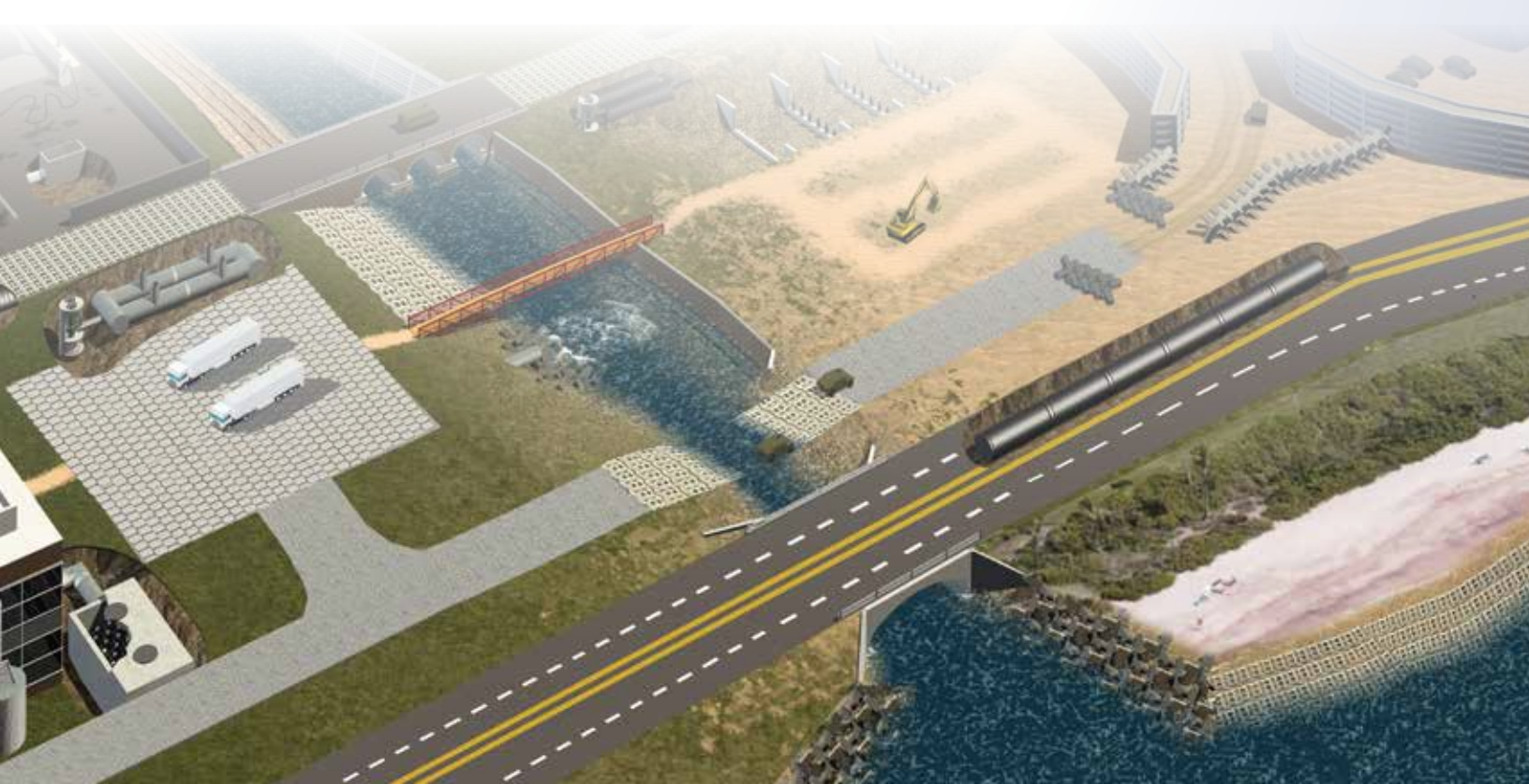


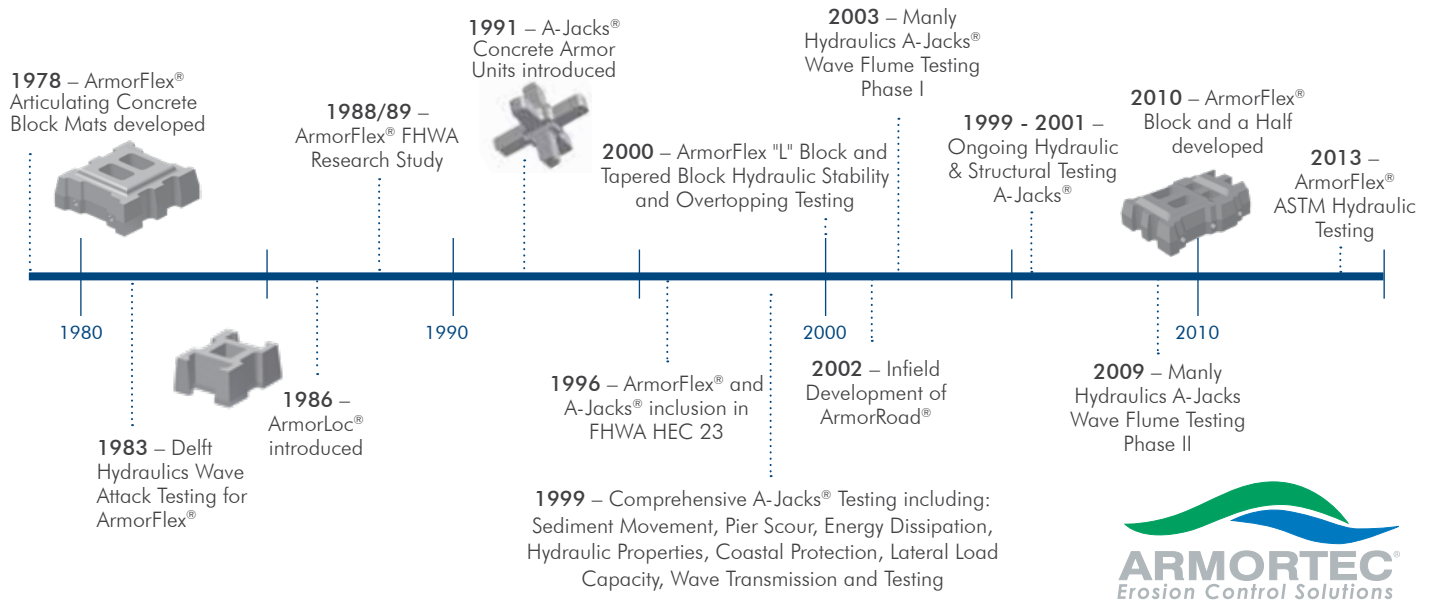
## ARMORTEC® HARD ARMOR SOLUTIONS



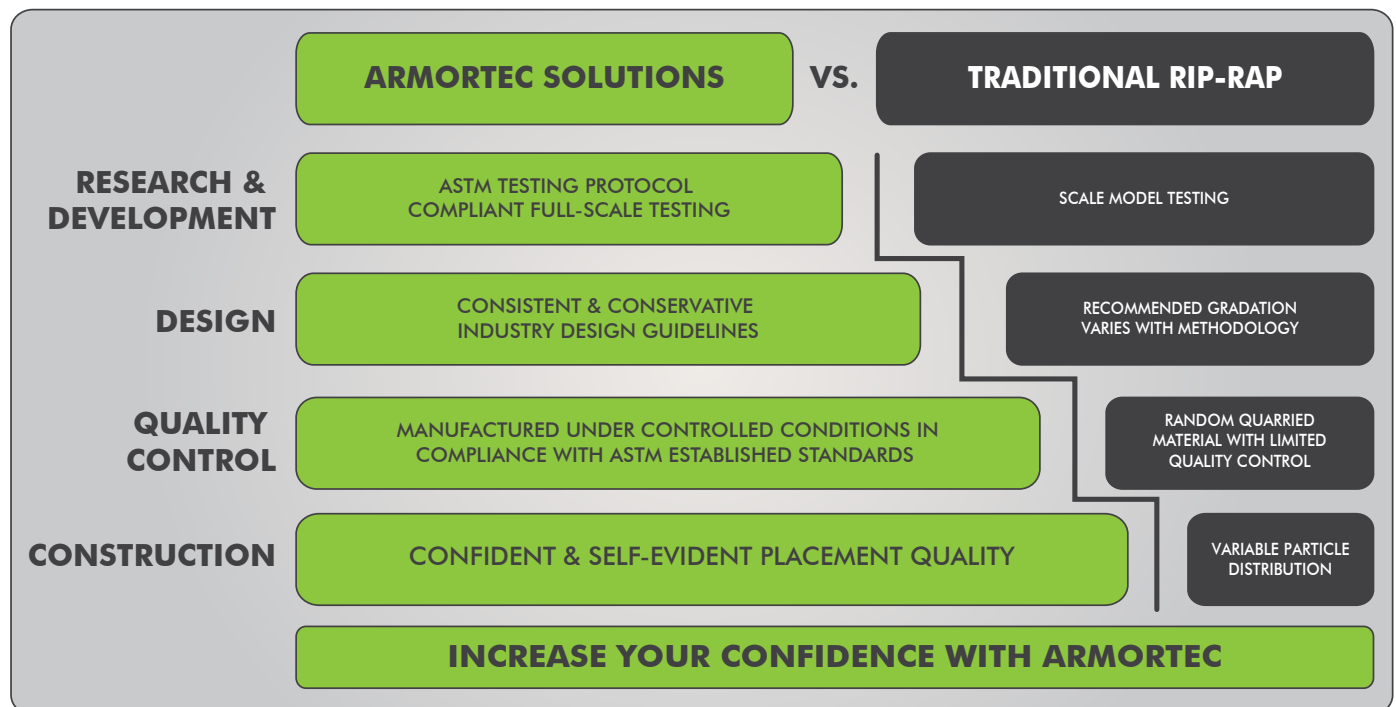
# ARMORTEC HARD ARMOR SOLUTIONS.

## A LEGACY OF SUCCESS

Doing the seemingly impossible is an everyday job. With erosion control systems for any need in any application, Contech Engineered Solutions delivers a range of effective, efficient solutions. Our engineered systems provide performance-tested solutions for a wide variety of applications including channel lining, shoreline protection, dam crests and spillways, energy dissipation, pipeline and cable protection, bridge and abutment protection, boat ramps, low water crossings, outfall protection, wave attack protection and more.



## BUILDING CONFIDENCE EVERY STEP OF THE WAY





# PROCESS – DESIGN, PREFABRICATION, INSTALL.

PRODUCTION



TRANSPORTATION



SITE PREPARATION



INSTALLATION



COMPLETION





# ARMORFLEX® ARTICULATING CONCRETE BLOCKS

## OPEN CELL BLOCK DESIGN ALLOWS FOR REVEGETATION



BEFORE



AFTER

## CLOSED CELL BLOCK DESIGN ALLOWS FOR HEAVY LOADING



VEHICULAR



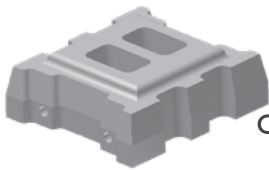
DEBRIS LOADING

## BOTH BLOCKS READILY ADAPT TO COMPLEX SITE GEOMETRIES

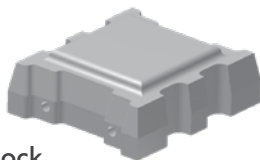


## BLOCK OPTIONS

Open-Cell Block



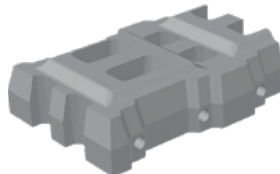
Closed-Cell Block



Tapered Open-Cell Block



Block and a Half®



### ARMORFLEX UNIT SPECIFICATION

Block Class		Nominal Thickness (in)	Length (in)	Width (in)	Gross Area (sf)	Minimum Weight (lbs)	Open Area %	τ <sub>c</sub> 0° slope* (psf)
OPEN	30-S	4.75	13.0	11.6	0.98	33	20	5.2
	50-S	6.00	13.0	11.6	0.98	42	20	6.1
	40	4.75	17.4	15.5	1.77	59	20	11.2
	50	6.00	17.4	15.5	1.77	76	20	13.6
	70	8.50	17.4	15.5	1.77	107	20	17.7
	40-L	4.75	17.4	23.6	2.58	97	20	14.6
	50-L	6.00	17.4	23.6	2.58	116	20	22.1
70-L	8.50	17.4	23.6	2.58	164	20	29.5	
CLOSED	45-S	4.75	13.0	11.6	0.98	39	10	6.2
	55-S	6.00	13.0	11.6	0.98	50	10	7.3
	45	4.75	17.4	15.5	1.77	71	10	13.5
	55	6.00	17.4	15.5	1.77	91	10	16.3
	85	8.50	17.4	15.5	1.77	126	10	21.1
	45-L	4.75	17.4	23.6	2.58	109	10	21.9
	55-L	6.00	17.4	23.6	2.58	138	10	26.3
85-L	8.50	17.4	23.6	2.58	195	10	35.1	
HIGH VELOCITY APPLICATIONS								
TAPERED	40-T	4.75	17.4	15.5	1.77	58	20	25.0
	50-T	6.00	17.4	15.5	1.77	75	20	30.5
	70-T	8.50	17.4	15.5	1.77	109	20	38.5

\* In accordance with ASTM D 7276 – Standard Guide for Analysis and Interpretation of Test Data for ACB Revetment Systems in Open Channel Flow.



# ARMORFLEX® ARTICULATING CONCRETE BLOCKS

## APPLICATIONS

- Channel Lining
- Shoreline Protection
- Scour Protection
- Slope Protection
- Outfall Protection
- Pipeline & Cable Protection
- Weirs
- Spillways
- Dam Overtopping
- Emergency Overflows
- Grade Transitions
- Intracoastal Waterways
- Bays
- Lakes
- Reservoirs
- Low Water Crossings
- Boat Ramps
- Down Chutes



SCOUR PROTECTION



SHORELINE PROTECTION



VEGETATED SLOPE



CHANNEL LINING



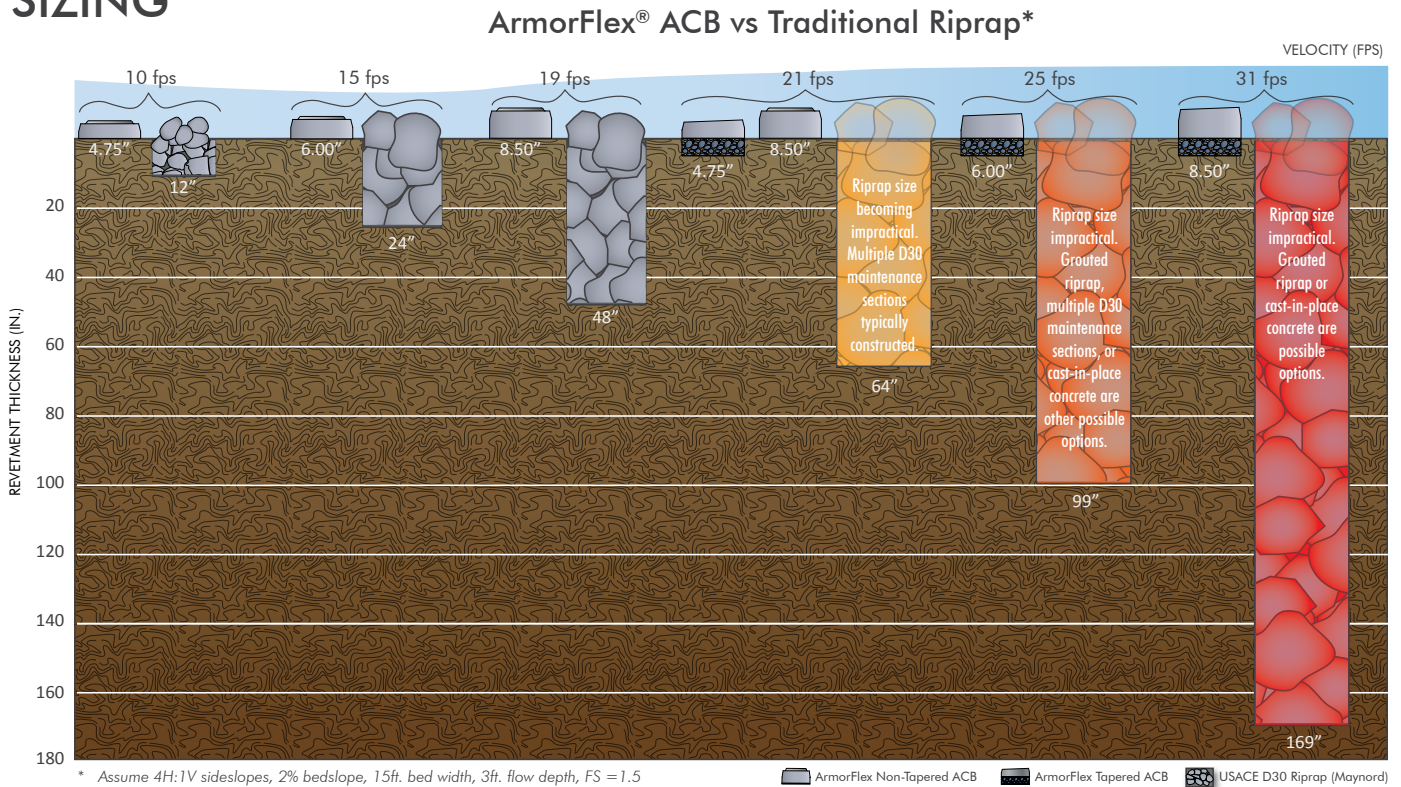
SUBMERGED ARMORING



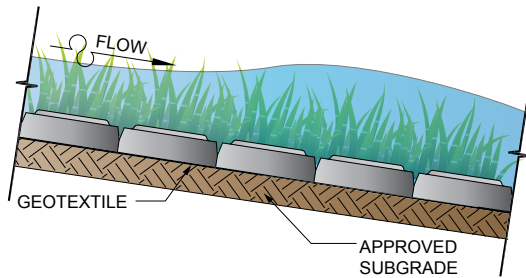
MATTED SOLUTIONS

# ARMORFLEX® DESIGN CONSIDERATIONS

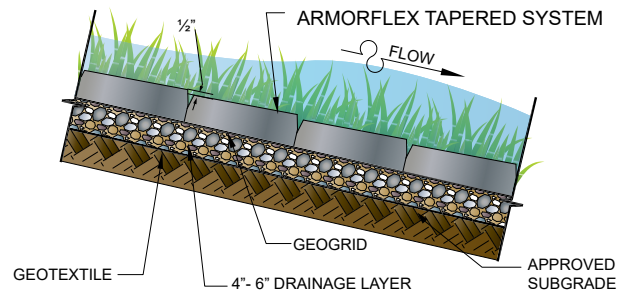
## SIZING



## TYPICAL CROSS SECTIONS (not to scale)



**Standard Cross Section**



**Tapered Series - Cross Section**

## REFERENCES AND STANDARDS

- National Concrete Masonry Association (2010), "Design Manual for Articulating Concrete Block (ACB) Revetment Systems", NCMA Publication TR 220A
- ASTM D 7276 – Standard Guide for Analysis and Interpretation of Test Data for ACB Revetment Systems in Open Channel Flow
- ASTM D 7277 – Standard Test Method for Performance Testing of ACB Revetment Systems for Hydraulic Stability in Open Channel Flow
- ASTM D 6684 – Standard Specification for Materials and Manufacture of Articulating Concrete Block (ACB) Revetment Systems
- ASTM D 6884 – Standard Practice for Installation of Articulating Concrete Block (ACB) Revetment Systems
- FHWA Hydraulic Engineering Circular NO. 23: Bridge Scour and Stream Instability Countermeasures: Experience, Selection and Design Guidance – Third Edition, Volume II, Design Guideline 8.
- USDOT Federal Highway Administration Hydraulic Engineering Circular NO. 15, Third Edition (2005) "Design of Roadside Channels with Flexible Linings" National Highway Institute.
- Julien, Pierre Y. (2010) "Erosion and Sedimentation", 2nd Edition, Cambridge University Press



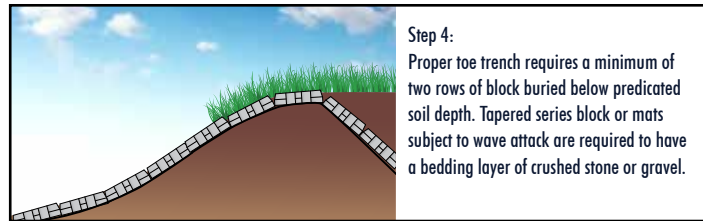
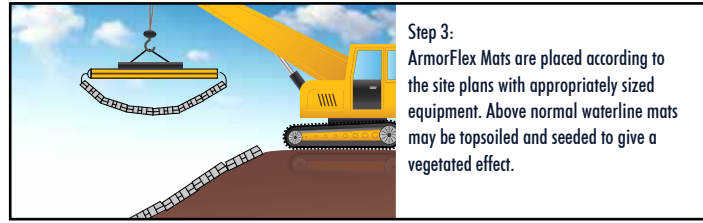
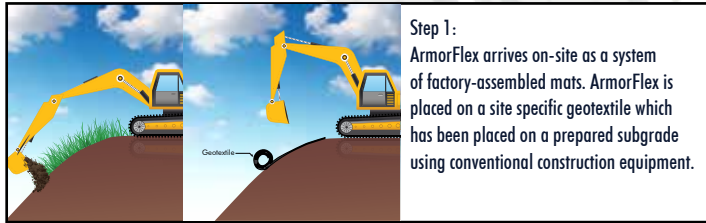
# ARMORFLEX® INSTALLATION

## THE ARMORTEC® HARD ARMOR ADVANTAGE

EASE OF INSTALLATION



## PROCESS



\* See ArmorFlex Installation Guide for additional information.

## ARMORROAD® CONCRETE UNITS

## APPLICATIONS

- Industrial Yards
- Durable Driving Surface
- Temporary Road
- Lay Down Yard
- Heaving and Expanding Subgrades



### ARMORROAD UNIT SPECIFICATION

Block	L	W	H	Minimum Weight (lbs / sf)	SF per Truck load
Mat	18.00	15.60	6.00	60	750



MATTED SOLUTIONS

# A-JACKS® CONCRETE ARMORING UNITS (CAU)

## APPLICATIONS

- Bridge/Pier Scour
- Energy Dissipation
- Streambank/Toe Stabilization
- Shoreline
- Drop Structure
- Weirs
- Coastal Breakwater (Jetty)
- Habitat Creation



A-Jacks® provided bridge pier foundation scour protection to withstand Hurricane Sandy.



ENERGY DISSIPATION



STREAMBANK



PIER SCOUR



## INSTALLATION

- Hand-placed and Bundled Unit Methods
- Field Technicians Available for Pre-con and Installation
- Construction Versatility

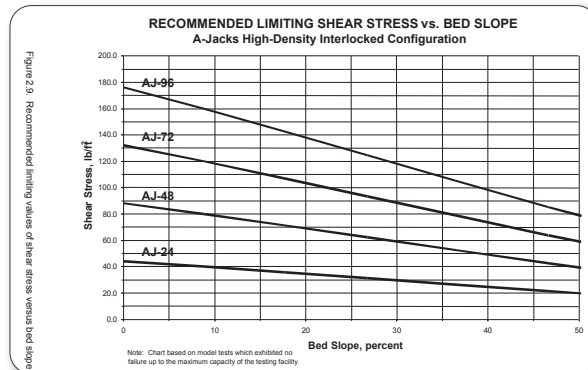
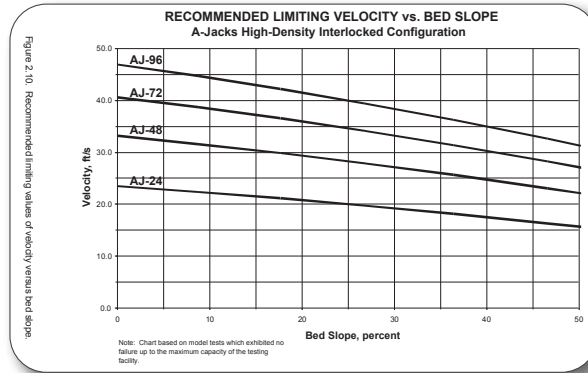
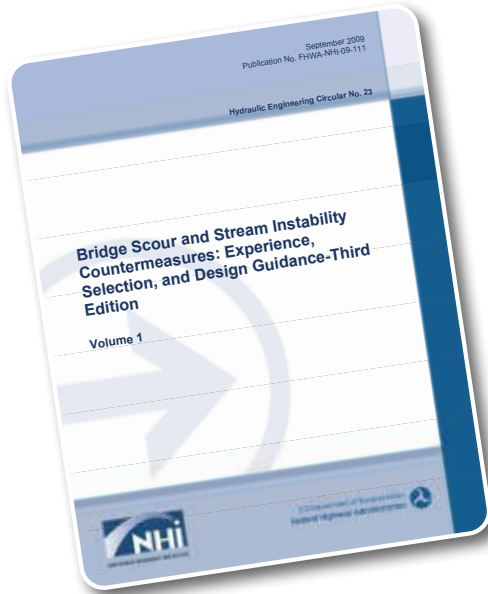




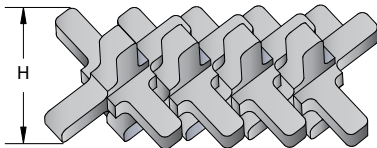
# A-JACKS® DESIGN CONSIDERATIONS

## DESIGN

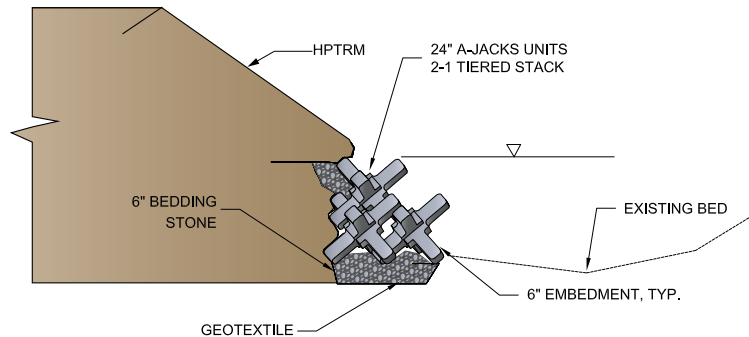
- A-Jacks® are recommended in FHWA HEC 23 with further guidance in Design Guideline 19.



## STANDARD DETAILS



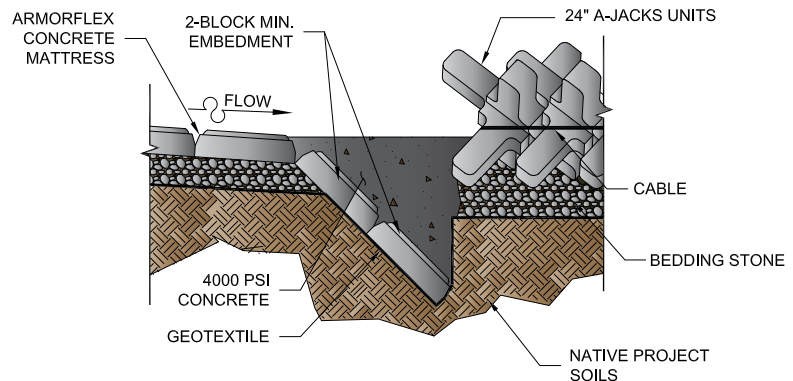
A-Jacks Placement Profile



A-Jacks Toe Stabilization Detail

### A-JACKS UNIT SPECIFICATION

A-Jacks	Coverage (SF)	Weight (lbs)	Standing Height (H) (ft)
AJ-24	1.0	78	1.5
AJ-48	4.0	629	3.0
AJ-72	9.0	2,120	4.5
AJ-96	16.0	5,022	6.0
AJ-120	25.0	9,699	7.5

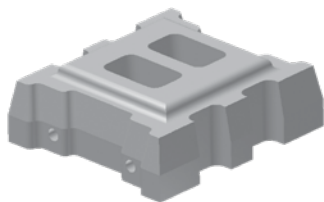


A-Jacks Energy Dissipation Detail

# ADDITIONAL HAND-PLACED ACB SOLUTIONS

## ARMORFLEX®

- Dam Overtopping
- Auxiliary Spillways
- Emergency Overflow
- Grade Transitions
- Retention Basins
- Shoreline Protection
- Drainage Ditch Lining
- Outfall Protection
- Bridge Abutment Protection



## ARMORLOC®

- Auxiliary Spillways
- Emergency Overflow
- Grade Transitions
- Retention Basins
- Shoreline Protection
- Drainage Ditch Lining
- Outfall Protection
- Bridge Abutment Protection
- Walking Paths
- Auxiliary Parking
- Slope Paving



## ARMORWEDGE®

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





# PROJECT PARTNER. CONTECH.

## OPTIONS & SUPPORT SPECIFIC TO YOUR PROJECT NEEDS

### CONSIDERATIONS FOR ENGINEER OF RECORD

Site Design

Soil Borings

Hydraulic Analysis



Scour Analysis



Scour Countermeasures


Permitting


Inspections


### SOLUTION DEVELOPMENT & DESIGN SUPPORT


Limit Assessment  



Hydraulic Analysis  



HEC RAS Review 



Factor of Safety Analysis 



Block Selection 



Engineer's Estimate 


Proposal Drawings  

Contract Drawings  

Specifications  

Approval Assistance  

Staging and Layout  

Fabrication Drawings 



Contech Support Available



Engineer of Record May Provide

### INSTALLATION SUPPORT

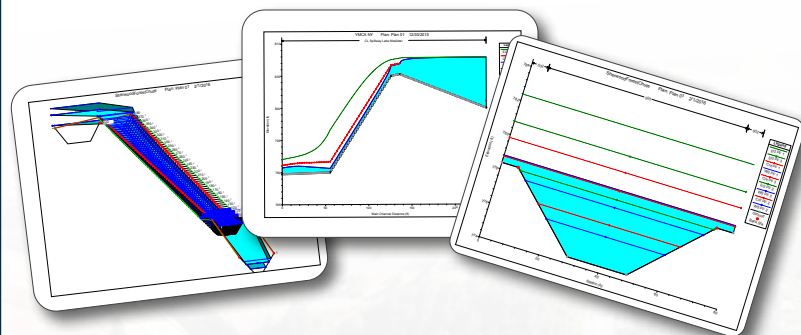
Preconstruction Meeting 

Logistics Coordination 

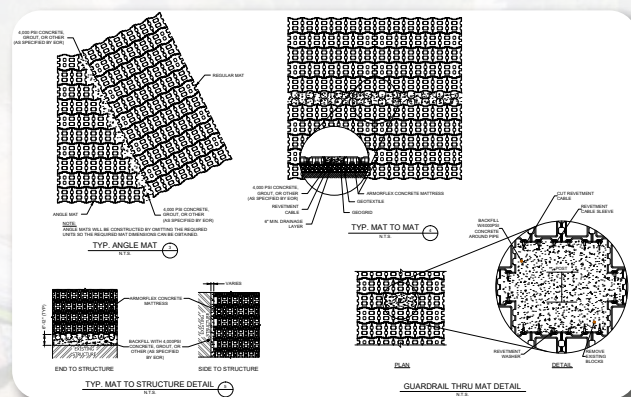
Onsite Installation Assistance 



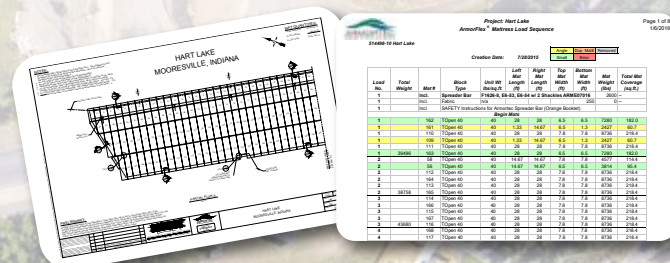
### HEC RAS REVIEW



### DRAWINGS & TECHNICAL SUPPORT



### STAGING & LAYOUT





Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.



STORMWATER  
SOLUTIONS



PIPE  
SOLUTIONS



STRUCTURE  
SOLUTIONS

## ADDITIONAL SPECIALTY PRODUCTS



TURF REINFORCEMENT MATS



BIN WALL



LIGHT GAGE METRIC SHEETING

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

<b>Corporate Office - Ohio (Cincinnati)</b>	<b>513-645-7000</b>
California (Roseville)	800-548-4667
Colorado (Denver)	720-587-2700
Florida (Orlando)	321-348-3520
Maine (Scarborough)	207-885-9830
Maryland (Baltimore)	410-740-8490
Oregon (Portland)	503-258-3180
Texas (Dallas)	972-590-2000

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