CurtainWall & GundWall®

HDPE VERTICAL MEMBRANE BARRIER SYSTEMS
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Solmax’s Vertical Barrier Systems are designed to block lateral migration of subsurface fluids such as fresh water, salt water, methane gas, and contaminated leachates from waste piles or leaking containments. These systems enable containment, exclusion, treatment, or removal of potentially hazardous liquids.

CIVIL AND ENVIRONMENTAL APPLICATIONS

Vertical barrier systems are used around the world in a variety of environmental and civil applications. A major benefit of an HDPE Vertical Barrier System is its flexibility, which enables it to conform to subsurface soil movement. In addition, unlike slurry, steel or PVC, HDPE geomembranes provide an excellent barrier to liquids and gases, and have a long service life.

Solmax manufactures two HDPE Vertical Barrier Systems, namely CurtainWall and GundWall. Both systems can be installed quickly and economically.

ADVANTAGES

- Outstanding chemical resistance and mechanical properties
- Environmental stress crack resistance
- Dimensional stability
- Good thermal aging
- Excellent resistance to UV radiation
- Suitable for exposed conditions
- Quick and economical installation in trenched and trenchless applications

- The mechanical interlocks on our CurtainWall and GundWall systems ensure leak-free panel connections, and fast, economical installation.
CurtainWall & GundWall: TYPICAL USES
The CurtainWall system is ideal for trenched applications due to its ease of installation, while the GundWall system is ideal for trenchless applications. Both systems include mechanical interlocks permanently attached to the vertical edges of the geomembrane panels to ensure leak-free panel connections.

The interlocks make use of HyperTite and HyperBlok, hydrophilic sealants that swell up to five times their dry volume when exposed to water, to fill seam and key cavities. This prevents fluid migration through the interlock, even after soil settlement and deformation.

- The CurtainWall Interlock system comprises a reversible HDPE profile designed with multiple sealant chambers. HyperTite is inserted into one or, for extra security, multiple chambers to create a mechanical seal.

  The CurtainWall Interlock profile is easily manipulated during installation in trenches, ensuring the successful alignment of the panels.

- The GundWall Interlock system comprises male and female HDPE profiles, and works much like a dovetail joint. HyperBlok hydrophilic sealant, inserted in key cavities, swells in water to ensure a tight, leak-free seal.

  This interlock configuration allows for panels to be vibrated into place using an insertion plate in loose to medium-dense, non-cohesive soils without prior excavation. Trenchless installation saves time and excavation expenses.

ENVIRONMENTAL BENEFITS
Vertical barrier systems made of HDPE reduce the carbon footprint of any geotechnical project by minimizing the need to mine, then transport high quality granular materials to the site. They also outperform traditional, high energy-consuming solutions such as concrete thanks to their outstanding engineering performance for the function they are intended to deliver.

- Our vertical barriers systems block lateral migration of subsurface fluids, enabling containment, exclusion, treatment or removal of potentially hazardous liquids.
DURA AVENUE LANDFILL REMEDIATION

Dura Avenue Landfill was a closed landfill that had to be remediated under CERCLA. The site is located at the convergence of the Ottawa River and Sibley Creek in Toledo, OH. Clean-up plans began in 1992 and were completed with the installation of an HDPE geomembrane cap in 1997. The immediate remedial action involved installing a GundWall vertical barrier system to stop the flow of contaminants into the adjacent river and to minimize pumping and treating costs. To stabilize the river bank, a structural steel pile wall was installed 12 feet out into the river. The GundWall panels were then vibrated into place alongside the steel piles to depths of 16 to 31 feet (5 to 9 meters) and keyed into an existing clay layer. Following the GundWall vertical barrier installation, a collection system was installed on the landfill side of the vertical barrier. The collection system draws only 3 gpm of leachate despite the presence or the river just a foot away.

REACH 11 DIKE SYSTEM

The Bureau of Reclamation elected to utilize a CurtainWall vertical barrier system to upgrade 12.5 miles (20 kms) of damaged earthen flood control dikes that protect Phoenix and Scottsdale, Arizona. The CurtainWall panels and a filter zone were installed in a 2-foot (0.5 m) wide trench that was supported by a biopolymer slurry. Panel depths reached 50 feet (15 m). Before proceeding with the project, a test section was built to evaluate the constructability and performance of the design. The test section of the dike was 1100 feet (335 m) long and 50 feet (15 m) deep. Retaining berms built behind the dike created a pond area with a depth equivalent to a Probable Maximum Flood level. Water was contained in the ponded area against the CurtainWall vertical barrier test section and monitored for 30 days. According to the Bureau report, the CurtainWall vertical barrier proved to be “an effective water-tight vertical barrier wall.” Construction of the 12.5 miles (20 kms) dike section was completed in 18 months and ahead of schedule.
HDPE VERTICAL BARRIER INSTALLATION METHODS

Every installation site presents challenging subsurface and above ground conditions that will determine the best ways to install an HDPE Vertical Barrier.

In selecting a method of installation, the evaluation of site-specific conditions must occur to ensure of a quality installation. These conditions include soil boring information, above grade obstructions, subsurface utilities, groundwater levels, site access and work hours, depth and length of wall, presence of contaminated soils, and the level of containment to be achieved. With these site conditions evaluated, the selection of an installation method can begin.

CurtainWall

Slurry wall: Successfully installed slurry projects have been installed to depths greater than 115 feet (25 m) and wall lengths of 12.5 miles (20 kms). Individual panel widths typically range from 10 - 24 feet (3 m - 7.3m). An HDPE CurtainWall can be installed to whichever depths a slurry wall can be excavated.

The installation involves the individual panels being temporarily attached to one of two steel support frames. The steel frames provide support to the flexible HDPE panels during installation. The first frame with an HDPE panel is lowered into the suspended slurry trench and left in place. The second frame with an HDPE panel is lowered into the trench and interconnected with the first HDPE panel via the HPDE mechanical interlocks. Once installed, the steel frame attached to the first HDPE panel is removed from the trench, leaving the first and second HDPE panels interconnected in the trench. This process of “leap frogging” the steel supports to install the HDPE CurtainWall continues until the installation is completed.

One-Pass Deep Trenching: Utilizes the established technology of one-pass deep trenching equipment with a patented modification. The steel boot that follows behind the trencher has been modified to add a second compartment. The first compartment accepts the hydraulic backfill, while the second compartment allows for the manual installation of HDPE panels into a supported and unobstructed opening.

The steel boot can also install HDPE collection pipes, pump low permeability grout into the bottom of the trench, and set collection sumps. Without benching down, installation depths are limited to approximately 25 feet (7.6 m).

GundWall

Vibratory: Soil boring information is critical when evaluating the vibratory method of installation. The vibratory installation of HDPE Vertical Barriers is similar to steel sheet pile driving, in that HDPE panels are vibrated into unexcavated soils. Equipment involves the use of a vibratory hammer. A vibratory installation can be considered in non-cohesive soils with cobbles of less than three inches (7.62 cm) in diameter. Due to the heat generated during the liquefaction of soils, the maximum installation depth of HDPE panels is limited to approximately 40 feet (12 m). For difficult stratum lense conditions, the jetting of liquids or the driving of a blind plate can assist in creating an easier subsurface installation path.

By vibrating HDPE panels, the problems associated with trenched excavations are eliminated. Problematic sites that are strong candidates for vibratory installations generally have poor soil mechanics (flowing sands), engineered structures in close proximity (buildings), or the presence of contaminants.
Control Ground Water Lateral Mistsrtion From Waste Disposal Sites With

Curtain Wall System

Containment Barrier
With Leachate Collection System

Unlined Waste Landfill

Permeable fill’s
Unprotected soil and ground water in permeable soils

Curtain Wall System

Protected soil and ground water in permeable soils

Fill (SB, SDB, CB)

Unprotected soil and ground water in permeable soils

Aquiclude

Containment Barrier

SOLMAX

Molcanova

07.05.2020

2

D-CW016
Water Containment With

Curtain Wall System

Cutoff Wall under or through existing or new Dam, Dike, Berm, Levee or Cofferdam

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Water Flow Control With Curtain Wall System
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Lower Water Table with Curtain Wall System
Curtain Wall System Project At A Chemical Plant

Legend

Curtain Wall System
Jet Grouting

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Curtain Wall Systems Stop Migration
Controlling Groundwater Lateral Migration From Waste Disposal Sites With Curtain Wall, Containment Barrier Or Containment Barrier With Leachate Collection System
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Legend:
- Gas
- Leachate
- Hazardous Waste
- Ground Water Table

HDPE Geomembrane Cap
Monitoring well

Gas venting system

Hazardous Waste

Leachate collection well

Curtain Wall System in a slurry wall

Slurry wall (CB, SCB or SB)

Aquiclude

Curtain Wall System with Leachate collection trench system

Curtain Wall System with Closure Cap
GundWall® Panel With Anchor

- **GundWall** female
- **GundWall** male
- Geomembrane
- HDPE Anchor

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**SOLMAX**

**DRAWN** Molcanova  **DATE** 07.05.2020  **REVISION** 2  **SCALE** n.t.s  **DWG. NO.** D-CW002
**GundWall® Panel With Pipe Penetration And HDPE Anchor**

**Typical Pipe Penetration**

- GundWall® male
- GundWall® female
- HDPE Anchor
- Extrusion weld
- Clamp
- Pipe boot
- Skirt
- Geomembrane

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**DRAWN DATE REVISION DWG. NO.**

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GundWall® Attachment To Concrete Structure

GundWall® male

2"x2"x?" S.S. angle

2"x2"x?" S.S. angle

Neoprene washer (Typ. 4 places)

Concrete manhole, not by

?"Ø S.S. Bolt w/nut & washer

?"Ø S.S. Anchor bolt
A thru G are potential monitoring or sealant chambers

A thru M are potential monitoring or sealant chambers

CurtainWall Interlock®; Connection and Joint
(Patented and other patents pending)
CurtainWall InterLock® (HDPE)

HyperFlex® (HDPE Geomembrane)

HyperTite™ (sealant)

CurtainWall InterLock® (HDPE)

HyperFlex® (HDPE Geomembrane)

HyperTite™ (sealant)

CurtainWall® System With HyperTite™
Concentration of leachate reaching barrier of fill and CurtainWall®

Much reduced leachate concentration reaching CurtainWall®

Tortuous path of about 13” for leachate to pass CurtainWall® Interlock™

CurtainWall® System

Cement-bentonite (K~10^{-7} cm/sec) filled channels

Additional very low permeability and chemically resistant sealant in one or more channels
Section Through Typical CurtainWall® Panels

(Patented and other patents pending)

Note: Measured dimensions are fabricated with tolerances of 2"

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Typical lengths of panels limited to 55’, due to shipping limitations. But lengths of +150’ can be fabricated to project requirements.

Length of CurtainWall Interlock is typically depth of excavation.

CurtainWall Interlock®
(Approx. thickness 190 Mil)

Panel is made of 80 to 120 mil HyperFlex® HDPE geomembrane. Typical panel is 100 mil HyperFlex®.

Top Flap (as desired) typically less than 5” used to facilitate staking into ground surface and tying into.

Bottom Flap (if desired) typically weighting material.

Selectable widths in 2’ increments up to 24’.

Gusset and Interlock can be made upon request.

CurtainWall® Panel

Note: Measured dimensions are fabricated with tolerances of 2”.

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CurtainWall® System Shipping and Packaging

- **Total length (55' Max., for shipping)**
- **5 Equally spaced straps**
- **CurtainWall Interlock® 190 Mil**
- **100 Mil HyperFlex® (HDPE Geomembrane)**
- **Panel width (24' Typical)**
- **Approx. 12” to 14”**
- **Typical Packaging and Shipping Method**

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GundWall Panel™ Fabrication Details

Job Name & Location: ________________________________
Ordered By: _______________________________________
Date Submitted: _________________________________

A = Total Panel Length
B = Length of Top Flap (Liner only)
C = Length of Bottom Flap (Liner only)
D = Length of InterLock
E = Width of Panel (O. to O. of Interlock)

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<tr>
<td>Dim E</td>
<td></td>
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</tbody>
</table>

Questions
1.) Please draw orientation of Interlocks (Please label male or female) and anchor lengths. Include any special details to be mentioned.
   (Top view of inserted panel in ground)

---

Geomembrane
CurtainWall® Panel Fabrication Details

Job Name & Location: __________________________
Ordered By: __________________________
Date Submitted: __________________________

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<th>Size</th>
<th>Number of Panels</th>
<th>Sheet Mill Thickness</th>
<th>Anchors (Yes/No)</th>
<th>Dim A</th>
<th>Dim B</th>
<th>Dim C</th>
<th>Dim D</th>
<th>Dim E</th>
</tr>
</thead>
</table>

Questions
1.) Are CurtainWall InterLocks the same or opposing directions?
2.) If the CurtainWall Panels include anchors, please draw the orientation of the anchor to the InterLocks.

Please detail the orientation of the InterLock and anchor lengths (Top view of inserted panel in ground)

---

A = Total Panel Length
B = Length of Top Flap (Liner only)
C = Length of Bottom Flap (Liner only)
D = Length of InterLock
E = Width of Panel (O. to O. of Interlock)
HOW TO EXPONENTIALLY IMPROVE THE IMPERMEABILITY OF A SLURRY CUTOFF WALL

Slurry walls are commonly used as an installation method for HDPE vertical geomembrane barriers (CurtainWalls). The combination of a conventional slurry wall and HDPE CurtainWall is referred to as a composite barrier wall.

A conventional slurry wall utilizes calcium or sodium bentonite clay mixture with soil to provide a cutoff barrier with a relatively low permeability level of $1 \times 10^{-7}$ cm/sec. Sodium bentonite is typically chosen as the clay amended to the slurry mixture, because of sodium bentonite’s high swelling and sealing capability in comparison to other montmorillonite clays, such as calcium bentonite. However, groundwater and waterways generally have elevated concentrations of divalent cations, such as calcium and magnesium, or other liquids and contaminants, such as hydrocarbons. This can have an adverse effect on the swelling potential of sodium bentonite and therefore increase the permeability level of the cutoff wall.

In comparison, an HDPE CurtainWall typically provides a permeability level of $1 \times 10^{-12}$ cm/sec, or 5 orders of magnitudes lower permeability than conventional sodium bentonite slurry walls. Additionally, the overall service life of a conventional slurry cutoff wall is increase by decades with the inclusion of an HDPE CurtainWall given the proven durability and chemical resistance of HDPE.

The fluctuation of the groundwater elevation may also affect the abilities of conventional slurry walls. During low groundwater elevations, the bentonite slurry can dehydrate and form cracks and pipes. Seepage of liquids into these pipes can then create boils and potentially lead to failure. The physical strength of HDPE makes it an outstanding material to use in cutoff wall applications. The HPDE CurtainWall is able to resist seismic activity, mechanical wall settling and changes in groundwater elevation.

Additionally, during the construction of a conventional slurry wall, there is potential for wall sections of soil to slough. This soil can obstruct slurry backfill and can settle in the cross-section of the slurry cutoff wall, creating a window of higher permeability soil than the surrounding slurry. The potential for windows is eliminated with an HDPE CurtainWall, since its interlocking panels fully line the cutoff wall from the ground surface to the confining aquiclude. An HDPE CurtainWall truly eliminates the potential for a seepage path through a cutoff wall both chemically and mechanically.
HDPE vertical barriers are composed of HDPE geomembrane with HDPE mechanical interlocks welded to the vertical sides to form panels. Panels vary in width from three to twenty-four feet (0.9 m - 7.3 m) and the minimum geomembrane thickness of 80 - 120 mils (2.5 mm). The lengths of the panels are determined by the required depth of the installation. Installation methods of vertical geomembrane barriers depend upon site and soil conditions, depth of installation, and groundwater elevation. HDPE vertical barriers provide a truly impermeable barrier because the HDPE CurtainWall blocks the horizontal migration of liquids.

In 1994, the world’s largest HDPE CurtainWall project was completed for the U.S. Bureau of Reclamation. The Hayden/Rhodes Aqueduct - Reach 11 Flood Detention Dikes are located along the Northern boundaries of Phoenix and Scottsdale, AZ. The HDPE CurtainWall was installed via a bio-polymer slurry trench that spanned for 12.5 linear miles with an average depth of 50 feet. The presence of erodible silts and dispersive clay soils resulted in the choice of an HDPE CurtainWall at Reach 11.

The technology and construction ability of a composite barrier wall has successfully existed for over two decades. Composite barrier walls provide:

- Guaranteed Leakage Barrier
- Five Order of Magnitudes Lower Permeability Level than other barrier materials
- Superior Chemical Resistance of HDPE
- Decades of Service Life
- Over 200 Successful Installations World Wide
CurtainWall® System being installed in a slurry Trench Excavation by a crawler crane and backfilled with soil–bentonite (SB)
IMPERMEABILITY LEVELS OF VARIOUS CUTOFF BARRIERS

Various materials and methods are used for vertical cutoff walls. These materials include grout, cement and soil bentonite, deep soil mixing and HDPE CurtainWall. Since these materials are intended to provide a water-tight barrier, their level of impermeability is critical in guaranteeing decades of service life. The graph shown below represents a comparison between typical hydraulic cutoff barrier walls and their level of impermeability.

As represented above, an HDPE CurtainWall provides 5 orders of magnitude greater impermeability level than any other conventional cutoff wall material.

Legend: Values equal $1 \times 10^{-x} \text{ cm/sec}$

DSM* = Deep Soil Mixing
SPECIFICATIONS FOR A FLEXIBLE HDPE GEOMEMBRANE VERTICAL BARRIER SYSTEM

PART 1 - GENERAL

The specification of the geomembrane thickness for a flexible HDPE vertical geomembrane barrier (CurtainWall) generally ranges among 80, 100 or 120 mils (2, 2.5, 3 mm). The CurtainWall shall have a minimum thickness of 80, 100 or 120 mils, respectively.

The installing contractor shall be qualified by either the Engineer or End User to have demonstrated a track record of successful installations, concerning the specified method of installation.

The geomembrane material and method of installation shall be approved by the Engineer and reviewed by Solmax subsequent to CurtainWall or GundWall fabrication or installation.

The CurtainWall barrier system shall provide a minimum permeability level of $1 \times 10^{-12}$.

SCOPE OF WORK OUTLINE

1.0 Material Specifications
2.0 HDPE CurtainWall Products
3.0 Installation Methods
4.0 Installation Quality Control
1.0 MATERIAL SPECIFICATIONS

1.1 SUBMITTALS TO ENGINEER
A. Properly labeled samples of each of the following
   1. Specified thickness of an HDPE geomembrane
   2. CurtainWall or GundWall interlocking sample
   3. Joint gasketing material
   4. Drainage net (if required)
B. Solmax’s HDPE geomembrane certifications.
C. Sample copy of Solmax’s material warranty.
D. The installing contractor shall provide documentation to the Engineer or End User that the installing contractor has contacted Solmax to review quality control procedures for installing Solmax’s CurtainWall or GundWall barrier products.

1.2 DELIVERY, STORAGE, AND HANDLING
A. Solmax shall ship CurtainWall panels on dedicated modes of transportation with lifting straps to prevent damage. CurtainWall panels shall be placed on a smooth surface, free of rocks or other protrusions. Panels shall be covered if they are exposed for more than three months to protect from damage, dirt and debris.
B. The hydrophilic seal or gasketing material shall be stored in their original boxes in a dry location.
C. Store all materials in locations that are in close proximity to the work area. Storage space should be protected from theft, vandalism and passage of vehicles.

1.3 PROJECT CONDITIONS
A. The work site is to be clear of all debris and obstacles that may interfere with the installation of the CurtainWall system, including the subsurface.
B. All overhead obstacles up to a height sufficient to clear installation equipment must be removed, deactivated or relocated so as not to delay the progress of the installation.
C. All underground utilities and other obstacles shall be located and their position clearly marked along the path of the installation. In addition, the installer shall be supplied with three sets of detailed drawings showing the location, type and depth of each obstruction.
D. If the location of utilities is unknown or uncertain, then a backhoe shall be used to excavate an exploratory trench along the path of installation. The trench depth will be agreed upon by the CurtainWall installer and the Engineer and/or End User.
E. When installing panels in an open trench, the trench shall not have any protrusions from the trench walls that could damage the CurtainWall panels or inhibit the installation.

1.4 WARRANTY
Solmax shall provide a standard CurtainWall material warranty. The CurtainWall installing contractor shall provide the installation warranty.
2.0 HDPE VERTICAL BARRIER PRODUCTS

2.1 MANUFACTURING OF VERTICAL PRODUCTS
A. All components of either the CurtainWall or GundWall panel systems shall be manufactured and fabricated by Solmax Necessary field fabricating of panels shall follow Solmax's standard field welding procedures.
B. Solmax shall fabricate the CurtainWall panels to the desired lengths in their designated fabrication facility. Sheet panels, interlock sections and sacrificial anchors shall be assembled using either wedge or extrusion welding.
C. Solmax shall air test all double-wedge welds of interlock attachment to a geomembrane. The Solmax standard welding procedures apply.

2.2 HDPE VERTICAL BARRIER MATERIALS
A. The mechanical interlocking section shall be an HDPE profile produced by Solmax. The minimum tensile strength at yield for the CurtainWall and GundWall interlock shall be a minimum value of 300 pounds per linear inch. The tensile shear strength of the wedge weld of geomembrane to interlock is a minimum value of 100 pounds per linear inch.
B. The HDPE geomembrane used for the CurtainWall panels shall be manufactured of first quality resin containing approximately 97.5% polymer and 2.5% of carbon black, antioxidants and heat stabilizers.
C. The interlocking seal shall be a hydrophilic elastomer profile that is capable of swelling to 3 times its volume in potable water within 72 hours. If the chemical resistance is not suitable for a chloroprene hydrophilic gasket, then a gasketing material of suitable chemical resistance, as approved by the Engineer shall be used.
D. The CurtainWall barrier system shall provide a minimum permeability level of 1 x 10^-12.
E. If required, the drainage net shall be a single-sided composite (geotextile/HDPE net).

3.0 INSTALLATION METHODS

3.1 GENERAL
A. A representative from the CurtainWall installer shall walk the installation path with the Engineer or its representative subsequent to beginning any work. Starting and stopping points, utility locations and overhead obstructions shall be discussed and checked against the drawings.
B. Damaged CurtainWall or GundWall panels shall be removed from the panel storage area on site. The Engineer and the installing contractor shall examine the damaged panel and determine if the panel can be salvaged by standard field repair methods.

3.2 SLURRY SUPPORTED TRENCH INSTALLATION
A. Solmax recommends utilizing the CurtainWall interlock and barrier system for slurry supported trench installations.
B. The installing contractor shall receive approval from the Engineer for the design of the support installation frame. Solmax can be contacted for frame design suggestions.
C. Solmax recommends that the panels be placed against the downgradient trench wall. If placement is other than the downgradient wall please contact Solmax.
D. The installation rate of the CurtainWall will coincide with the excavation and backfill progress of the slurry trench. If panels are placed into a cement/bentonite slurry, then a retardant shall be added to allow sufficient time for installation of the geomembrane panels before hardening. If hardening of the cement slurry takes place subsequent to the next panel being installed, the installing contractor shall temporarily insert a full length section of CurtainWall interlock to keep the interlock channels open and accessible.

E. When selecting and placing the backfill soil material, care shall be taken, so as to not damage the CurtainWall panels.

3.3 VIBRATORY INSTALLATION METHODS
A. If possible, soil borings shall be taken a minimum of every 100 linear feet of the installation path.
B. For Vibratory installations only the GundWall interlock shall be used.
C. The installation of GundWall panels shall not deviate by more than 1 1/2 feet, either side of the installation centerline.
D. The initial panel shall be installed with the panel orientation of the male interlock facing the direction of the next panel to be installed.
E. When using a fixed lead, a three-foot level will be used to assure that the lead is plumb.
F. If utilizing an elastomeric seal, the seal is attached to the bottom of the female interlock and fed into the opening from the bottom.
G. If during an installation the plate comes to a complete halt, subsequent to reaching the installation depth, then the plate shall be withdrawn and the following actions can be taken. First, switch to a blind plate and attempt to drive through the obstruction. If this is not successful, then a trench shall be excavated along the path of installation to ascertain the nature of the obstruction. If the obstruction is removed, the excavation will be backfilled and the installation continued. If the obstruction is not removed, the installation plan will be modified as approved by the Engineer.
H. If a drainage layer is used, the panels will be installed so that the drainage layer is sandwiched between the insertion plate and the HDPE GundWall panel.

3.4 ONE PASS DEEP TRENCHER INSTALLATION METHOD
A. The GundWall shall be installed in a continuous trench by utilizing a one pass deep trencher to excavate the trench and support the open trench walls. Panels are placed upon the downgradient trench wall.
B. Simultaneously with the placement of the panels, the upgradient portion of the trench shall be backfilled with the specified backfill.
C. If required, an HDPE leachate collection system consisting of a 5 -6 inch HDPE perforated pipe and gravel filter media will be installed adjacent to the CurtainWall.

4.0 INSTALLATION QUALITY CONTROL
A. The elastomeric hydrophilic gasket shall be monitored during installation to assure that its rate of insertion is the same as the CurtainWall panel.
B. For CurtainWall panels, Solmax can include an Electronic Verification Device (EVD®) to assure full joint interconnection. A contact element and conductive wire are attached to each interlock. The contact elements are positioned on the bottom of the interlock so as to touch each other when two panels of CurtainWall are properly installed. A battery is connected to the wires to create a current. Measuring the resistance in the conductive wires will verify the interconnection of the panels at depth.
<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>LOCATION</th>
<th>INSTALLATION DATE</th>
<th>CONTRACTOR</th>
<th>PRODUCT</th>
<th>AREA (SF)</th>
<th>DEPTH (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arab Potash Co. Soil Stabilization</td>
<td>Jordan</td>
<td>1980</td>
<td>Winpey Geotech</td>
<td>CurtainWall</td>
<td>1,398,800</td>
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<td>Deutsche Bundesbahn Leachate Barrier</td>
<td>Bruchsal, FRG</td>
<td>1988</td>
<td>Zueblin, AG</td>
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<td>118,342</td>
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<td>Chemical Factory</td>
<td>Savona, I</td>
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<td>Acna</td>
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<td>Permanent Dewaterina for Highway</td>
<td>Best, NL</td>
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<td>NGT</td>
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<td>Reach 11 Dike System</td>
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<td>CurtainWall</td>
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<td>Water Flow Cutoff</td>
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<td>Western Tank and Lining</td>
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<td>Water Flow Cutoff</td>
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<td>Envirocon</td>
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<table>
<thead>
<tr>
<th>Project Name</th>
<th>Location</th>
<th>Date</th>
<th>Contractor</th>
<th>Product</th>
<th>Area (SF)</th>
<th>Depth (FT)</th>
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<td>Ground Water Treatment &amp; Technology</td>
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<td>SUNOCO - Read Boyd Farm</td>
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<td>Graham Industrial Services</td>
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<td>Compass Minerals</td>
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<td>Ames Construction</td>
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<td>City of Toledo</td>
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<td>Chihong Zhehai Water Quenching Slag Dumpsite</td>
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<td>Beijing BGE</td>
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</table>

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