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Geolink® Handplaced Installation Guide

ARMORTEC®
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The purpose of the Geolink Handplaced Installation Guide is to provide recommendations for the proper installation of Handplacing the Geolink Articulating Concrete Block (ACB) system. While this guide offers a set of instructions for performing those operations that are critical for the proper functioning of ACB revetment systems, final preparation and installation is the responsibility of the end user. Additional information is contained in ASTM D6884 Standard Practice for Installation of Articulating Concrete Block (ACB) Revetment Systems.

It is the Contractor's responsibility to maintain safe work practices consistent with OSHA (Occupational Safety and Health Administration) regulations and other prevailing safe work practices. This guide is intended to be used in conjunction with all applicable safety regulations and safe work practices and is in no way a replacement thereof.

Site Preparation

Stable and compacted subgrade soil shall be prepared to the lines, grades and cross sections shown on the contract drawings. Transitions between slopes, termination trenches, benches, and embankment crests shall be compacted, shaped and uniformly graded to ensure intimate contact between the ACB system and the underlying subgrade section.

Recommendations

- Subgrade compaction – 90% Standard Proctor density (ASTM D 698)
- Unsuitable subgrade material shall be removed
    a. Excessive in-place moisture content
    b. Clods, roots, or other organic material
    c. Any removed material shall be backfilled with acceptable soils and compacted
- Geotextile Application/Sizing – AASHTO M-288 for Permanent Erosion Control

Geotextile Placement

Prior to placing geotextile and ACB system, the prepared subgrade should be inspected by the Engineer of Record (EOR) or their representative. Placed directly on the prepared surface, the geotextile is to be free of folds and wrinkles. The geotextile must be placed so upstream strips overlap downstream strips and so upslope strips overlap downslope strips; overlaps are to be in the direction of flow wherever possible. All longitudinal and transverse joints shall be overlapped at least three feet for below-water installations and at least one and a half feet for dry installations. There should be no voids or "bridging" between the geotextile and the subgrade. The geotextile is to extend beyond the top, toe and side termination points of the ACB system, as detailed by the manufacturer or as directed by the EOR.

If necessary, a graduated filter layer may be used in lieu of a geotextile, as specified by the EOR.

ACB Placement (Geolink®)

After the geotextile is placed or the filter is constructed, the area is ready for the placement of the revetment units.

When installing on a channel side slope or steepened bed slope, standard installation procedure is to begin at the bottom of the grade and work up the slope.

Geolink ACBs are configured in a nested bond interlocking matrix as seen in Figure 1. Installation shall be conducted in a manner to minimize gaps/voids between units. Units should be placed with the long axis parallel to the flow direction and with the Geolink logo facing up. Partial units should not be utilized. Centering the ACB units and working outward will help to minimize gaps and required grouting.

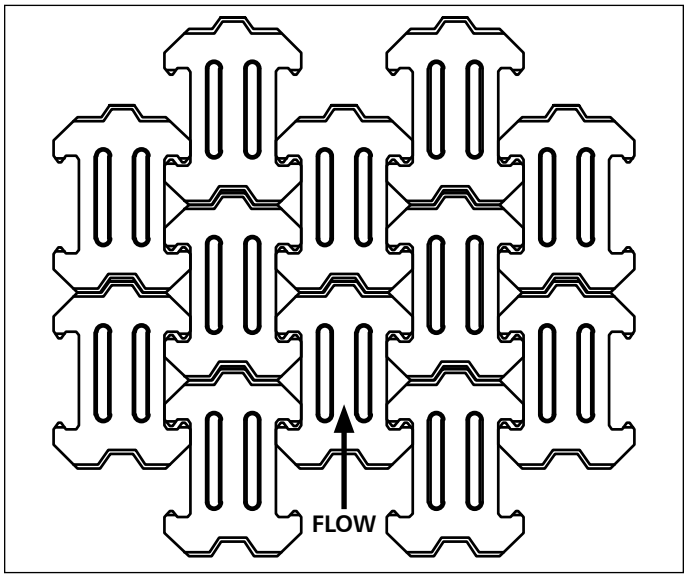

Figure 1 – Geolink Nested Interlocking Bond

Terminations – Top/Toe and Lateral/Flank Trenches

The extents of all ACB protection areas must have the proper termination to ensure the overall integrity of the system. Whether transitioning from natural ground or adjacent structures to ACBs, these zones require treatment.

Where the ACB system transitions to natural ground, extend the termination into the subgrade at a depth determined by the EOR. Currently, the industry standard recommendation is a minimum of two (2) units embedded at a downward 45-degree angle and backfilled with a non-erosive material. Concrete material is generally recommended, however the material can be dependent on the termination location (top, toe, or flanks), freeboard elevation, and its exposure to erosion conditions. Discussion with the EOR is recommended when determining final material for project installation.

As seen in Figure 2, constructing the termination trench can be accomplished by preparing a rounded excavation. The trench configurations are dependent on site conditions and the orientation of the ACB with the main focus of construction being required depth "D" in the field and backfilled with approved non-erosive backfill.

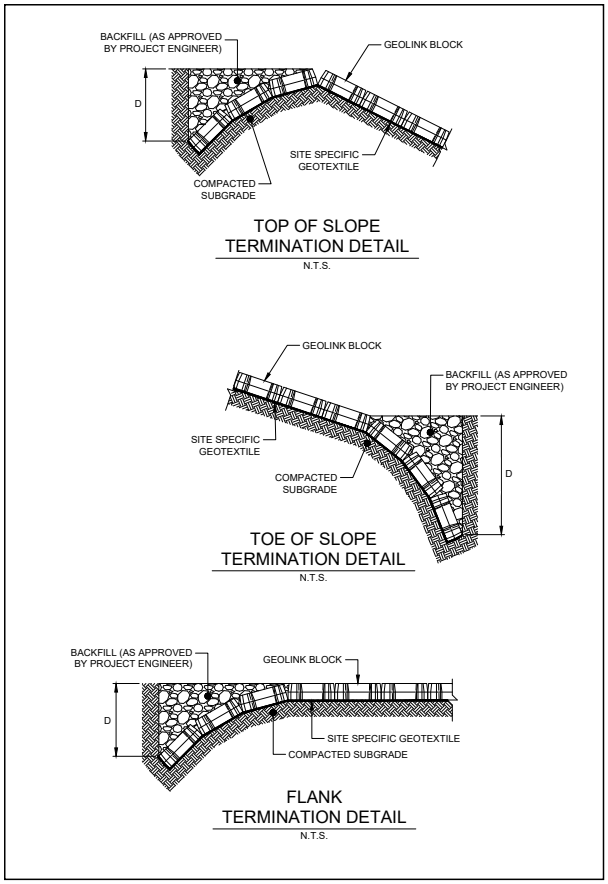

Figure 2 – Rounded and Angled Terminations

Where the ACB system transitions to a hard structure point, such as a bridge abutment, pier, etc., terminations may be accomplished by placing ACB units as close as possible to the hard point and backfilling with approved material; see Figure 3 for example. Any void adjacent to structure greater than 2" requires backfill with a non-erosive material to at least 3/4 block height.

Figure 3 – Hard Point Terminations

Radius/Alignment Transitions

In armoring areas where a channel alignment changes or a radius occurs, the orientation of the blocks will change, resulting in gaps larger than 2". These areas should be filled with concrete, grout, or other material as specified by the EOR. See Figure 4 for example.

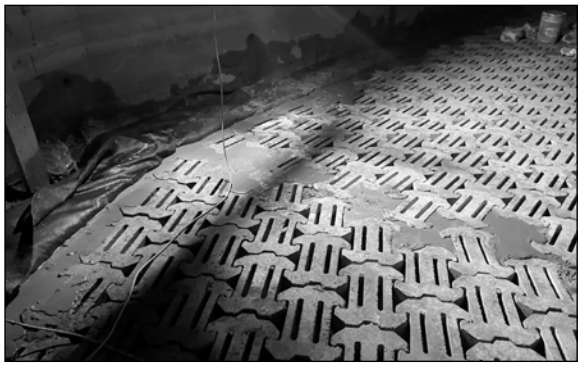

Figure 4 – Radius/Alignment Transition

Finishing/Backfilling

As directed by the EOR, stone or soil backfill is placed within the voids of the ACB units after block installation has been completed. Typical backfill material is an angular gravel with no fines and no component larger than 1.5" equivalent diameter, or native soil; other material may be used at the discretion of the EOR. See Figure 5 for example.

Figure 5 – Backfilled Geolink

Approximate backfill volumes can be estimated by the values shown in Table 1. Volumes may vary based on installation spacing, block placement, and infill density.

Height	Approximate Backfill Volume (cf)
4"	0.06 cf/sf
6"	0.10 cf/sf

Table 1 - Approximate Backfill Volume

Material Delivery – Palletized Quantities & Geosynthetics

Included below in Table 2 are the anticipated pallet quantities and weights for the Geolink units. Geolink will be palletized and wrapped on standard 4' wooden pallets to be unloaded with 4,000 lb. capacity equipment with forks. Standard material handling techniques are assumed upon delivery of material to the project site.

Height	Width	Length	Min. Weight/ Block	# Units per Pallet	Typical Weight/Pallet
4"	12"	16"	36	60	2235
6"	12"	16"	55	48	2715

Table 2 - Palletized Quantities

Geosynthetic materials are shipped to the project site in full rolls and delivered prior to or in conjunction with the palletized ACB material.

Damaged Units

Conduct a visual Inspection of ACB material upon delivery. All units should be sound and free of defects that would interfere with either the proper placement of the unit or impair the performance of the system. Surface cracks incidental to the usual methods of manufacture or surface chipping resulting from customary methods of handling in shipment and delivery shall not be deemed grounds for rejection.

a. Cracks exceeding 0.25 inches (0.635 cm) in width and/ or 1.0 inch (2.54 cm) in depth shall be deemed grounds for rejection.
b. Chipping resulting in a weight loss exceeding 10% of the average weight of a concrete unit shall be deemed grounds for rejection.

Damaged ACB Unit - Cracked or split through the block.

- Method 1: Remove existing damaged unit(s), re-grade and replace geotextile per project specification, replace with new unit(s).
- Method 2: Remove existing damaged unit(s), re-grade and replace geotextile per project specification, grout solid with 4,000 psi grout or concrete. Ensure filled void is adequately consolidated (vibration of material) as well as finishing the in-filled area to the top, but not above, the surrounding ACB units(s).

Bulged ACB Unit - Bulging or dislodged block/Unacceptable Projection Height

- Method 1: Remove existing dislodged unit(s), re-grade and replace geotextile per project specification, and re-install previously dislodged unit(s).
- Method 2: Remove existing damaged unit(s), re-grade and replace geotextile per project specification, grout solid with 4,000 psi grout or concrete. Ensure filled void is adequately consolidated (vibration of material) as well as finishing the in-filled area to the top, but not above, the surrounding ACB unit(s).

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