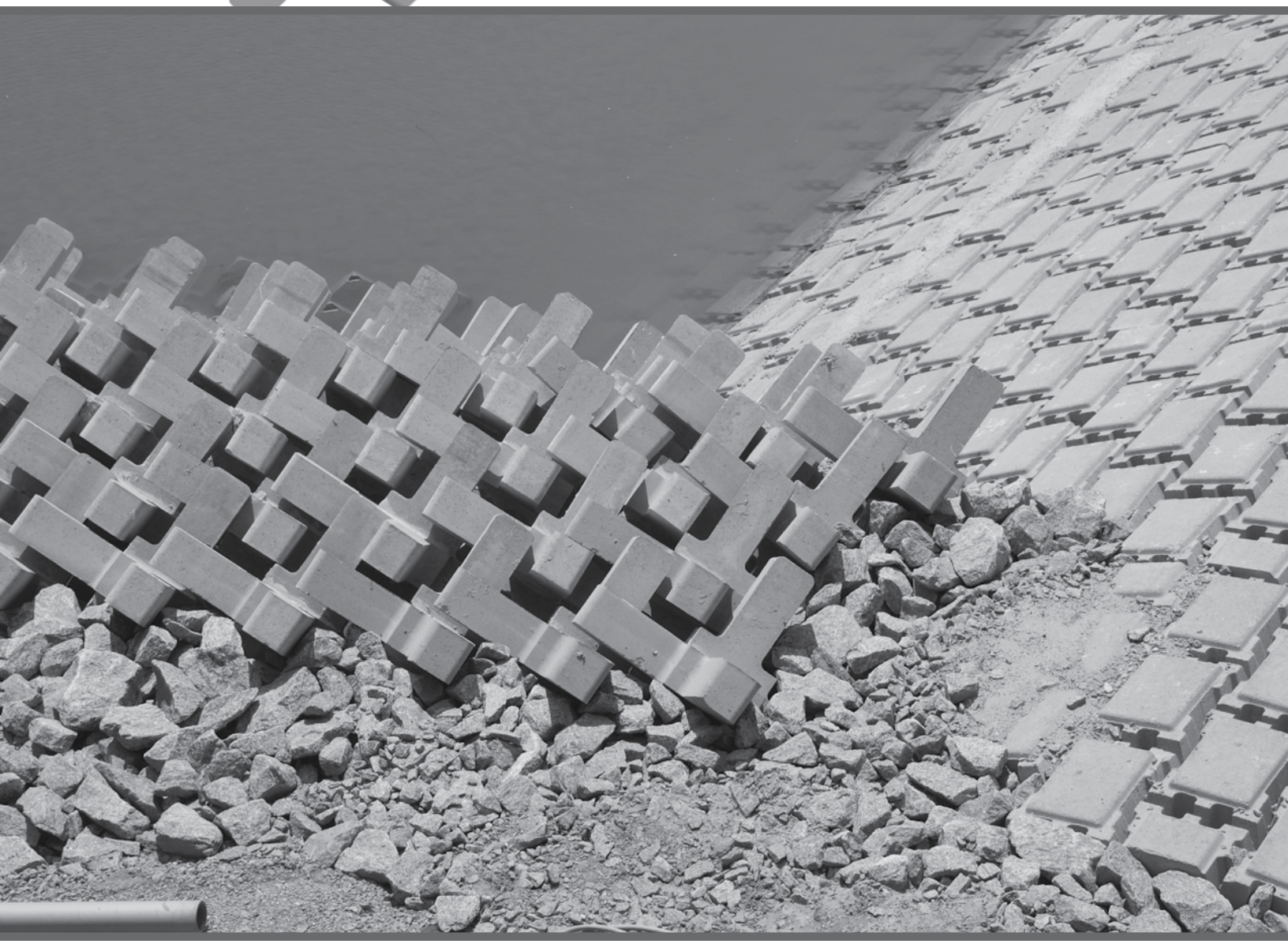
CONTECH®
ENGINEERED SOLUTIONS

A-Jacks® Installation Guide



ARMORTEC®
Erosion Control Solutions

A-Jacks® Installation Guide

General

It is the Contractor's responsibility to maintain safe work practices consistent with Occupational Safety and Health Administration (OSHA) 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.

The purpose of the A-Jacks Installation Guide is to provide recommendations for the proper installation of A-Jacks revetment systems. While this guide offers a set of instructions for performing those operations that are critical for the proper functioning of A-Jacks revetment systems, final preparation and installation is the responsibility of the end user. Additional information is contained in HEC-23 Design Guideline 19, Concrete Armor Units.

The proper installation of A-Jacks is important to achieving the intended hydraulic performance and maintaining stability against the erosive forces of flowing water. An A-Jacks revetment system consists of a prepared and compacted subgrade, a site-specific filter fabric, and properly sized A-Jacks placed on a bedding layer (granular materials and/or geotextile) in such a manner in which they produce a densely-interlocked matrix in "intimate contact" with the bedding layer and subgrade. Each individual site will vary so it is important to follow the engineering project drawings as designed and sealed by a registered Professional Engineer.

Proper installation of A-Jacks is important to achieving the intended hydraulic performance.

Site Planning & Preparation

Foundation Preparation

All subgrade preparation should be performed in accordance with ASTM D6884-03, Standard Practice for Installation of Articulating Concrete Block (ACB) Revetment Systems and with approved contract drawings.

Fabric shall have the proper overlap and be free of any holes or tears.

Embankment & Energy Dissipation Applications

Areas on which filter fabric and A-Jacks are to be placed, shall be constructed to the lines and grades shown on the contract drawings to the tolerances specified in the contract documents and approved by the engineer. All areas to receive the A-Jacks shall be compacted and graded smooth to facilitate the installation of the revetment system and ensure that intimate contact (between the slope face, the filter fabric and the A-Jacks) is maintained throughout the system.

Unsatisfactory soils (soils having excessive in-place moisture content, soils containing clods, roots, or other organic material that impair the local slope face) must be removed, replaced with approved material and compacted to a minimum 90% of Standard Proctor density (ASTM D698).

Large holes, "pockmarks", slope board teeth marks, footprints or other voids normal to the local slope face shall not be permitted. Where such areas are evident, they shall be brought to grade by placing compacted homogeneous material. The slope and slope face shall be uniformly compacted, and the Engineer shall determine the depth of layers, homogeneity of soil, and amount of compaction required.

Care shall be exercised so as not to excavate below the grades shown on the Engineer's Contract Drawings, unless directed by the engineer to remove unsatisfactory materials. In such areas, they should be brought to grade by placing and compacting thin layers of approved material. In such areas where subgrade is above specified grade, they shall be brought to grade by removing material or reworking existing material and compacting until the required grades are achieved.

Pier Scour Applications

When applicable, the foundation preparation methodology described in the embankment applications section should be followed for pier scour applications as well. When working in an underwater application, it is the contractor's responsibility to assess the jobsite conditions and the means of achieving proper subgrade preparation, per the Engineer's Contract drawings, specifications, and tolerances. In the presence of existing scour holes, filling to the desired grade may be achieved by using soil or stone, as required by the Engineer of Record.

The foundation preparation methodology in the embankment section should be followed in for pier scour applications as well.

If stone is used, the geotextile will need to be placed within the scour hole prior to backfilling. In the case of soil being used, backfill the hole first, then the geotextile will be wrapped around the bundled A-Jacks on top of the fill.

Product Delivery and Handling

Deliveries are typically made on 48' flatbed trailers, so adequate truck access and turnaround room at the jobsite must be provided by the Contractor.

The trucks and drivers may be contract carriers, and the drivers are not expected to have any special certifications, jobsite training or equipment. Required off-loading equipment shall be the responsibility of the contractor to provide. In the case where special requirements are needed, the terms and conditions will need to be negotiated and established at the time of the order.

A-Jacks modules are comprised of 2 individual pieces delivered to the site on pallets (60 pieces/30 units per pallet).

Drivers will only untie their loads and are not qualified to help with any rigging, unloading or installation. CONTECH requires notification of any changes or cancellation of scheduled deliveries during normal business hours the day prior to loading in order to avoid any cancellation fees. CONTECH requires at least a full 4-day notice to schedule trucks (Example: notification on Monday for Friday delivery).

A-Jacks modules are comprised of 2 individual pieces, which are delivered to the site on pallets (60 pieces/30 units per pallet for 24" A-Jacks and 6 pieces/3 units per pallet for 48" A-Jacks). Units can be constructed on-site and banded together in clusters of various sizes, depending on equipment limitations, for ease of placement.

When standard delivery is not viable, the units can be reassembled and installed with a crane and spreader bar directly from the truck and will require additional coordination with the appropriate CONTECH representative. Timing is everything, be prepared to unload the A-Jacks when the trucks arrive. If applicable, the first load will have the filter fabric, along with the first set of A-Jacks.

CONTECH typically allows 2 hours for unloading time. Demurrage may apply after this 2 hour period and will be charged to the contractor. Loads are typically pre-loaded the day before in order to arrive first thing in the morning. Each load will have a Bill of Lading (BOL) that has the load number with unloading dates and time.

Installation Instructions

Placement of Filter Fabric

Embankment and Dissipation Applications

The subgrade shall be inspected immediately prior to filter fabric and A-Jack placement for proper preparation. The filter fabric shall be placed directly on the prepared subgrade, in intimate contact with the subgrade. The filter fabric shall not be walked on or disturbed in a manner that results in the loss of intimate contact between the filter fabric, the A-Jacks and subgrade soils.

The filter fabric shall be placed so that upstream sections overlap downstream sections and so that upslope sections overlap downslope sections ("shingle effect"). Overlaps shall be in the direction of flow wherever possible. The longitudinal and transverse joints shall be overlapped at least 3 feet (91 cm) for below-water installations and at least 2 feet (60 cm) for dry installations. The filter fabric shall extend at least 1 foot beyond the top, bottom, and flanking revetment termination points.

Geotextile filter fabric is placed directly on prepared subgrade and should not be disturbed.

Pier Scour Applications

When the filter fabric cannot be laid prior to the setting of the A-Jack units, the bundling procedure should be followed. Please refer to the section on bundling for more information.

Dissipation Applications

When using A-Jacks for dissipation purposes, the perimeter units can be grouted in place once final positioning has been decided upon. The grout should encase approximately 1/3 to 1/2 of the units standing height to prevent any unintended shifting of the system. In cases where grouting in place is not applicable, a stone drainage layer is recommended.

Placement of A-Jacks Units

Assembly

For A-Jacks greater than 24", units should be assembled with an epoxy-based grout in accordance with the manufacturers specifications. The armor units should be placed on a bedding layer (granular materials and/or geotextile).

A-Jacks articulating concrete blocks (ACB) units should be placed on a bedding layer.

Bedding Stone

Clean Bedding stone material can be utilized for bridging interior voids and establishing a consistent bedding layer for additional lifts of unit(s), whether hand placed or bundled. Vertical fluctuations occurring from unit to unit or bundle to bundle will be compensated for by utilizing bedding. The bedding stone serves the additional purpose of providing a layer of protection on top of the geotextile, preventing the units from potentially puncturing the fabric.

The recommended bedding layer size (D50) for 24" A-Jacks is 2-3"and for 48" A-Jacks is 4-8"; alternate D50 size for bedding layer will be defined by local aggregate availability, approved by the Design Engineer.

Placement of A-Jack Unit

A-Jacks can be installed individually or in bundles at the discretion of the Contractor. The proposed A-Jacks units will be constructed within the specified lines and grades shown on the Contract Drawings.

Placed individually, A-Jacks will be set with uniform spacing. For a specified area receiving the 24" units, standard spacing between unit center in both the x and y dimension is 12". Tighter placement tolerances are possible, but may become difficult to achieve while placing successive rows in a matrix. Standard installation includes placing the units in a consistent repeatable fashion to aid in efficiency.

Recommended in-place orientation of the unit(s) emphasizes pointing exposed projecting unit arm (vertical or horizontal) downstream whenever practical during construction. Subsequent cabling of outer units is common, depending on the system embedment for the project.

Bundling Instructions

Bundling is typically required in conditions where the ability to set individual units is restricted. This may be due to the requirement for a wet install in high water or site conditions that prevent laborers from reaching the install location. In these cases, bundling the A-Jacks allows for the setting of multiple units at a time without the need for a hands on installation approach.

Bundling is required where the ability to set individual units is restricted.

When bundling, A-Jacks are placed into a pre-determined matrix, spacing them as closely as possible (9.6" center spacing in x and y directions). Cable will be placed around the pre-determined matrix (around mid-section), hand tightened and connected using standard cable hardware supplied by the manufacturer. Bundles are to be placed as closely as possible, with recommended tolerance requirement of 4" between bundles. If the bundling method is employed by the Contractor, tolerances between bundles will be discussed and agreed upon prior to commencing work.

If a geotextile is utilized, the bundle configuration will require the appropriate filter fabric to be laid out first and the desired configuration of A-Jacks set on top of the fabric. The fabric will then be wrapped around the bottom and side, securing the A-Jacks within using cable comprised of UV-stabilized polyester, galvanized steel, or stainless steel as appropriate for the particular application.

This cable (belly band) is not for lifting, but instead is intended to hold the units together when lifted and after placement.

The cable should be tighten to fit "snug"; Cable is too tight if corner units begin to move. Use crimp sleeves to secure cables once properly bundled.

Once the configuration is secure, the bundle can be lifted and set in the desired location.

Lifting

To secure the A-Jacks bundle for lifting, a cable must be run under every row of units to ensure the load is evenly distributed. To properly lift bundles, a spreader bar must be used to distribute the load without crushing the interior units. Contech does not provide A-Jack spreader bars, but examples of spreader bars developed by others are shown below.

A cable must be run under every row of units to ensure the load is evenly distributed.

A spreader bar is essential to distribute the load without crushing the interior units.

Consultation

CONTECH may provide design and construction guidance to the specifying engineer during the project design phase, and may have a representative available on-site during the initial installation phases as needed and at the discretion of the Engineer of Record.

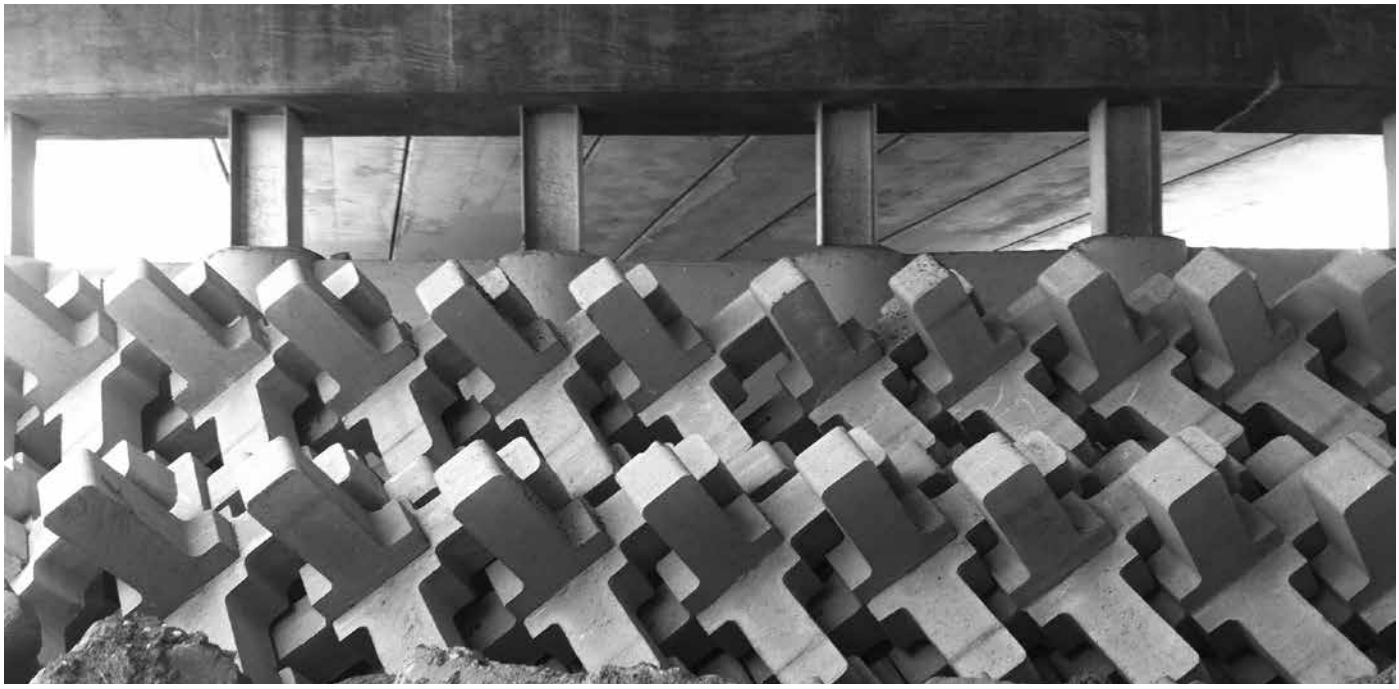
Special Instructions for 48" A-Jacks

The assembly of 48" A-Jacks on site can be facilitated by the preparation of an assembly fixture (8" masonry blocks and 2x6 boards work well, as depicted below). The contractor should plan for space on the project site for this purpose, and plan on some additional labor dedicated to A-Jacks assembly; the process involves the use of a grout (typically a 4000 psi cement grout or epoxy grout) to eliminate movement between the assembled halves and allow the A-Jacks to function as a single unit.

Cement grouts with a fast-curing admixture can allow for A-Jacks to be moved within about 30 minutes, with full curing within about 8 hours. Epoxy grouts can be used for special underwater installations if necessary but is generally about 5 times more expensive than cement grouts.

Individual 48" A-Jacks weigh about 600-630 lbs when assembled and are generally moved into place individually using webbing; bundling as described for 24" A-Jacks is possible as well.

Notes:



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Support

If you need guidance please, call your local sales representative or our corporate headquarters at 800-338-1122 and ask for a representative.

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from Contech representatives.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products.

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