

EFA TEST DATA

Project #:	3.07011E+11
Tip #:	ENOREE RIVER
Sample #:	SAMPLE -1 (62)
Date:	November 17, 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 ²
Perimeter of conduit:	P	304.8	mm
Density of water:		1000	Kg/m ³
Kinematic velocity of water:		1.12E-06	m ² /sec
Hydraulic diameter:	$D = 4(A/P)$	0.0677	m

Variable	Value	Units
$d_{50} =$	0.028	mm
$= d_{50}/2 =$	0.014	
$/D =$	0.000207	

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	27.0	3600
Test #3	1.50	2.0	3600
Test #4	2.50	25.0	3600
Test #5	3.00	2.0	3600
Test #6	4.00	50.0	1317
Test #7	4.50	23.0	3600
Test #8	5.00	50.0	948
Test #9			
Test #10			

CALCULATIONS

	Reynold's Number	Friction Factor (f)
Formula:	$Re = u*D/\nu$	*See Note
Test #1	30,236	0.0274
Test #2	60,473	0.0230
Test #3	90,709	0.0208
Test #4	151,182	0.0179
Test #5	181,419	0.0172
Test #6	241,892	0.0169
Test #7	272,128	0.0167
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 ²
Test #2	27.000	mm/hr	2.878	N/m ²
Test #3	2.000	mm/hr	5.850	N/m ²
Test #4	25.000	mm/hr	13.984	N/m ²
Test #5	2.000	mm/hr	19.350	N/m ²
Test #6	136.674	mm/hr	33.800	N/m ²
Test #7	23.000	mm/hr	42.272	N/m ²
Test #8		mm/hr		N/m ²
Test #9		mm/hr		N/m ²
Test #10		mm/hr		N/m ²

Figure 1. Results of soil tests for sample 1 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 307011 County LAURENS Owner _____
 Date: Sampled 10/20/04 Received 11/5/04 Reported 9-Nov-04
 Sampled from ENOREE RIVER By STEPHEN BENEDICT
 Submitted by T ALLEN EFA #62 _____ 1995 Standard Specifications

718061 TO 718061
11/17/04

TEST RESULTS

Proj. Sample No.		S#1				
Lab. Sample No.		718061				
Retained #4 Sieve	%	-				
Passing #10 Sieve	%	99				
Passing #40 Sieve	%	94				
Passing #200 Sieve	%	71				

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	%	9.9				
Fine Sand Ret - #270	%	22.6				
Silt 0.05 - 0.005 mm	%	29.1				
Clay < 0.005 mm	%	38.4				
Passing #40 Sieve	%	-				
Passing #200 Sieve	%	-				

L. L.		45				
P. I.		15				
AASHTO Classification		A-7-5(11)				
Station						
Hole No.						
Depth (Ft)						
		to				

cc: TRAVIS ALLEN
Soils File



 Soils Engineer