain using tape or spray adhesive to prevent soil intrusion.
- E. Installation of corners
1. Inside corners
 - a. Bend sheet and/or combination drain around corner. No cutting or fittings required.
 2. Outside corners
 - a. Combination drain
 - 1) Cut combination drain flush with corner using a utility knife or shears.
 - 2) Attach combination drain to wall flush to each side of corner using manufacturer recommended practices.
 - 3) Install 12" Corner Guard fitting at corner to connect sections of combination drain and insure secure flow path around corner.
 - b. Sheet drain
 - 1) Cut sheet drain flush with corner using utility knife or shears.
 - 2) Attach sheet drain to wall flush to each side of corner using manufacturer recommended practices.
 - 3) Secure fabric over exposed edges of sheet drain at corner to prevent soil intrusion.
- F. Installation of Fittings
1. Install manufacturer supplied fittings per manufacturer recommended practices.

{NOTE TO SPECIFIER: Please contact American Wick Drain at (800) 242-9425 for assistance.}

3.04 BACKFILLING AND COMPACTING

- A. Prior to backfilling, inspect prefabricated drainage system for damage and repair.
- B. When backfilling, take care to avoid damage to prefabricated drainage system.
- C. Carefully backfill directly against drain to a minimum of 6" above drain to allow for coverage after soil settlement.
- D. Compact backfill material using a method approved by the project engineer, ensuring that the prefabricated drainage system is not damaged during compaction.
- E. Direct compactor exhaust away from prefabricated drainage system to prevent damage.

END OF SECTION