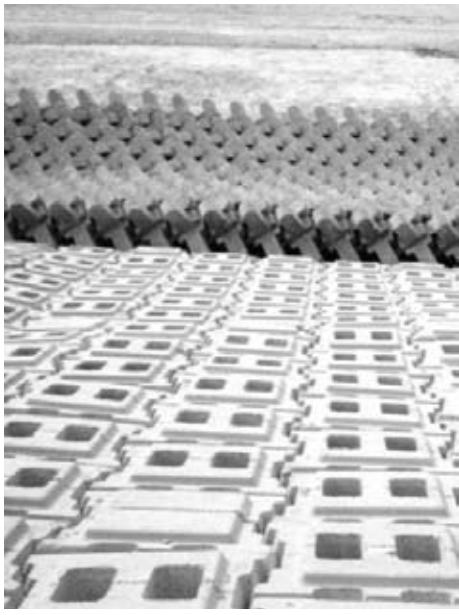
CONTECH®
CONSTRUCTION PRODUCTS INC.

Engineered Hard Armor Solutions



ARMORTEC™
Erosion Control Solutions

Channel Lining | Shoreline Protection | Dam & Spillway Protection | Levee Stabilization | Bridge Scour

ArmorFlex: Articulating Concrete Block Mats

The industry leader since 1978, ArmorFlex® mats make a flexible matrix of concrete blocks with uniform size, shape and weight used for hard armor erosion control. ArmorFlex blocks have specific hydraulic capacities and are laced longitudinally with galvanized steel, stainless steel or polyester revetment cables which provide ease of handling and installation.

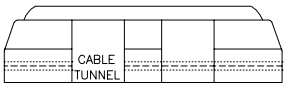
Open-Cell Block

Closed-Cell Block

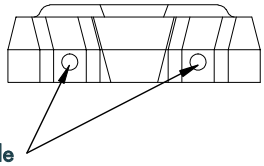
Applications

- Channel Lining
- Shoreline Protection
- Boat Ramps & Access Roads
- Dam Overtopping Protection
- Pipeline & Cable Protection
- Bridge Abutment Protection
- Retention Basins
- Levee Stabilization
- Bridge Scour Protection

Side View



End View



ArmorFlex has proven to be an aesthetic and functional alternative to dumped stone riprap, gabions, structural concrete and other hard armor erosion protection systems. ArmorFlex is easy to install and has a low life-cycle cost when compared to other permanent solutions. These two benefits can drastically reduce the cost to install and maintain the system. ArmorFlex mats are installed on a prepared subgrade utilizing conventional construction equipment and site-specific filter fabric. While both block types provide protection and stability, only the open-cell specifically offers the void space necessary for revegetation.

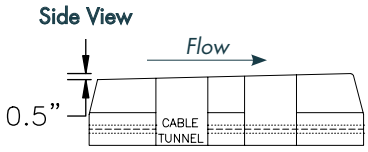
Research Proven Performance

Armortec has carried out extensive research into wave and open channel flow conditions on ArmorFlex in the United States and the Netherlands. Design manuals and computer programs are available to assist in the proper ArmorFlex block selection for your hydraulic conditions.

Tapered Series

Armortec's unique Tapered Series ArmorFlex block design offers superior protection for embankment dams, spillways, high velocity channels and down chutes. The essential design component of ArmorFlex Tapered series is the 0.5 inch taper that virtually eliminates destabilizing impact flow forces, thereby providing a high factor of safety. The ArmorFlex Tapered block system has been successfully tested under hydraulic jump conditions at Colorado State University. Each Tapered series design incorporates a four inch rock drainage layer beneath the system.

Tapered-Cell Block



ArmorFlex Design Software and Guidelines are available through the CONTECH website at www.contech-cpi.com

ArmorWedge

ArmorWedge® is a concrete step overlay protection system for embankment dams and spillways that are subject to high forces associated with overtopping flow. Researchers at Colorado State University assessed the stability of the blocks by comparing the downward (positive) forces of the block weight and the pressure of the flowing water to the uplift (negative) forces. The ArmorWedge system was tested up to and including the facility discharge capacity of 40 cf/s/ft. This discharge capacity had associated water velocities of 35 ft/sec and a shear stress of 22 lbs/sqft. Even at these levels the ArmorWedge system remained stable. An effective drainage system - allowing water to be removed from beneath the system - is essential to the design of the overlay.

The practicality of ArmorWedge lies in the cost effective ease of installation. This is particularly true for projects where the use of large machinery is deemed impractical due to confined, hard to reach jobsites or environmental impact on the surrounding area. ArmorWedge is typically installed by hand over site-specific filter fabric and subsequent drainage medium on a well compacted surface.

Applications

- Dam Overtopping
- High Velocity Channels
- Primary and Secondary Spillways

ArmorWedge Block

ArmorLoc

ArmorLoc® concrete interlocking blocks are specifically designed to control erosion. The ArmorLoc system provides easy and economical installation when equipment is not feasible or cannot be used due to confined or hard to reach areas. ArmorLoc is installed manually over site-specific filter fabric on a prepared surface. It improves the landscape and promotes drainage from the smallest erosion control job to the largest commercial project.

ArmorLoc is available in two sizes and weight classifications that provide excellent performance during light wave and open-channel flow conditions. The unique interlocking design of ArmorLoc keys each block into four adjacent blocks to hold it firmly in position and resist lateral movement.

Applications

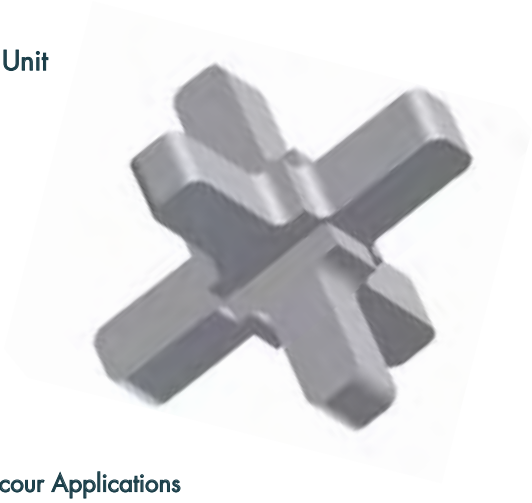
- Retention Basins
- Shoreline Protection
- Drainage Ditch Lining
- Outfall Protection
- Bridge Abutment Protection

ArmorLoc Block

A-Jacks: Streambank Stabilization, Scour Protection and Energy Dissipation

A-Jacks® are high stability concrete armor units designed to interlock into a flexible, highly permeable matrix. A-Jacks can be installed either randomly or in a uniform pattern. The voids formed within the A-Jacks matrix provide approximately 40% open space in the uniform placement pattern. These voids provide habitat for fish and other marine life when applied as a reef, revetment or as a soil support system in river applications. In addition, the voids may be backfilled with suitable soils and planted with a variety of vegetation including grasses, shrubs and trees above the normal base flow.

A-Jacks Unit



Applications

- Drop Structures
- Weirs
- Energy Dissipation
- Bridge Scour Protection
- Streambank/Toe Stabilization

Streambank Applications

Streambank erosion often produces steep banks with little or no vegetation. These unprotected banks are even more susceptible to erosion due to over steepening, loss of ground cover, groundwater discharge and stream erosion at the base of the bank. A-Jacks concrete armor units provide an alternative which when used with bio stabilization technique, develops a cost-effective solution.

Bridge Scour Applications

The ability of the A-Jacks system to dissipate energy and resist the erosive forces of flowing water allows this system to protect channel boundaries from scour and erosion. Extensive laboratory research was performed on both model and full scale units in order to evaluate the hydraulic properties of the A-Jacks units. An A-Jacks Design Manual for the hydraulic design of open-channel conveyance ways and pier scour countermeasure is available upon request.

Energy Dissipation

A-Jacks ability to dissipate energy in channel, spillway or culvert outfall applications relies on the inherent roughness of the units. For A-Jacks, the design value for Manning's roughness coefficient is n=0.1. This value was determined from extensive full and quarter scale laboratory testing. The ability of A-Jacks to increase roughness creates a hydraulic jump when flow encounters the units. Creating the hydraulic jump effectively releases the energy associated with high velocity and/or steep embankment flow conditions. By releasing the energy, the erosive forces associated with the hydraulic jump are also greatly diminished. As the flow travels downstream through the A-Jacks matrix, the energy grade line slope continues to be reduced until the desired flow conditions are obtained downstream of the A-Jacks units.

ArmorFlex Design Software and Guidelines are available through the CONTECH website at www.contech-cpi.com

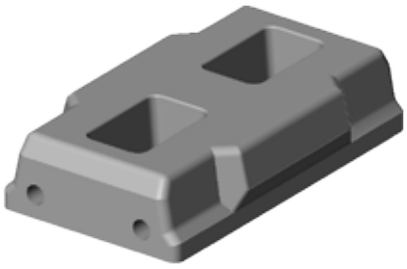
ArmorStone

ArmorStone® concrete interlocking blocks are specifically designed to control erosion by minimizing vertical movement of the units. The ArmorStone system provides easy and economical installation when equipment is not feasible or cannot be used due to confined or hard to reach areas. ArmorStone is installed manually over site-specific filter fabric on a prepared surface. It improves the landscape and promotes drainage from the smallest erosion control job to the largest commercial project. Cable ducts are designed into the units to allow for the subsequent lacing of blocks to secure the extreme perimeters of the system if necessary.

Applications

- Channel Lining
- Shoreline Protection
- Boat Ramps & Access Roads
- Dam Overtopping Protection
- Pipeline & Cable Protection
- Bridge Abutment Protection
- Retention Basins
- Levee Stabilization
- Bridge Scour Protection

ArmorStone Block



ArmorRoad

ArmorRoad® was developed in the field with input from contractors, construction managers and owners. The result is a flexible product that is efficient to install, aesthetically pleasing and able to withstand heavy traffic loads in harsh environments. ArmorRoad does not require the sand backfill typically required of standard pavers due to its unmatched durability with 8,000 PSI and 6" thickness. In addition, should a problem occur in the subgrade, ArmorRoad can be removed quickly and reinstalled.

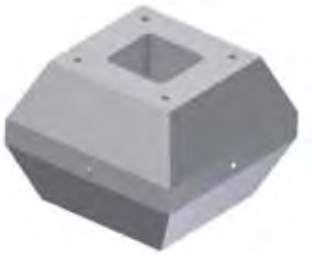
Applications

- Durable Driving Surface
- Temporary Road Application
- Heaving and Expanding Subgrade Condition

ArmorRoad Block

ArmorFlex: Off Shore (OS)

ArmorFlex OS Block



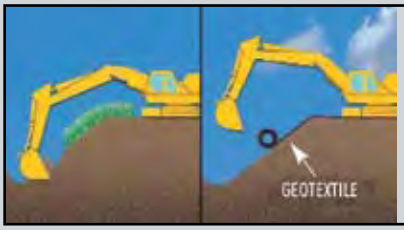
The ArmorFlex® OS system is a variable size, articulating mat consisting of machine compressed concrete units. Each unit is kiln dried, resulting in compressive strengths over 3,000 psi. After the units have been manufactured, mats are assembled by lacing the individual units with corrosion resistant polyester cable. Polyester cable and aluminum fittings provide for a long lasting, non-corrosive connection allowing the retrieval of a mat that has been in place for many years. The ArmorFlex OS system also provides abrasion resistant padding (as shown below) on each unit to prevent damage from occurring to pipes and cables while providing cathodic protection when specified.

The ability of the ArmorFlex OS open cell system to withstand wave action during placement in rough seas makes it superior to competitive systems. The method of assembly of the ArmorFlex OS system provides for mats of varied dimension which are available with or without abrasion resistant pads. Mats are typically eight feet wide by lengths as required by design. These custom-made mats can reduce installation time when compared to other concrete mat systems.

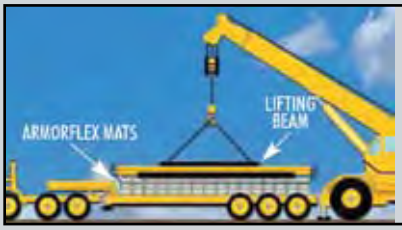
Applications

- Resistant to Horizontal & Vertical Movement of Pipelines/Cables
- Protection Against Dragging Anchors
- Wave, Currents & Storm Protection

ArmorFlex: Installation

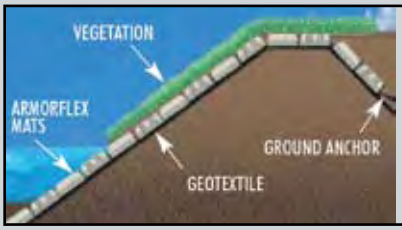


Step 1:
ArmorFlex arrives on-site as a system of factory-assembled mats. ArmorFlex is placed on a site specific geotextile which has been placed on a prepared subgrade using conventional construction equipment.



Step 2:
Mats are supplied on flat bed trailers. Mats can be handled with a spreader bar which can be rented from CONTECH.

Step 3:
Above normal waterline mats may be topsoiled and seeded to give a vegetated effect.



Step 4:
Proper toe trench requires a minimum of two rows of block buried below predicated soil depth. Tapered series block or mats subject to wave attack are required to have a bedding layer of crushed stone or gravel.

Contact your local CONTECH representative for complete information on how to properly install ArmorFlex.

ArmorFlex Design Software and Guidelines are available through the CONTECH website at www.contech-cpi.com

CONTECH Construction Products Inc. provides site solutions for the civil engineering industry. CONTECH's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control and soil stabilization products.

For more information, call one of CONTECH's Regional Offices located in the following cities:

Ohio (Corporate Office)	**513-645-7000**
California (San Bernardino)	909-885-8800
Colorado (Denver)	303-431-8999
Florida (Tampa)	727-544-8811
Georgia (Atlanta)	770-409-0814
Indiana (Indianapolis)	317-842-7766
Kansas (Kansas City)	913-906-9200
Maryland (Baltimore)	410-740-8490
Oregon (Portland)	503-258-3180
Texas (Dallas)	972-590-2000

Visit our web site: www.contech-cpi.com
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