

**HYDRAULIC STABILITY OF
CHANNEL FLEX PBD SERIES CLASS 475
ARTICULATING CONCRETE BLOCK SYSTEM
IN STEEP-SLOPE, HIGH VELOCITY FLOW**

2H:1V Slope, No Drainage Layer



Prepared for:
Erosion Prevention Products
P.O. Box 891586
Houston, TX 77289-1586
July 2011

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P.O. Box 270460
Fort Collins, Colorado 80527
(970) 223-5556, FAX (970) 223-5578

Ayres Project No. 32-1614.00
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Paul E.



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1. INTRODUCTION

1.1 General

This report documents a series of full-scale tests to determine the hydraulic stability of an articulating concrete block (ACB) revetment system produced by Erosion Prevention Products. Ayres Associates was contracted by Erosion Prevention Products to conduct a hydraulic study program involving the installation and testing of a 4.75-inch thick articulating concrete block revetment system known as the Channel Flex – Parallel Bi-Directional (PBD) Class 475 system.

The testing program described in this report was conducted during June 2011 at Colorado State University's (CSU) Engineering Research Center in Fort Collins, Colorado. The testing program was conducted in CSU's Steep Slope Flume on a 4-foot wide, 25-foot long test section of compacted soil, 12 inches thick, at a slope of 1V:2H (50%) in the direction of flow.

The Channel Flex block is a precast open cell concrete block system. Each block in the system has 2 open cells that can be filled with rock, or with topsoil for vegetation. Physical characteristics of the blocks are discussed in detail in Section 2.2.

The system included a nonwoven needle-punched geotextile (Mirafi® 180N) installed directly on the soil. The revetment system was placed by hand on top of the geotextile according to procedures outlined by Erosion Prevention Products. No drainage layer was used beneath the block system. No cables were used in the installation.

Personnel from the CSU hydraulics laboratory constructed the earthen test section, installed the block system, conducted the test runs, and performed all data collection. Ayres Associates personnel observed installation of the testing system, all phases of the testing program, conducted the hydraulic analysis and interpretation of test data, and developed this report.

The preparation and construction of the earth test section and installation of the revetment product followed the techniques outlined in ASTM standard D7277, *"Standard Test Method for Performance Testing of Articulating Concrete Block (ACB) Revetment Systems for Hydraulic Stability in Open Channel Flow."* The hydraulic tests, including data collection techniques and reporting, followed the protocols established by ASTM standard D7277.

Hydraulic analysis included regression techniques and direct-step computation as recommended in ASTM standard D7276, *"Standard Guide for Analysis and Interpretation of Test Data for Articulating Concrete Block (ACB) Revetment Systems in Open Channel Flow"*. These procedures were used to determine the Manning's n value and associated hydraulic conditions using measured water surface elevations and total discharge for each test. Key personnel involved in the study included:

Erosion Prevention Products:

Mr. Lee Smith
Mr. Steve Kole
Dr. Jim DeShaw

Ayres Associates:

Mr. Paul E. Clopper, P.E.
Mr. John A. Eklund, P.E.

Colorado State University:

Dr. Chris Thornton, P.E.
Dr. Amanda Cox, P.E.
Mr. Denny Dahlin

CSU personnel involved in the installation and testing of the block system included Mr. Philip Clopper, Mr. Patrick Noonan, and Mr. Daniel Mogen.

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