

## EFA TEST DATA

Project #:	3.07011E+11
Tip #:	ENOREE RIVER
Sample #:	SAMPLE-2 (63)
Date:	November 15, 2004

GIVEN	Variable	Value	Units
Width of conduit:	w	101.6	mm
Height of conduit:	h	50.8	mm
Area of conduit:	A	5161	mm <sup>2</sup>
Perimeter of conduit:	P	304.8	mm
Density of water:		1000	Kg/m <sup>3</sup>
Kinematic velocity of water:		1.12E-06	m <sup>2</sup> /sec
Hydraulic diameter:	$D = 4(A/P)$	0.0677	m

Variable	Value	Units
$d_{50} =$	0.297	mm
$= d_{50}/2 =$	0.1485	
$/D =$	0.002193	

## MEASURED

	Water Velocity (u, in m/sec)	Soil Pushed (d, in mm)	Time (t, in sec)
Test #1	0.50	1.0	3600
Test #2	1.00	7.0	3600
Test #3	1.50	21.0	3600
Test #4	2.00	35.0	3600
Test #5	2.50	50.0	2240
Test #6			
Test #7			
Test #8			
Test #9			
Test #10			

## CALCULATIONS

	Reynold's Number		Friction Factor (f)
Formula:	$Re = u \cdot D / \nu$		*See Note
Test #1	30,236		0.0274
Test #2	60,473		0.0230
Test #3	90,709		0.0208
Test #4	120,946		0.0260
Test #5	151,182		0.0251
Test #6			
Test #7			
Test #8			
Test #9			
Test #10			

\*Note: If Reynold's Number,  $Re < 100,000$

$$\text{Friction Factor, } f = 0.361/Re^{0.25}$$

If Reynold's Number,  $Re > 100,000$

Friction Factor, f = obtained from Moody's Chart

**GRAPH DATA**

Formula:	Scour Rate ( $\square$ )	Units	Shear Stress ( $\square$ )	Units
	$\square = d/t$		$\square = f \cdot \square \cdot u^2/8$	
Test #1	1.000	mm/hr	0.856	N/m <sup>2</sup>
Test #2	7.000	mm/hr	2.878	N/m <sup>2</sup>
Test #3	21.000	mm/hr	5.850	N/m <sup>2</sup>
Test #4	35.000	mm/hr	13.000	N/m <sup>2</sup>
Test #5	80.357	mm/hr	19.609	N/m <sup>2</sup>
Test #6		mm/hr		N/m <sup>2</sup>
Test #7		mm/hr		N/m <sup>2</sup>
Test #8		mm/hr		N/m <sup>2</sup>
Test #9		mm/hr		N/m <sup>2</sup>
Test #10		mm/hr		N/m <sup>2</sup>

**Figure 1.** Results of soil tests for sample 2 at structure 307011200100 on Road S-112, crossing the Enoree River in Laurens County, South Carolina

M & T Form 503

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAY  
 MATERIALS & TESTS UNIT  
 SOILS LABORATORY

T. I. P. No. \_\_\_\_\_

REPORT ON SAMPLES OF SOILS FOR QUALITY \_\_\_\_\_

Project 3.07011E+11 County LAURENS Owner \_\_\_\_\_  
 Date: Sampled 10/20/04 Received 11/8/04 Reported 11/10/04  
 Sampled from ENOREE RIVER By STEPHEN BENEDICT  
 Submitted by TRAVIS ALLEN EFA #63 \_\_\_\_\_ 1995 Standard Specifications

718124 TO 718124  
 11/15/04

TEST RESULTS

Proj. Sample No.		#2				
Lab. Sample No.		718124				
Retained #4 Sieve	%	1				
Passing #10 Sieve	%	92				
Passing #40 Sieve	%	58				
Passing #200 Sieve	%	33				

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	%	47.7				
Fine Sand Ret - #270	%	18.7				
Silt 0.05 - 0.005 mm	%	11.5				
Clay < 0.005 mm	%	22.1				
Passing #40 Sieve	%	-				
Passing #200 Sieve	%	-				

L. I.		37				
P. I.		14				
AASHTO Classification		A-2-6(1)				
Station						
Hole No.						
Depth (Ft)						
		to				

cc: TRAVIS ALLEN  
 Soils File

*CV*

*Stephen Benedict*  
 Soils Engineer