

September 26, 2016

Subject: **Report of Results for CRD-C 48-92 Water Permeability Testing**
Testing Project Name: Penetron Permeability Testing
TEC Services Project No: 05-0526
TEC Laboratory No: 16-136-15055-001- Control

Dear Sirs:

Testing, Engineering and Consulting Services, Inc. (TEC Services) is an AASTHO R18, ANS/ISO/IEC 17025:2005 and Army Corp of Engineers accredited laboratory. TEC Services is pleased to present this report of our results on the submitted concrete cylinder specimen designated as “Mix # - 15055-001 - Control” for water permeability testing. Our services were performed in accordance with the terms and conditions of our Service Agreement TEC-PRO-05-0526. The test results presented only pertain to the samples tested.

The purpose of our testing was to evaluate the submitted specimen in accordance with the U.S. Army Corp of Engineers test method CRD-C 48-92 *Standard Test Method for Water Permeability of Concrete*. It is our understanding that the received specimen had been moist cured for a minimum of 28 days. Using a wet diamond table saw, the 6” x 12” cylinder was cut to produce the required 6” x 6” cylindrical specimen size for testing. The sample was tested using an applied pressure of 200 psi at the request of the client. Results of the water permeability testing are reported in Table 1. A graphical representation of the CRD-C 48-92 test results are presented in Figure 1. Photos of the tested specimen and the testing set-up are presented in Photos 1 & 2.

Table 1 – CRD-C 48-92 – Water Permeability Test Results

Average Flow Rate for Last 5 Days of Testing (cm ³ /hr):	0.052
Average Water Permeability (ft ³ /sec)/ft ² (ft head/ft)	2.86 E-12
Average Total Change in Volume of Water Based on Readings (cm ³)	48.70
Average Total Volume of Water Passed Through Specimen - Drip Pan (cm ³)	0.00

Figure 1 – Results of USACE CRD-C 48-92 Permeability Testing

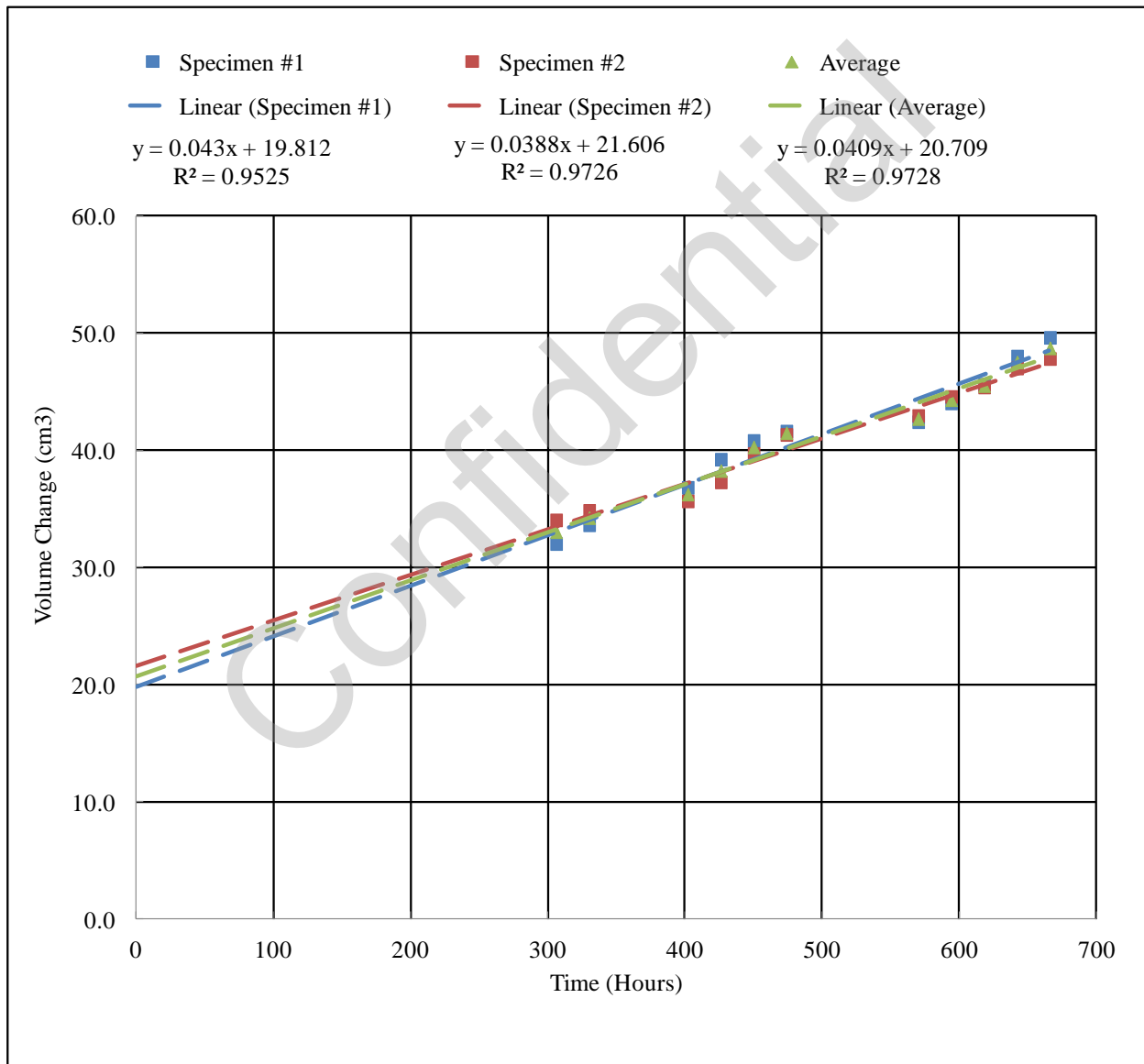


Photo 1 – Photo of Tested Specimen Showing Depth of Water Penetration



Photo 2 – Photo of CRD-C 48-92 Water Permeability Testing Set-Up



Testing, Engineering and Consulting Services, Inc. appreciates the opportunity to provide our professional services for this important project. If you have any questions regarding this report, or if we can be of further assistance please contact us at 770-995-8000.

TESTING, ENGINEERING & CONSULTING SERVICES, INC.



Chip P. Sherwood Jr.
Project Manager



Shawn P. McCormick
Laboratory Principal

Confidential

September 26, 2016

Subject: **Report of Results for CRD-C 48-92 Water Permeability Testing**
Testing Project Name: Penetron Permeability Testing
TEC Services Project No: 05-0526
TEC Laboratory No: 16-136-15055-004 - Penetron Admix

Dear Sirs:

Testing, Engineering and Consulting Services, Inc. (TEC Services) is an AASTHO R18, ANS/ISO/IEC 17025:2005 and Army Corp of Engineers accredited laboratory. TEC Services is pleased to present this report of our results on the submitted concrete cylinder specimen designated as “Mix # - 15055-004 - Penetron Admix” for water permeability testing. Our services were performed in accordance with the terms and conditions of our Service Agreement TEC-PRO-05-0526. The test results presented only pertain to the samples tested.

The purpose of our testing was to evaluate the submitted specimen in accordance with the U.S. Army Corp of Engineers test method CRD-C 48-92 *Standard Test Method for Water Permeability of Concrete*. It is our understanding that the received specimen had been moist cured for a minimum of 28 days. Using a wet diamond table saw, the 6” x 12” cylinder was cut to produce the required 6” x 6” cylindrical specimen size for testing. The sample was tested using an applied pressure of 200 psi at the request of the client. Results of the water permeability testing are reported in Table 1. A graphical representation of the CRD-C 48-92 test results are presented in Figure 1. Photos of the tested specimen and the testing set-up are presented in Photos 1 & 2.

Table 1 – CRD-C 48-92 – Water Permeability Test Results

Average Flow Rate for Last 5 Days of Testing (cm ³ /hr):	0.009
Average Water Permeability (ft ³ /sec)/ft ² (ft head/ft)	4.82 E-13
Average Total Change in Volume of Water Based on Readings (cm ³)	22.13
Average Total Volume of Water Passed Through Specimen - Drip Pan (cm ³)	0.00

Figure 1 – Results of USACE CRD-C 48-92 Permeability Testing

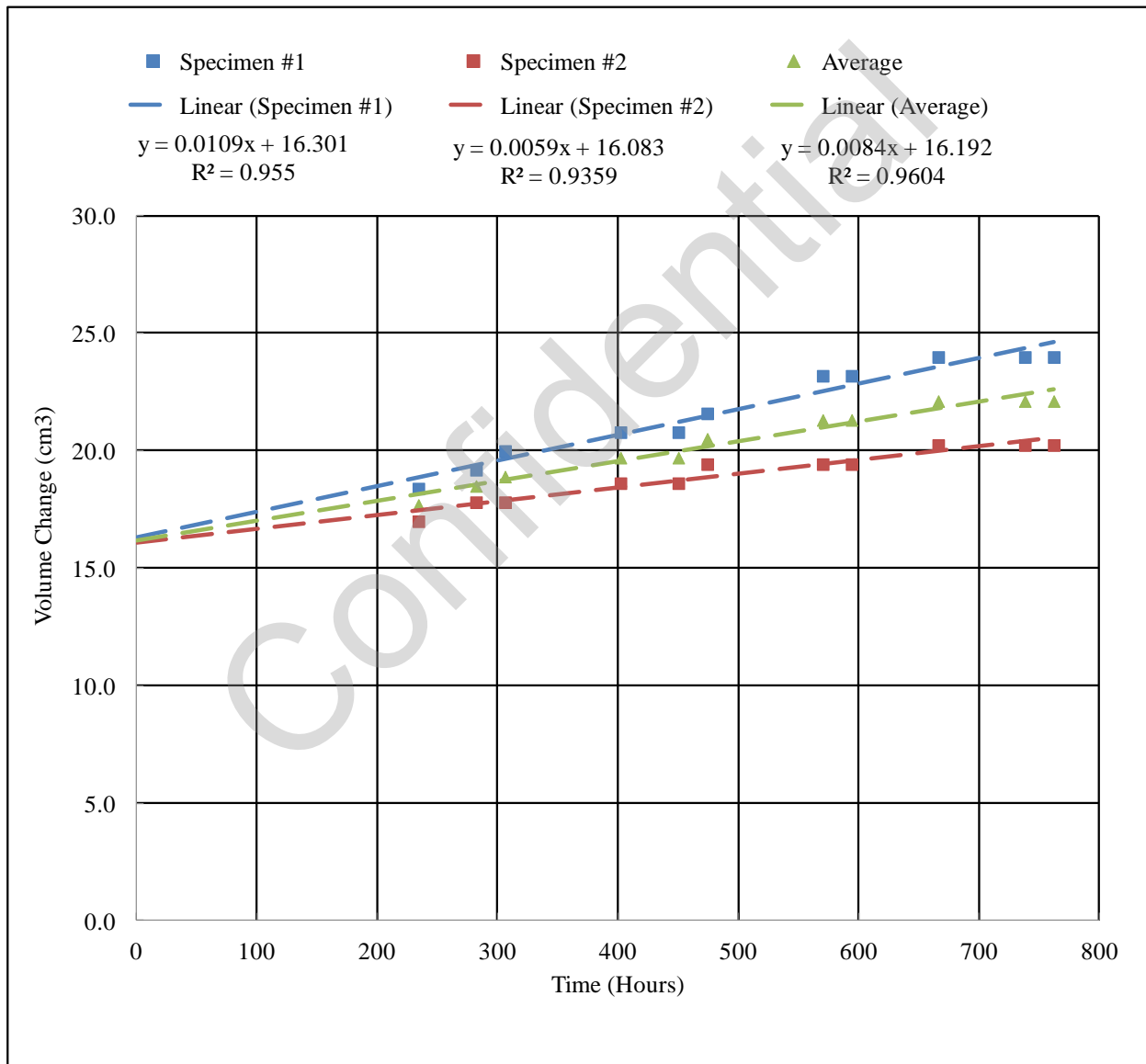


Photo 1 – Photo of Tested Specimen Showing Depth of Water Penetration



Photo 2 – Photo of CRD-C 48-92 Water Permeability Testing Set-Up



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