

Attachments**HEC-RAS Scour Plots**

Bridge 246.38 BR (I-71 SB) Scour Plot
Bridge 246.34 BR (Ramp D3) Scour Plot
Bridge 246.30 BR (I-70 WB) Scour Plot
Bridge 246 BR (I-70 EB & I-71 NB) Scour Plot
Bridge 245.43 BR (Ramp A) Scour Plot

HEC-RAS Scour Output Files

Bridge 246.38 BR (I-71 SB) Sour Results
Bridge 246.34 BR (Ramp D3) Sour Results
Bridge 246.30 BR (I-70 WB) Sour Results
Bridge 246 BR (I-70 EB & I-71 NB) Sour Results
Bridge 245.43 BR (Ramp A) Sour Results

Soil Information

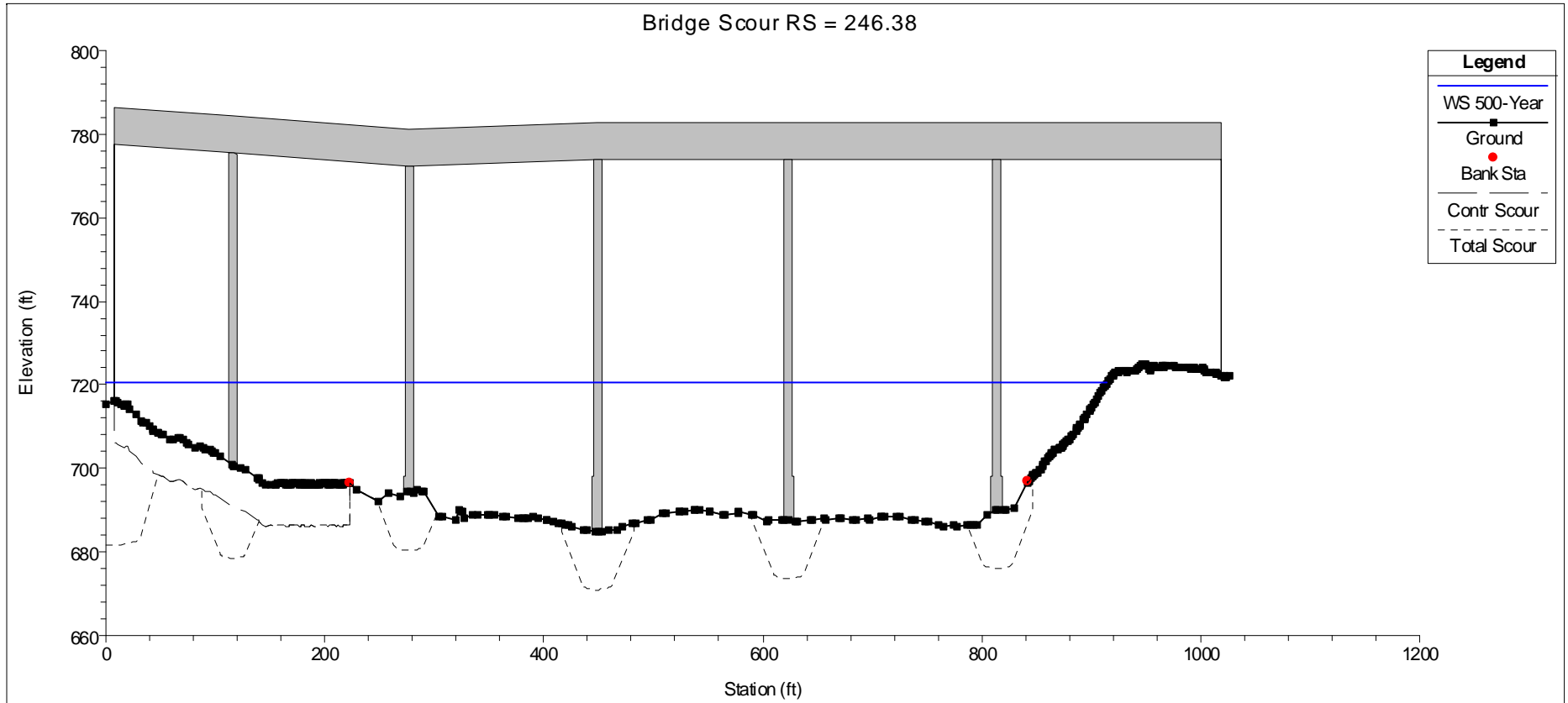
1957 Historic Boring Logs
1957 Historic Boring Laboratory Data
W-13-045 Gradation Curves

cc: file

HEC-RAS Scour Plots

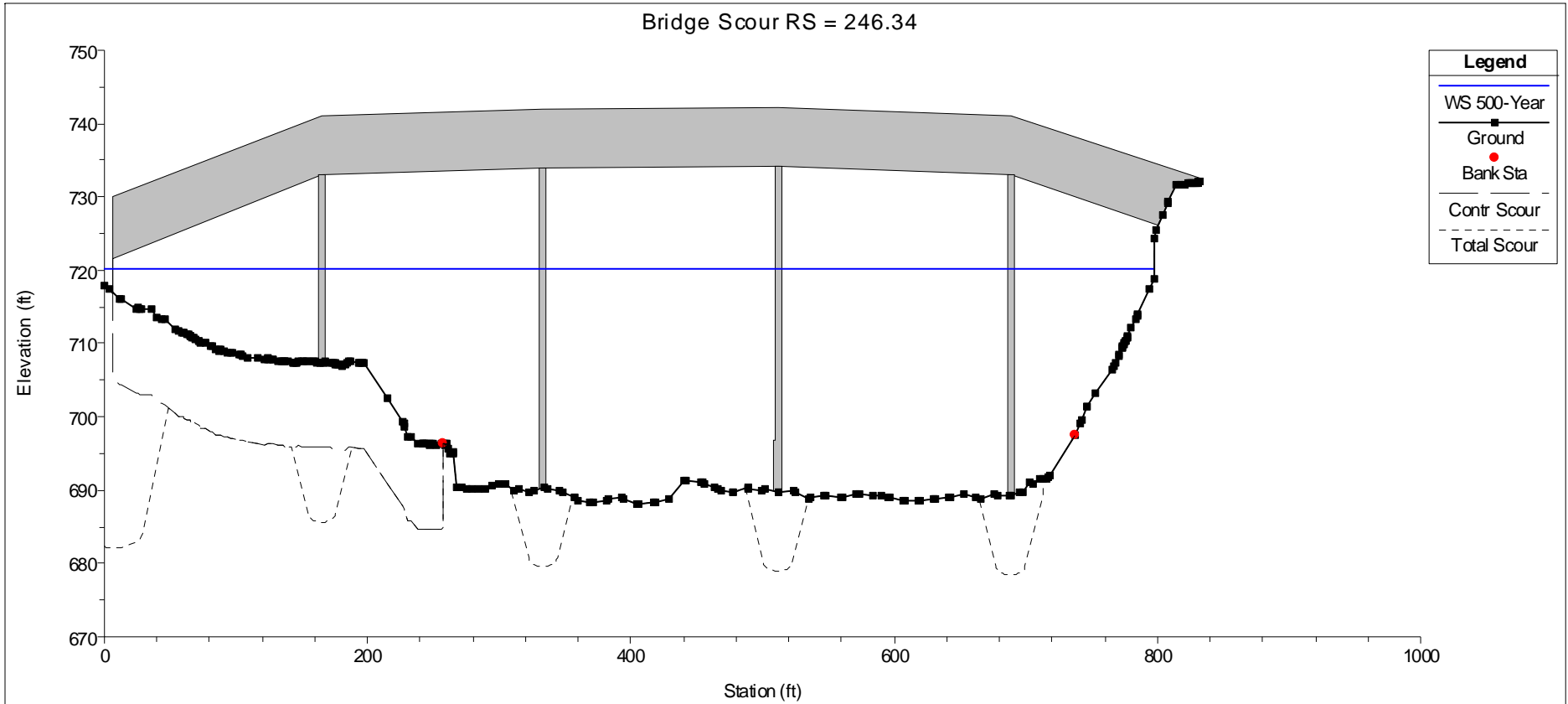
Bridge 246.38 BR (I-71 SB) RC-1 Scour Plots
Bridge 246.34 BR (Ramp D3) RC-2 Scour Plots
Bridge 246.30 BR (I-70 WB) RC-3 Scour Plots
Bridge 246 BR (I-70 EB & I-71 NB) RC-4 Scour Plots
Bridge 245.43 BR (Ramp A) RC-5 Scour Plots

Scour Analysis HEC-RAS Plots FRA-70 Project 4A



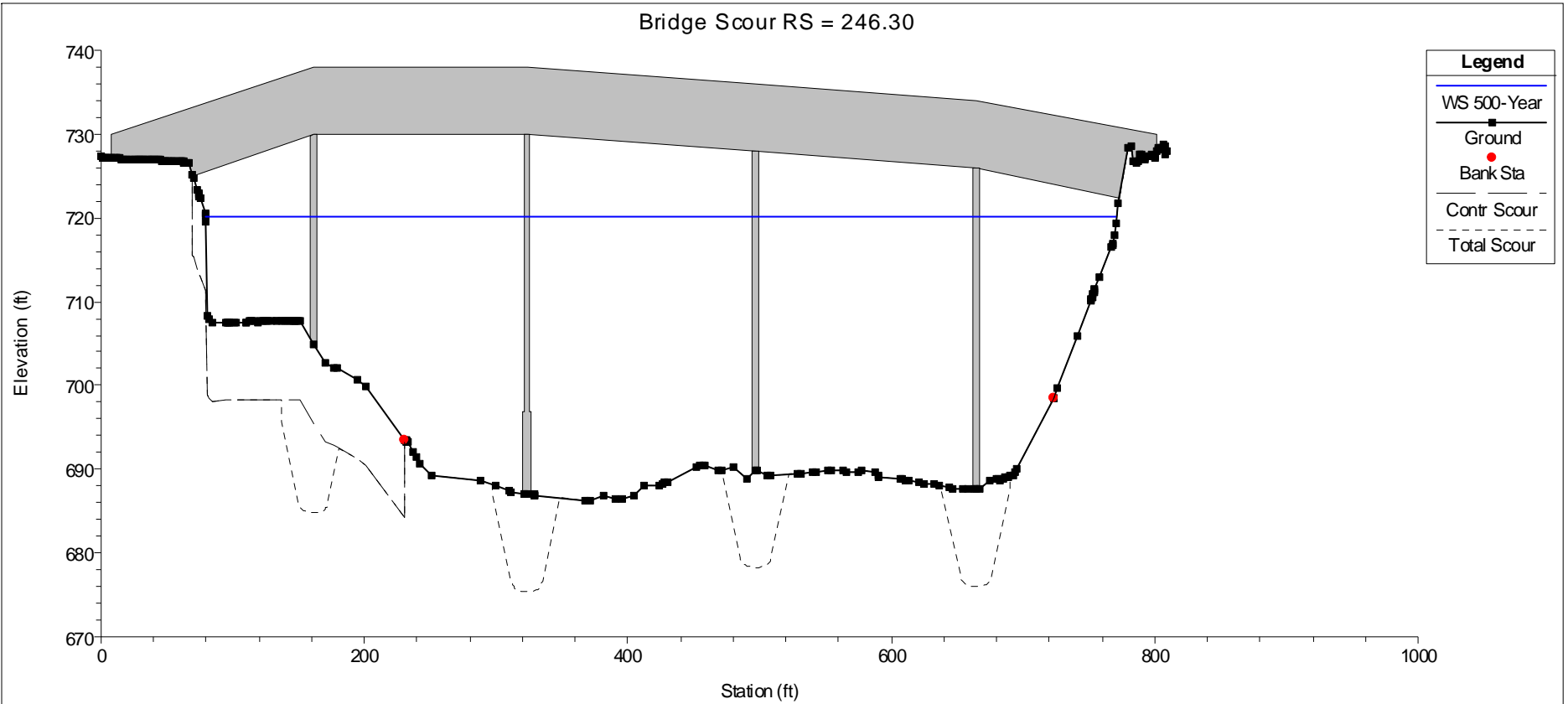
Bridge 246.38 (I-71SB) RC-1 Scour Plots

Bridge Scour RS = 246.34



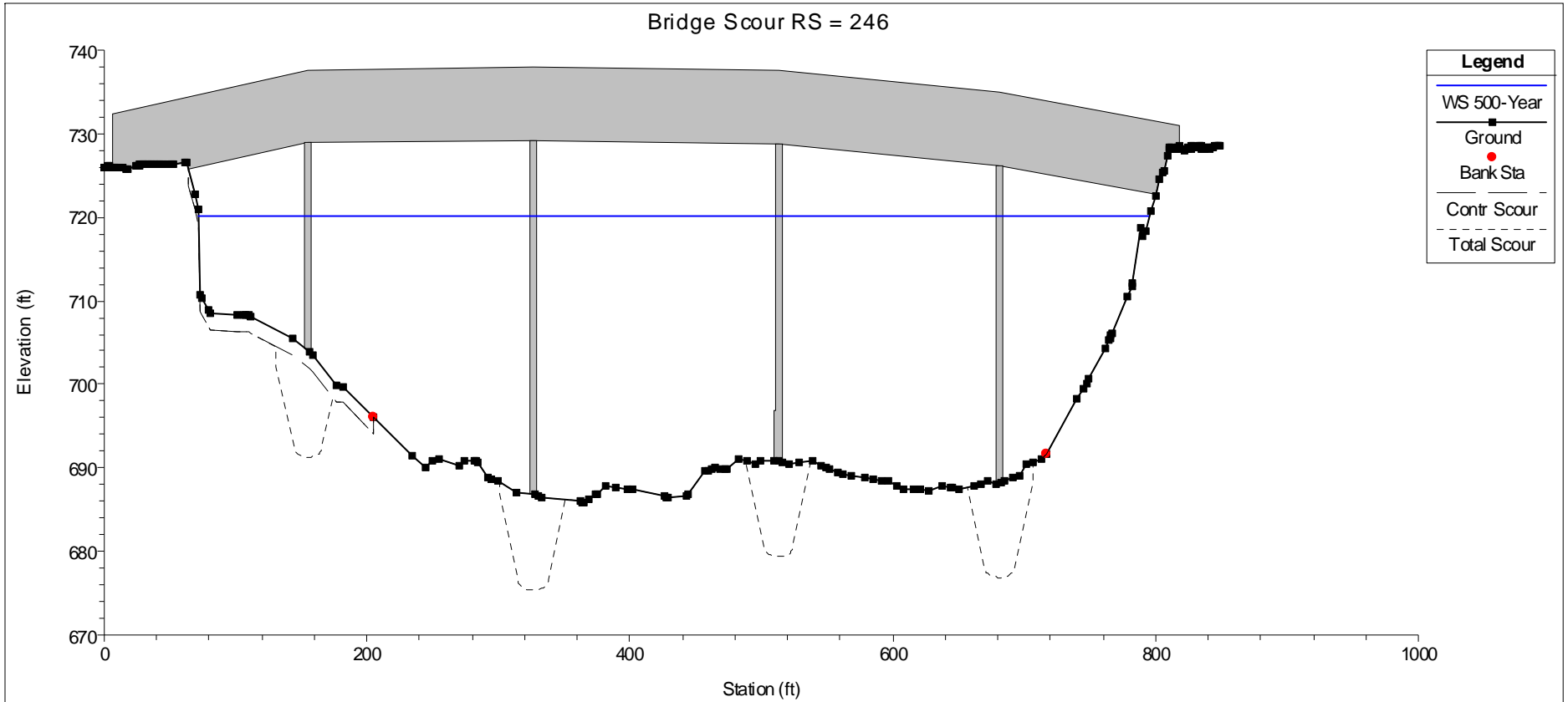
Bridge 246.34 (Ramp D3) RC-2 Scour Plots

Bridge Scour RS = 246.30



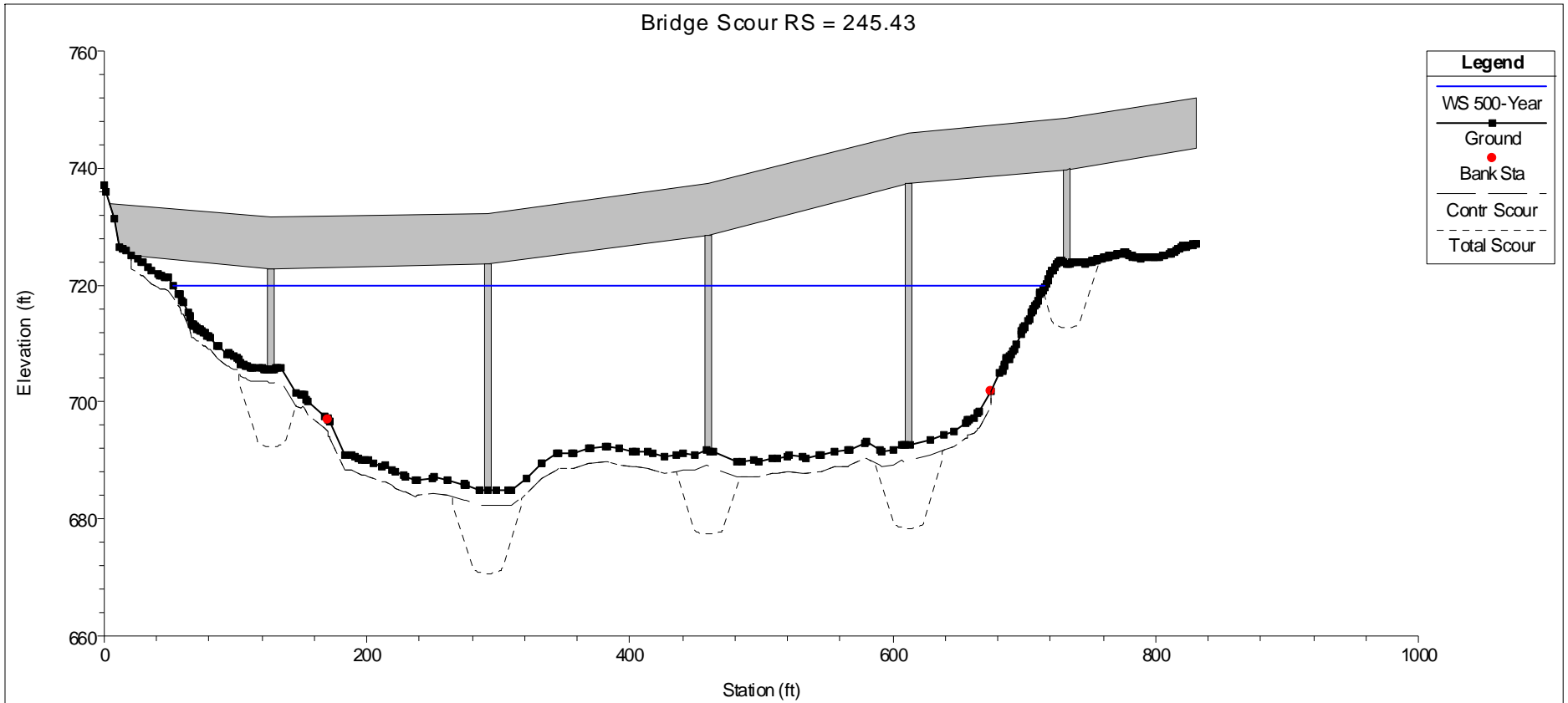
Bridge 246.30 (I-70 WB) RC-3 Scour Plots

Bridge Scour RS = 246



Bridge 246 (I-70EB and I-71 NB) RC-4 Scour Plots

Bridge Scour RS = 245.43



Bridge 245.43 (Ramp A) RC-5 Scour Plots



HEC-RAS Scour Output Files

Bridge 246.38 BR (I-71 SB) RC-1 Scour Results
Bridge 246.34 BR (Ramp D3) RC-2 Scour Results
Bridge 246.30 BR (I-70 WB) RC-3 Scour Results
Bridge 246 BR (I-70 EB & I-71 NB) RC-4 Scour Results
Bridge 245.43 BR (Ramp A) RC-5 Scour Results

HEC-RAS 246.38 BR
 Hydraulic Design Data
 Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	10.76	31.46	15.16
Approach Velocity (ft/s):	1.91	7.76	3.41
Br Average Depth (ft):	17.57	31.79	13.04
BR Opening Flow (cfs):	25179.3	87327.45	1493.24
BR Top WD (ft):	214.95	587.34	72.55
Grain Size D50 (mm):	2.43	2.43	2.43
Approach Flow (cfs):	1437.79	105847.5	6714.67
Approach Top WD (ft):	69.85	433.43	130.1
K1 Coefficient:	0.59	0.64	0.59
Results			
Scour Depth Ys (ft):	10.02	0	0
Critical Velocity (ft/s):	3.32	3.98	3.52
Equation:	Clear	Live	Clear

Pier Scour

Pier: #1 (CL = 116.043)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	8
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	17.73
Velocity Upstream (ft/s):	5.17
K1 Nose Shape:	1
Pier Angle:	
Pier Length (ft):	109.5
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	4.44
K4 Armouring Coef:	1
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	12.04
Froude #:	0.22
Equation:	CSU equation

Pier: #2 (CL = 276.814)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	10
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	17.73
Velocity Upstream (ft/s):	5.17
K1 Nose Shape:	1

Pier Angle:
 Pier Length (ft): 109.5
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 13.92
 Froude #: 0.22
 Equation: CSU equation

Pier: #3 (CL = 448.985)

Input Data

Pier Shape: Round nose
 Pier Width (ft): 10
 Grain Size D50 (mm): 2.43
 Depth Upstream (ft): 17.73
 Velocity Upstream (ft/s): 5.17
 K1 Nose Shape: 1
 Pier Angle:
 Pier Length (ft): 109.5
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 13.92
 Froude #: 0.22
 Equation: CSU equation

Pier: #4 (CL = 623.473)

Input Data

Pier Shape: Round nose
 Pier Width (ft): 10
 Grain Size D50 (mm): 2.43
 Depth Upstream (ft): 17.73
 Velocity Upstream (ft/s): 5.17
 K1 Nose Shape: 1
 Pier Angle:
 Pier Length (ft): 109.5
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 13.92

Pier: #5 (CL = 813.82)
 Input Data
 Froude #: 0.22
 Equation: CSU equation

Pier Shape: Round nose
 Pier Width (ft): 10
 Grain Size D50 (mm): 2.43
 Depth Upstream (ft): 17.73
 Velocity Upstream (ft/s): 5.17
 K1 Nose Shape: 1
 Pier Angle:
 Pier Length (ft): 109.5
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 13.92
 Froude #: 0.22
 Equation: CSU equation

Abutment Scour

Input Data

	Left	Right
Station at Toe (ft):	8.03	1018.63
Toe Sta at appr (ft):	109.99	934.68
Abutment Length (ft):	69.85	130.1
Depth at Toe (ft):	4.61	-1.37
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90	90
K2 Skew Coef:	1	1
Projected Length L' (ft):	69.85	130.1
Avg Depth Obstructed Ya (ft):	10.76	15.16
Flow Obstructed Qe (cfs):	1437.79	6714.67
Area Obstructed Ae (sq ft):	751.31	1971.78

Results

Scour Depth Ys (ft): 24.39
 Qe/Ae = Ve: 1.91
 Froude #: 0.1
 Equation: Froehlich Default

Combined Scour Depths

Pier : #1 (CL = 116.043) (Contr + Pier) (ft): 22.06
 Pier : #2 (CL = 276.814) (Contr + Pier) (ft): 13.92
 Pier : #3 (CL = 448.985) (Contr + Pier) (ft): 13.92

Pier : #4 (CL = 623.473) (Contr + Pier) (ft):	13.92	
Pier : #5 (CL = 813.82) (Contr + Pier) (ft):	13.92	
Left abutment scour + contract		34.41

HEC-RAS 246.34 BR
 Hydraulic Design Data
 Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	12.76	30.17	13.66
Approach Velocity (ft/s):	4.18	6.56	1.86
Br Average Depth (ft):	12.39	30.3	12.33
BR Opening Flow (cfs):	29008.22	83559.19	1432.58
BR Top WD (ft):	251.95	465.52	60.25
Grain Size D50 (mm):	2.43	2.43	2.43
Approach Flow (cfs):	14911.95	96921.09	2166.97
Approach Top WD (ft):	279.62	490.06	85.44
K1 Coefficient:	0.59	0.64	0.59
Results			
Scour Depth Ys (ft):	11.61	0	0
Critical Velocity (ft/s):	3.42	3.95	3.46
Equation:	Live	Live	Clear

Pier Scour

Pier: #1 (CL = 165.108)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	12.5
Velocity Upstream (ft/s):	7.91
K1 Nose Shape:	1
Pier Angle:	
Pier Length (ft):	86
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	4.44
K4 Armouring Coef:	1
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	10.16
Froude #:	0.39
Equation:	CSU equation

Pier: #2 (CL = 333.036)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5.5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	12.5
Velocity Upstream (ft/s):	7.91
K1 Nose Shape:	1

	Pier Angle:	
	Pier Length (ft):	86
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	10.81
	Froude #:	0.39
	Equation:	CSU equation
Pier: #3 (CL = 511.631)		
Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	5.5
	Grain Size D50 (mm):	2.43
	Depth Upstream (ft):	12.5
	Velocity Upstream (ft/s):	7.91
	K1 Nose Shape:	1
	Pier Angle:	
	Pier Length (ft):	86
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	10.81
	Froude #:	0.39
	Equation:	CSU equation
Pier: #4 (CL = 688.573)		
Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	5.5
	Grain Size D50 (mm):	2.43
	Depth Upstream (ft):	12.5
	Velocity Upstream (ft/s):	7.91
	K1 Nose Shape:	1
	Pier Angle:	
	Pier Length (ft):	86
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	10.81

Froude #: 0.39
Equation: CSU equation

Abutment Scour

	Left	Right
Input Data		
Station at Toe (ft):	7	800.13
Toe Sta at appr (ft):	162.23	964.91
Abutment Length (ft):	279.62	85.44
Depth at Toe (ft):	3.49	-5.78
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90	90
K2 Skew Coef:	1	1
Projected Length L' (ft):	279.62	85.44
Avg Depth Obstructed Ya (ft):	12.76	13.66
Flow Obstructed Qe (cfs):	14911.95	2166.97
Area Obstructed Ae (sq ft):	3566.67	1166.81

Results

Scour Depth Ys (ft): 23.04
Froude #: 0.75
Equation: HIRE Default

Combined Scour Depths

ier : #1 (CL = 165.108) (Contr + Pier) (ft):	21.77
ier : #2 (CL = 333.036) (Contr + Pier) (ft):	10.81
ier : #3 (CL = 511.631) (Contr + Pier) (ft):	10.81
ier : #4 (CL = 688.573) (Contr + Pier) (ft):	10.81

Left abutment scour + contract	34.65	
Degree of Skew (degrees):	90	90
K2 Skew Coef:	1	1
Projected Length L' (ft):	69.85	130.1
Avg Depth Obstructed Ya (ft):	10.76	15.16
Flow Obstructed Qe (cfs):	1437.79	6714.67
Area Obstructed Ae (sq ft):	751.31	1971.78

Results

Scour Depth Ys (ft): 24.39
Qe/Ae = Ve: 1.91
Froude #: 0.1
Equation: Froehlich Default

Combined Scour Depths

Pier : #1 (CL = 116.043) (Con	22.06
Pier : #2 (CL = 276.814) (Con	13.92
Pier : #3 (CL = 448.985) (Con	13.92

Pier : #4 (CL = 623.473) (Con	13.92
Pier : #5 (CL = 813.82) (Contr	13.92

Left abutment scour + contract	34.41
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HEC-RAS 246.30 BR
 Hydraulic Design Data
 Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	12.56	29.66	12.06
Approach Velocity (ft/s):	7	6.12	1.44
Br Average Depth (ft):	16.2	31.09	11.67
BR Opening Flow (cfs):	23932.61	89030.48	1036.9
BR Top WD (ft):	146.22	477.15	48.39
Grain Size D50 (mm):	2.43	2.43	2.43
Approach Flow (cfs):	6582.88	106701	716.14
Approach Top WD (ft):	74.84	587.73	41.26
K1 Coefficient:	0.59	0.64	0.59
Results			
Scour Depth Ys (ft):	9.37	0	0
Critical Velocity (ft/s):	3.41	3.94	3.39
Equation:	Live	Live	Clear

Pier Scour

Pier: #1 (CL = 161.032)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	16.27
Velocity Upstream (ft/s):	8.64
K1 Nose Shape:	1
Pier Angle:	
Pier Length (ft):	76.5
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	4.44
K4 Armouring Coef:	1
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	10.93
Froude #:	0.38
Equation:	CSU equation

Pier: #2 (CL = 323.348)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5.5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	16.27
Velocity Upstream (ft/s):	8.64
K1 Nose Shape:	1

	Pier Angle:	
	Pier Length (ft):	76.5
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	11.63
	Froude #:	0.38
	Equation:	CSU equation
Pier: #3 (CL = 497.012)		
Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	5.5
	Grain Size D50 (mm):	2.43
	Depth Upstream (ft):	16.27
	Velocity Upstream (ft/s):	8.64
	K1 Nose Shape:	1
	Pier Angle:	
	Pier Length (ft):	76.5
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	11.63
	Froude #:	0.38
	Equation:	CSU equation
Pier: #4 (CL = 664.248)		
Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	5.5
	Grain Size D50 (mm):	2.43
	Depth Upstream (ft):	16.27
	Velocity Upstream (ft/s):	8.64
	K1 Nose Shape:	1
	Pier Angle:	
	Pier Length (ft):	76.5
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	11.63

Froude #: 0.38
 Equation: CSU equation

Combined Scour Depths

Pier : #1 (CL = 161.032) (Contr + Pier) (ft): 20.31
 Pier : #2 (CL = 323.348) (Contr + Pier) (ft): 11.63
 Pier : #3 (CL = 497.012) (Contr + Pier) (ft): 11.63
 Pier : #4 (CL = 664.248) (Contr + Pier) (ft): 11.63

Pier Length (ft): 109.5
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 13.92
 Froude #: 0.22
 Equation: CSU equation

Abutment Scour

Left Right

Input Data

Station at Toe (ft):	8.03	1018.63
Toe Sta at appr (ft):	109.99	934.68
Abutment Length (ft):	69.85	130.1
Depth at Toe (ft):	4.61	-1.37
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90	90
K2 Skew Coef:	1	1
Projected Length L' (ft):	69.85	130.1
Avg Depth Obstructed Ya (10.76	15.16
Flow Obstructed Qe (cfs):	1437.79	6714.67
Area Obstructed Ae (sq ft):	751.31	1971.78

Results

Scour Depth Ys (ft): 24.39
 Qe/Ae = Ve: 1.91
 Froude #: 0.1
 Equation: Froehlich Default

Combined Scour Depths

Pier : #1 (CL = 116.043) (Contr - 22.06
 Pier : #2 (CL = 276.814) (Contr - 13.92
 Pier : #3 (CL = 448.985) (Contr - 13.92

Pier : #4 (CL = 623.473) (Contr -	13.92
Pier : #5 (CL = 813.82) (Contr +	13.92
Left abutment scour + con'	34.41

HEC-RAS 246 BR
 Hydraulic Design Data
 Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	14.48	31.08	15.6
Approach Velocity (ft/s):	8.34	6.24	1.8
Br Average Depth (ft):	15.43	31.1	16.29
BR Opening Flow (cfs):	18479.27	92606.84	2913.9
BR Top WD (ft):	128.29	497.07	78.47
Grain Size D50 (mm):	2.43	2.43	2.43
Approach Flow (cfs):	13716.89	98673.54	1609.57
Approach Top WD (ft):	113.59	508.78	57.2
K1 Coefficient:	0.59	0.64	0.59
Results			
Scour Depth Ys (ft):	1.97	0	0
Critical Velocity (ft/s):	3.49	3.97	3.54
Equation:	Live	Live	Clear

Pier Scour
 Pier: #1 (CL = 155.066)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	15.52
Velocity Upstream (ft/s):	8.34
K1 Nose Shape:	1
Pier Angle:	
Pier Length (ft):	139.5
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	4.44
K4 Armouring Coef:	1
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	10.7
Froude #:	0.37
Equation:	CSU equation

Pier: #2 (CL = 326.324)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5.5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	15.52
Velocity Upstream (ft/s):	8.34
K1 Nose Shape:	1

	Pier Angle:	
	Pier Length (ft):	139.5
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	11.39
	Froude #:	0.37
	Equation:	CSU equation
Pier: #3 (CL = 512.877)		
Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	5.5
	Grain Size D50 (mm):	2.43
	Depth Upstream (ft):	15.52
	Velocity Upstream (ft/s):	8.34
	K1 Nose Shape:	1
	Pier Angle:	
	Pier Length (ft):	139.5
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	11.39
	Froude #:	0.37
	Equation:	CSU equation
Pier: #4 (CL = 681.39)		
Input Data		
	Pier Shape:	Round nose
	Pier Width (ft):	5.5
	Grain Size D50 (mm):	2.43
	Depth Upstream (ft):	15.52
	Velocity Upstream (ft/s):	8.34
	K1 Nose Shape:	1
	Pier Angle:	
	Pier Length (ft):	139.5
	K2 Angle Coef:	1
	K3 Bed Cond Coef:	1.1
	Grain Size D90 (mm):	4.44
	K4 Armouring Coef:	1
	Set K1 value to 1.0 because angle > 5 degrees	
Results		
	Scour Depth Ys (ft):	11.39

Froude #: 0.37
Equation: CSU equation

Combined Scour Depths

r : #1 (CL = 155.066) (Contr + Pier) (ft): 12.67
r : #2 (CL = 326.324) (Contr + Pier) (ft): 11.39
r : #3 (CL = 512.877) (Contr + Pier) (ft): 11.39
er : #4 (CL = 681.39) (Contr + Pier) (ft): 11.39

Pier Length (ft): 109.5
K2 Angle Coef: 1
K3 Bed Cond Coef: 1.1
Grain Size D90 (mm): 4.44
K4 Armouring Coef: 1
Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 13.92
Froude #: 0.22
Equation: CSU equation

Abutment Scour

	Left	Right
Input Data		
Station at Toe (ft):	8.03	1018.63
Toe Sta at appr (ft):	109.99	934.68
Abutment Length (ft):	69.85	130.1
Depth at Toe (ft):	4.61	-1.37
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90	90
K2 Skew Coef:	1	1
Projected Length L' (ft):	69.85	130.1
Avg Depth Obstructed Ya (ft):	10.76	15.16
Flow Obstructed Qe (cfs):	1437.79	6714.67
Area Obstructed Ae (sq ft):	751.31	1971.78

Results

Scour Depth Ys (ft): 24.39
Qe/Ae = Ve: 1.91
Froude #: 0.1
Equation: Froehlich Default

Combined Scour Depths

Pier : #1 (CL = 116.043) (Co) 22.06
Pier : #2 (CL = 276.814) (Co) 13.92
Pier : #3 (CL = 448.985) (Co) 13.92

Pier : #4 (CL = 623.473) (Co	13.92	
Pier : #5 (CL = 813.82) (Con	13.92	
Left abutment scour + contract		34.41

HEC-RAS 245.43 BR
 Hydraulic Design Data
 Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	12.23	30.73	14.69
Approach Velocity (ft/s)	7.82	6.26	1.86
Br Average Depth (ft):	12.75	29.07	8.91
BR Opening Flow (cfs):	14814.31	98518.8	666.9
BR Top WD (ft):	113.09	489.13	41.28
Grain Size D50 (mm):	2.43	2.43	2.43
Approach Flow (cfs):	14032.64	97233.06	2734.3
Approach Top WD (ft):	146.78	505.13	100.05
K1 Coefficient:	0.59	0.64	0.59
Results			
Scour Depth Ys (ft):	2.19	2.65	0
Critical Velocity (ft/s):	3.4	3.96	3.5
Equation:	Live	Live	Clear

Pier Scour

Pier: #1 (CL = 126.865)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	12.87
Velocity Upstream (ft/s)	9.27
K1 Nose Shape:	1
Pier Angle:	
Pier Length (ft):	84
K2 Angle Coef:	1
K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	4.44
K4 Armouring Coef:	1
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	10.92
Froude #:	0.46
Equation:	CSU equation

Pier: #2 (CL = 291.613)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	5.5
Grain Size D50 (mm):	2.43
Depth Upstream (ft):	12.87
Velocity Upstream (ft/s)	9.27
K1 Nose Shape:	1

Pier Angle:
 Pier Length (ft): 84
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 11.62
 Froude #: 0.46
 Equation: CSU equation

Pier: #3 (CL = 460.107)

Input Data

Pier Shape: Round nose
 Pier Width (ft): 5.5
 Grain Size D50 (mm): 2.43
 Depth Upstream (ft): 12.87
 Velocity Upstream (ft/s): 9.27
 K1 Nose Shape: 1
 Pier Angle:
 Pier Length (ft): 84
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 11.62
 Froude #: 0.46
 Equation: CSU equation

Pier: #4 (CL = 612.254)

Input Data

Pier Shape: Round nose
 Pier Width (ft): 5.5
 Grain Size D50 (mm): 2.43
 Depth Upstream (ft): 12.87
 Velocity Upstream (ft/s): 9.27
 K1 Nose Shape: 1
 Pier Angle:
 Pier Length (ft): 84
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 11.62

Pier: #5 (CL = 732.3)
 Froude #: 0.46
 Equation: CSU equation

Input Data

Pier Shape: Round nose
 Pier Width (ft): 5
 Grain Size D50 (mm): 2.43
 Depth Upstream (ft): 12.87
 Velocity Upstream (ft/s): 9.27
 K1 Nose Shape: 1
 Pier Angle:
 Pier Length (ft): 84
 K2 Angle Coef: 1
 K3 Bed Cond Coef: 1.1
 Grain Size D90 (mm): 4.44
 K4 Armouring Coef: 1
 Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft): 10.92
 Froude #: 0.46
 Equation: CSU equation

Combined Scour Depths

1 (CL = 126.865) (Contr + Pier) (ft): 13.11
 2 (CL = 291.613) (Contr + Pier) (ft): 14.27
 3 (CL = 460.107) (Contr + Pier) (ft): 14.27
 4 (CL = 612.254) (Contr + Pier) (ft): 14.27
 : #5 (CL = 732.3) (Contr + Pier) (ft): 10.92

K2 Skew Cc 1 1
 Projected L 69.85 130.1
 Avg Depth 10.76 15.16
 Flow Obstr 1437.79 6714.67
 Area Obstr 751.31 1971.78

Results

Scour Dept 24.39
 Qe/Ae = Vε 1.91
 Froude #: 0.1
 Equation: Froehlich Default

Combined Scour Depths

Pier : #1 (CL = 116.043) 22.06
 Pier : #2 (CL = 276.814) 13.92
 Pier : #3 (CL = 448.985) 13.92

Pier : #4 (CL = 623.473) 13.92
Pier : #5 (CL = 813.82) (13.92

Left abutm 34.41

Soil Information

1957 Historic Boring Logs
1957 Historic Boring Laboratory Data
W-13-045 Gradation Curves

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

SUMMARY OF SOIL TEST DATA

CO., RT. NO., SEC. FRANKLIN
FRA-40-12.30
FRA-40-1230
OVER SCIOTO RIVER
SHEET NO. 2 OF 2 SHEETS

SAMPLE NUMBER	LABORATORY NUMBER SQ-	PHYSICAL CHARACTERISTICS							WATER CONTENT	DESCRIPTION		
		% AGGREGATE RET. # 10	% COARSE SAND 2.0MM - 0.42MM	% FINE SAND 0.42MM - 0.075MM	% SILT 0.075MM - 0.006MM	% CLAY < 0.006MM	LIQUID LIMIT	PLASTICITY INDEX				
1	67412	16	56	9	15	4	NP	NP	17	GRAY SILTY GRAVELLY SAND	3a	
2	67413	32	32	14	17	5	NP	NP	10	GR & BR SILTY GRAVELLY SAND	1-b	
3	67414	VISUAL									GRAVEL AND STONE FRAGMENTS	
4	67415	73	16	3	2	1	NP	NP	5	SANDY GRAVEL	1-a	
5	67416	72	13	5	8	2	NP	NP	6	SANDY GRAVEL	1-a	
6	67417	83	9	3	4	1	NP	NP	2	GRAVEL	1-a	

B-24-57

B-24-57

**STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY**

SUMMARY OF SOIL TEST DATA

CO., RT. NO., SEC. FRANKLIN
 FRA-40-12.30
 FRA-40-1230
 OVER SCIOTO RIVER
 SHEET NO. 1 OF 28 SHEETS

SAMPLE NUMBER	LABORATORY NUMBER SQ-	PHYSICAL CHARACTERISTICS								WATER CONTENT	DESCRIPTION
		% AGGREGATE RET. # 10	% COARSE SAND 2.0MM - 0.42MM	% FINE SAND 0.42MM - 0.075MM	% SILT 0.075MM - 0.0075MM	% CLAY < 0.0075MM	LIQUID LIMIT	PLASTICITY INDEX			
											DRIVE SAMPLES
1	66517	80	20	0	0	0	NP	NP	11		GRAY SANDY GRAVEL 1-a
2	66518	21	17	44	16	2	NP	NP	13		GRAY SILTY GRAVELLY SAND 3a
3	66519	67	15	8	9	1	NP	NP	10		GRAY SILTY SANDY GRAVEL 1-a
4	66520	74	14	9	2	1	NP	NP	11		GRAY SILTY GRAVEL 1-a
5	66521									28	WEATHERED SHALE 6b
1	66522										GRAVEL
2	66523	76	10	3	10	1	NP	NP	12		BROWN SANDY GRAVEL 1-a
3	66524	1	54	18	23	4	NP	NP	15		GR & BR GRAVELLY SAND 3a
4	66525	77	14	4	5	0	NP	NP	10		BR & GR SANDY GRAVEL 1-a
5	66526	55	30	9	5	1	NP	NP	11		BR & GR SANDY GRAVEL 1-a
6	66527										STONE FRAGMENTS
7	66528									13	GRAY SOFT SHALE
8	66529									11	SHALE
1	67937	77	11	5	7	0	NP	NP	11		SANDY GRAVEL 1-a
2	67938	37	7	12	27	17	31	8	24		SANDY GRAVELLY SILT 4a
3	67939	0	1	6	52	41	34	16	25		BROWN CLAY 6a
4	67940	54	5	8	19	14	27	9	26		BROWN SILTY GRAVEL 2-4
5	67941	84	9	2	3	2	NP	NP	7		GRAVEL 1-a
6	67942	76	9	4	8	3	NP	NP	10		SILTY GRAVEL 1-a
1	67403	76	9	3	8	4	NP	NP	11		GRAY AND BROWN SILTY GRAVEL 1-a
2	67404	87	5	2	4	2	NP	NP	7		GRAVEL 1-a
3	67405	0	5	13	42	40	35	15	24		BROWN CLAY 6a
4	67406	54	19	10	12	5	NP	NP	12		GR & BR SILTY SANDY GRAVEL 1-b
5	67407	83	12	3	2	0	NP	NP	14		GRAVEL 1-a
6	67408	97	2	1	0	0	NP	NP	8		GRAVEL 1-a
7	67409	76	13	15	5	1	NP	NP	13		SANDY GRAVEL 1-a
8	67410	58	21	3	11	2	NP	NP	7		SILTY SANDY GRAVEL 1-a
9	67411	24	6	13	28	29	24	12	18		GRAY GRAVELLY SANDY CLAY 6a

B-005-5-57

B-013-5-57

B-046-5-57

B-061-5-57

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

B-020-S-57

LOG OF BORING

CO., RT. NO. SEC. FRA-40-12.30 BRIDGE NO. FRA-40-1230
FORWARD ABUTMENT OVER SCIOTO RIVER

LOCATION: T.H. 20 STA. 32+05 OFFSET 19' LT FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
726.0	0			
	2			
	4			
721.0	6	-----	-----	SAND & SMALL GRAVEL
	8			
	10			
715.0	12	10	67937	SANDY GRAVEL
	14			
	16			
709.0	18	17	-----	SANDY GRAVELLY SILT
	20			
705.0	22	25	67938	SANDY GRAVELLY SILT
	24			
	26			
700.0	28	15	67939	BROWN CLAY
	30			
695.0	32	23	67940	BROWN SILTY GRAVEL
	34			
690.0	36	25	67941	GRAVEL

AB
7.24.57

LOG OF BORING (CONTINUED)

B-020-S-57

BRIDGE NO. FRA-40-1230 T.H. 20

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
	38			
	40			
650.5	42	75	67942	SILTY GRAVEL
	44			↑ BOTTOM OF HOLE
	46			
	48			
	50			
	52			
	54			
	56			
	58			
	60			
	62			
	64			
	66			
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

AB
7.24.57

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

B-013-S-57

LOG OF BORING

CO., RT. NO. SEC. FRA 40-12.30 BRIDGE NO. FRA-40-1230
SIXTH PIER OVER SCIOTO RIVER
LOCATION: T.H. 13 STA. 28+73 OFFSET C.L. FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
691.4	0			
	2			
	4			
686.9	6	15	66522	GRAVEL
	8			
682.9	10	90	66523	BROWN SANDY GRAVEL
	12			
	14			
676.9	16	27	66524	GRAY AND BROWN GRAVELLY SAND
	18			
672.9	20	30	66525	BROWN AND GRAY SANDY GRAVEL
	22			
	24			
666.9	26	200	66526	BROWN AND GRAY SANDY GRAVEL
665.9	28		66527	STONE FRAGMENTS
	30	200	66528	GRAY SOFT SHALE TOP OF ROCK
660.9	32		66529	SHALE
	34			
	36			

AB
7-29-57

LOG OF BORING (CONTINUED)

B-013-S-57

BRIDGE NO. FRA-40-1230 T.H. 13

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
	38			SHALE
652.4	40			BOTTOM OF HOLE
	42			
	44			
	46			
	48			
	50			
	52			
	54			
	56			
	58			
	60			
	62			
	64			
	66			
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

AB
7-29-57

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

B-009-S-57

LOG OF BORING

CO., RT. NO. SEC. FRA-40-12.30 BRIDGE NO. FRA-40-1230
FOURTH PIER OVER SCIOTO RIVER
LOCATION: T.H. 9 STA. 26+25 OFFSET C.L. FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
686.1	0			
	2			
	4			
	6			
	8			
677.4	10	39	67412	GRAY SILTY GRAVELLY SAND
	12			
672.4	14	171	67413	GRAY AND BROWN SILTY GRAVELLY SAND
	16			
669.4	18		67414	GRAVEL AND STONE FRAGMENTS
	20			
	22			
	24			
662.4	26	39	67415	SANDY GRAVEL
660.4	28	190	67416	SANDY GRAVEL
	30			
654.4	32			
	34	70	67417	GRAVEL
651.4				TOP OF ROCK
	36			FIRM GRAY CLAY SHALE

AS
7-24-57

LOG OF BORING (CONTINUED)

B-009-S-57

BRIDGE NO. FRA-45-1230 T.H. 9

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
648.7	38			FIRM GRAY CLAY SHALE
646.0	40			DENSE GRAY LIMESTONE WITH DARK WAVY PARTINGS
	42			BOTTOM OF HOLE
	44			
	46			
	48			
	50			
	52			
	54			
	56			
	58			
	60			
	62			
	64			
	66			
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

AS
7-24-57

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

B-005-S-57

LOG OF BORING

CO., RT. NO., SEC. FRA-40-12,30 BRIDGE NO. FRA-40-1230
SECOND PIER OVER SCIOTO RIVER
LOCATION: T.H. 5 STA. 24+00 OFFSET C.L. FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
681.7	0			
	2			
	4			
676.4	6	24	66517	GRAY SANDY GRAVEL
	8			
671.4	10			
	12	73	66518	GRAY SILTY GRAVELLY SAND
	14			
666.4	16	180	66519	GRAY SILTY SANDY GRAVEL
	18			
663.4	20			COARSE SAND
661.4	22	117	66520	GRAY SILTY GRAVEL
	24			
656.4	26	20	----	FINE SAND, SILT AND SMALL GRAVEL
	28			
652.7 652.1	30	600	66521	WEATHERED SHALE
				TOP OF ROCK
	32			
	34			HARD DENSE GRAY LIMESTONE
645.7	36			BOTTOM OF HOLE

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7-24-57

STATE OF OHIO
DEPARTMENT OF HIGHWAYS
TESTING LABORATORY

B-001-S-57

LOG OF BORING

CO., RT. NO. SEC. FRA-40-12.30 BRIDGE NO. FRA-40-1230
REAR ABUTMENT OVER SCIOTO RIVER
 LOCATION: T.H. 1 STA. 21+75 OFFSET C.L. FED. NO. _____

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
724.0	0			
	2			
	4			
	6			
	8			
714.0	10	18	67403	GRAY AND BROWN SILTY GRAVEL
	12			
	14			
709.0	16	45	67404	GRAVEL
	18			
704.0	20	30	67405	BROWN CLAY
	22			
	24			
699.0	26	70	67406	GRAY AND BROWN SILTY SANDY GRAVEL
	28			
694.0	30			
	32	52	67407	GRAVEL
	34			
689.0	36	33	67408	GRAVEL

7-24-57

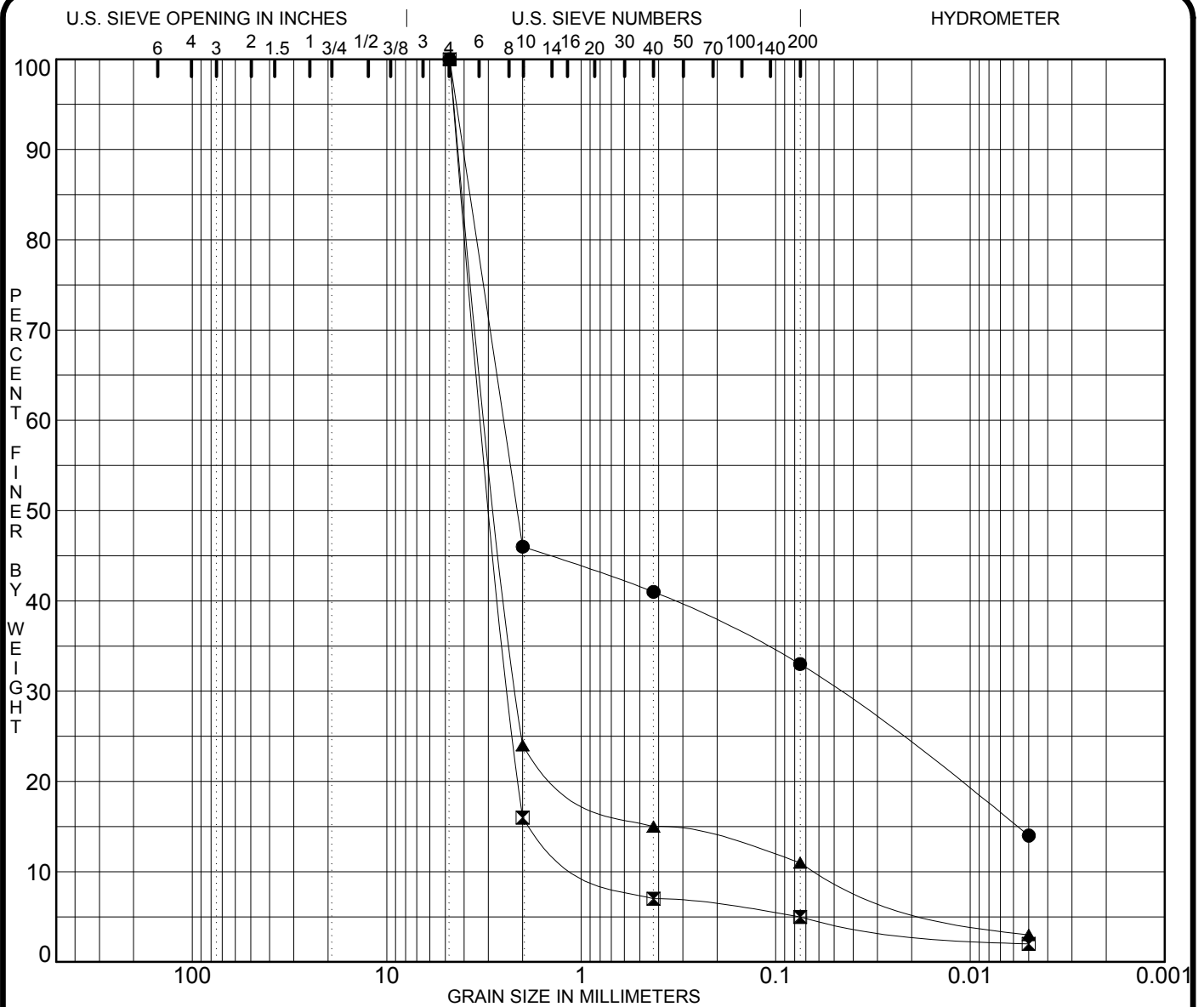
LOG OF BORING (CONTINUED)

B-001-S-57

BRIDGE NO. FRA-40-1230 T.H. 1

ELEV.	DEPTH	NO. BLOWS	SAMPLE NO.	DESCRIPTION
	38			
684.0	40	74	67409	SANDY GRAVEL
	42			
680.0	44	90	67410	SILTY SANDY GRAVEL
	46			
	48			
674.0	50	155	67411	GRAY GRAVELLY SANDY CLAY
	52			
	54			
	56			
667.0	58			BOULDERS
	60			
	62			
661.0	64			LARGE BOULDERS
	66			BOTTOM OF HOLE
	68			
	70			
	72			
	74			
	76			
	78			
	80			
	82			

7-24-57



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

Specimen Identification	Depth	Classification			MC%	LL	PL	PI	Cz	Cu
● B-020-S-57	31.0	A-2-6			26	27	9	18		
⊠ B-020-S-57	36.0	A-1-a			7	NP	NP	NP	2.38	4.4
▲ B-020-S-57	41.0	A-1-a			10	NP	NP	NP	28.47	56.4

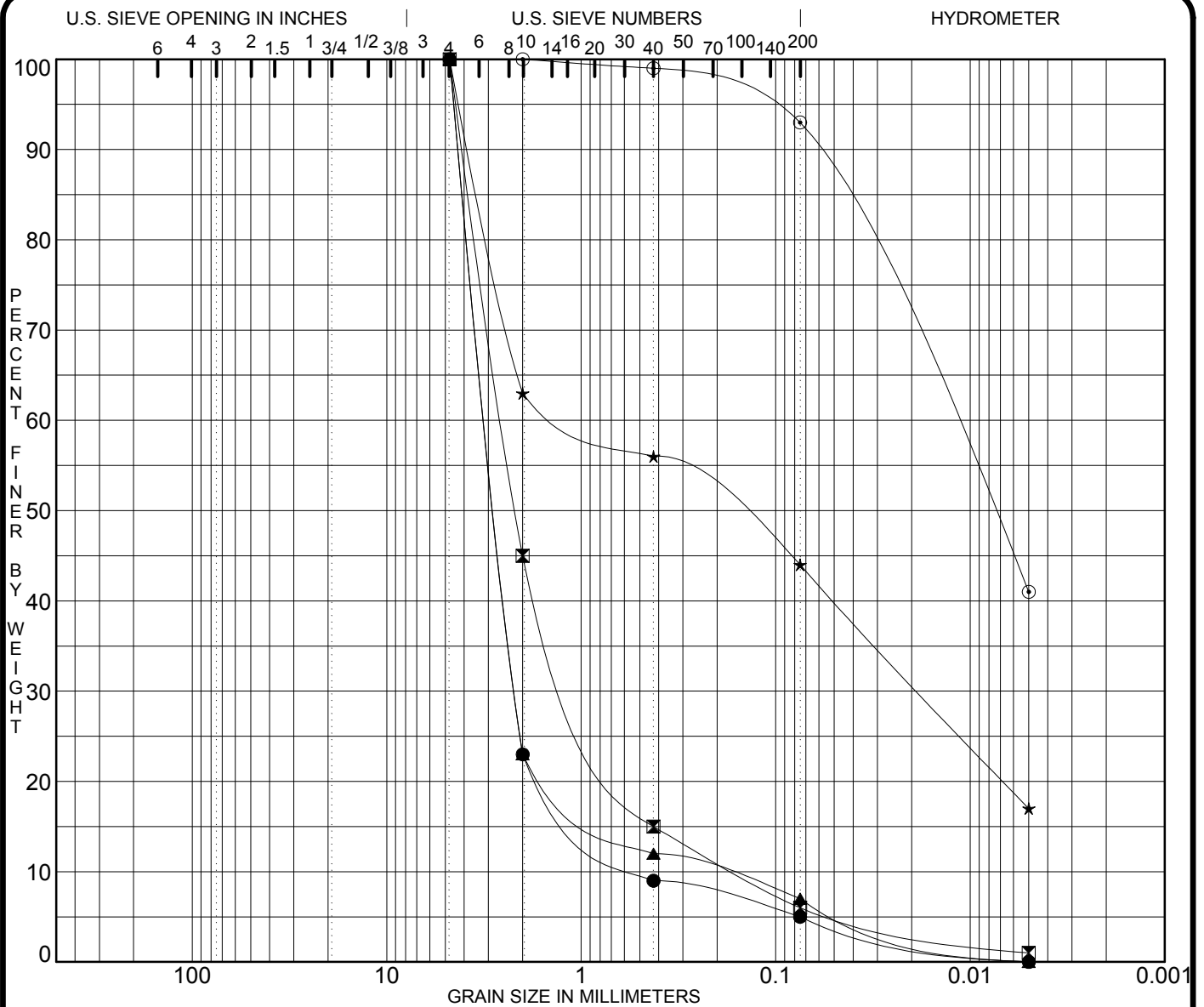
Specimen Identification	D95	D50	D30	D10	%Gravel		%Sand		%Silt	%Clay
					coarse	fine	coarse	fine		
● B-020-S-57	4.384	2.132	0.049		0.0	54.0	5.0	8.0	19.0	14.0
⊠ B-020-S-57	4.512	2.838	2.310	0.7122	0.0	84.0	9.0	2.0	3.0	2.0
▲ B-020-S-57	4.487	2.689	2.141	0.0535	0.0	76.0	9.0	4.0	8.0	3.0

PROJECT FRA-70-1321R

JOB NO. W-13-045
DATE 4/4/14

GRADATION CURVES

Resource International, Inc



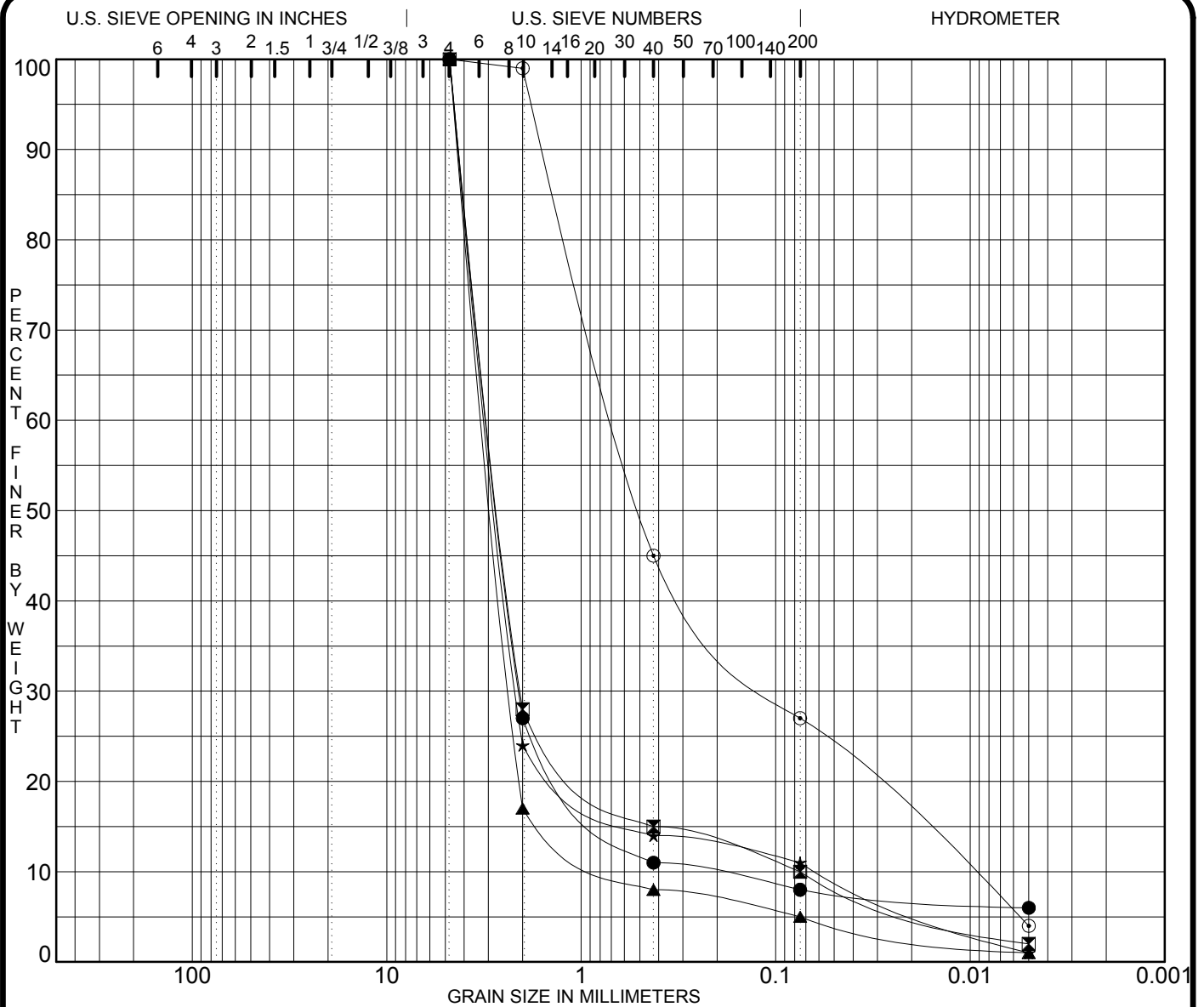
COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

Specimen Identification	Depth	Classification				MC%	LL	PL	PI	Cz	Cu
● B-013-S-57	19.0	A-1-a				10	NP	NP	NP	3.25	6.4
⊠ B-013-S-57	25.0	A-1-a				11	NP	NP	NP	2.07	15.6
▲ B-020-S-57	11.0	A-1-a				11	NP	NP	NP	7.27	14.3
★ B-020-S-57	22.0	A-6b				24	31	8	23		
⊙ B-020-S-57	27.0	A-6b				25	34	16	18		
Specimen Identification	D95	D50	D30	D10	%Gravel		%Sand		%Silt	%Clay	
● B-013-S-57	4.491	2.709	2.164	0.4747	0.0	77.0	14.0	4.0	5.0	0.0	
⊠ B-013-S-57	4.391	2.164	0.922	0.1621	0.0	55.0	30.0	9.0	5.0	1.0	
▲ B-020-S-57	4.491	2.709	2.164	0.2124	0.0	77.0	11.0	5.0	7.0	0.0	
★ B-020-S-57	4.226	0.179	0.018		0.0	37.0	7.0	12.0	27.0	17.0	
⊙ B-020-S-57	0.134	0.008			0.0	0.0	1.0	6.0	52.0	41.0	

PROJECT FRA-70-1321R

JOB NO. W-13-045
DATE 4/4/14

GRADATION CURVES
Resource International, Inc



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

Specimen Identification	Depth	Classification				MC%	LL	PL	PI	Cz	Cu
● B-009-S-57	25.0	A-1-a				5	NP	NP	NP	6.09	12.4
⊠ B-009-S-57	28.0	A-1-a				6	NP	NP	NP	19.05	39.2
▲ B-009-S-57	33.0	A-1-a				2	NP	NP	NP	2.79	5.2
★ B-013-S-57	8.0	A-1-a				12	NP	NP	NP	26.60	52.7
⊙ B-013-S-57	15.0	A-3a				15	NP	NP	NP	1.51	64.5

Specimen Identification	D95	D50	D30	D10	%Gravel		%Sand		%Silt	%Clay
					coarse	fine	coarse	fine		
● B-009-S-57	4.477	2.627	2.072	0.2384	0.0	73.0	16.0	3.0	2.0	6.0
⊠ B-009-S-57	4.473	2.605	2.049	0.0750	0.0	72.0	13.0	5.0	8.0	2.0
▲ B-009-S-57	4.509	2.821	2.290	0.5996	0.0	83.0	9.0	3.0	4.0	1.0
★ B-013-S-57	4.487	2.689	2.141	0.0572	0.0	76.0	10.0	3.0	10.0	1.0
⊙ B-013-S-57	1.783	0.491	0.100	0.0101	0.0	1.0	54.0	18.0	23.0	4.0

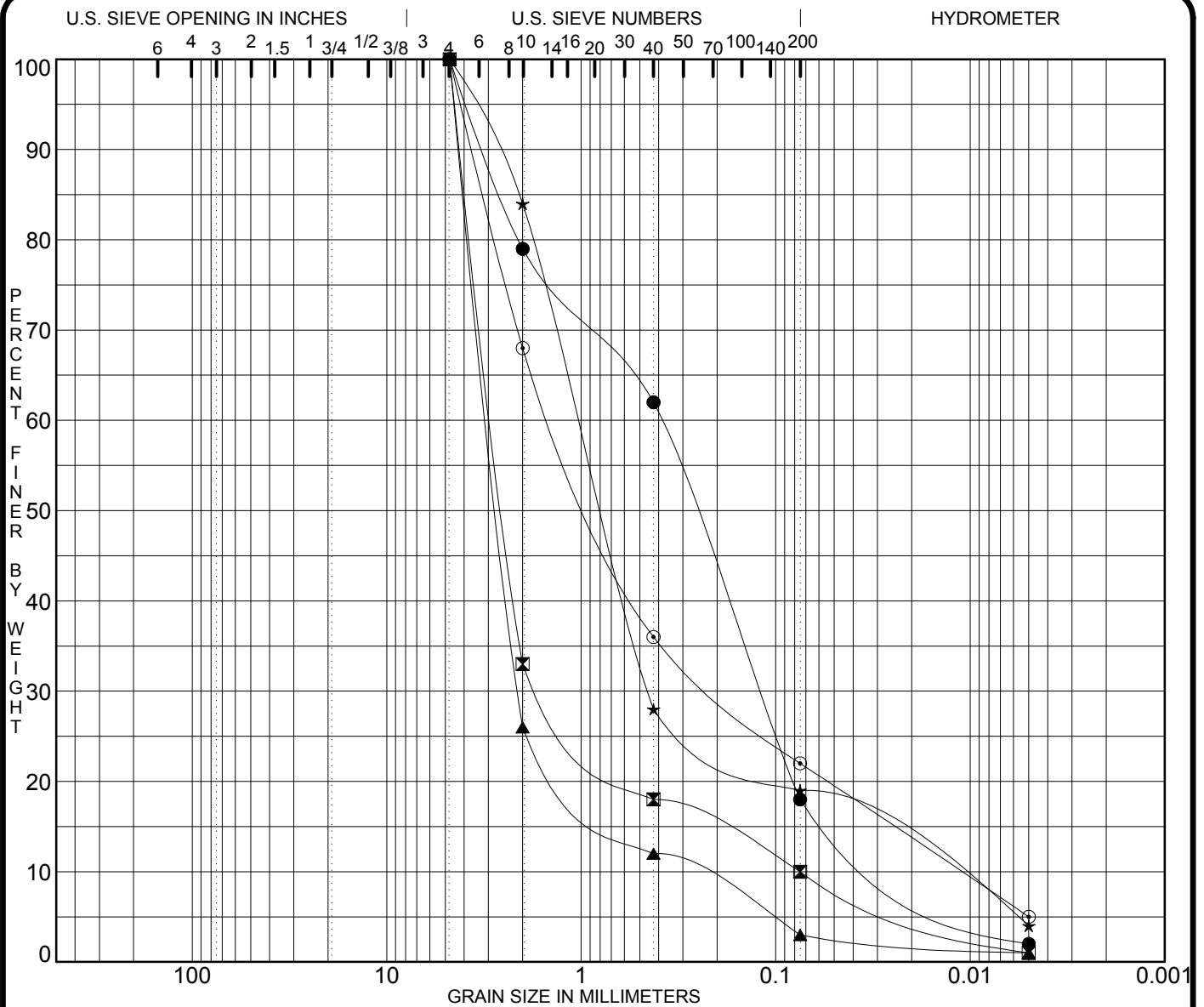
PROJECT FRA-70-1321R

JOB NO. W-13-045

DATE 4/4/14

GRADATION CURVES

Resource International, Inc



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

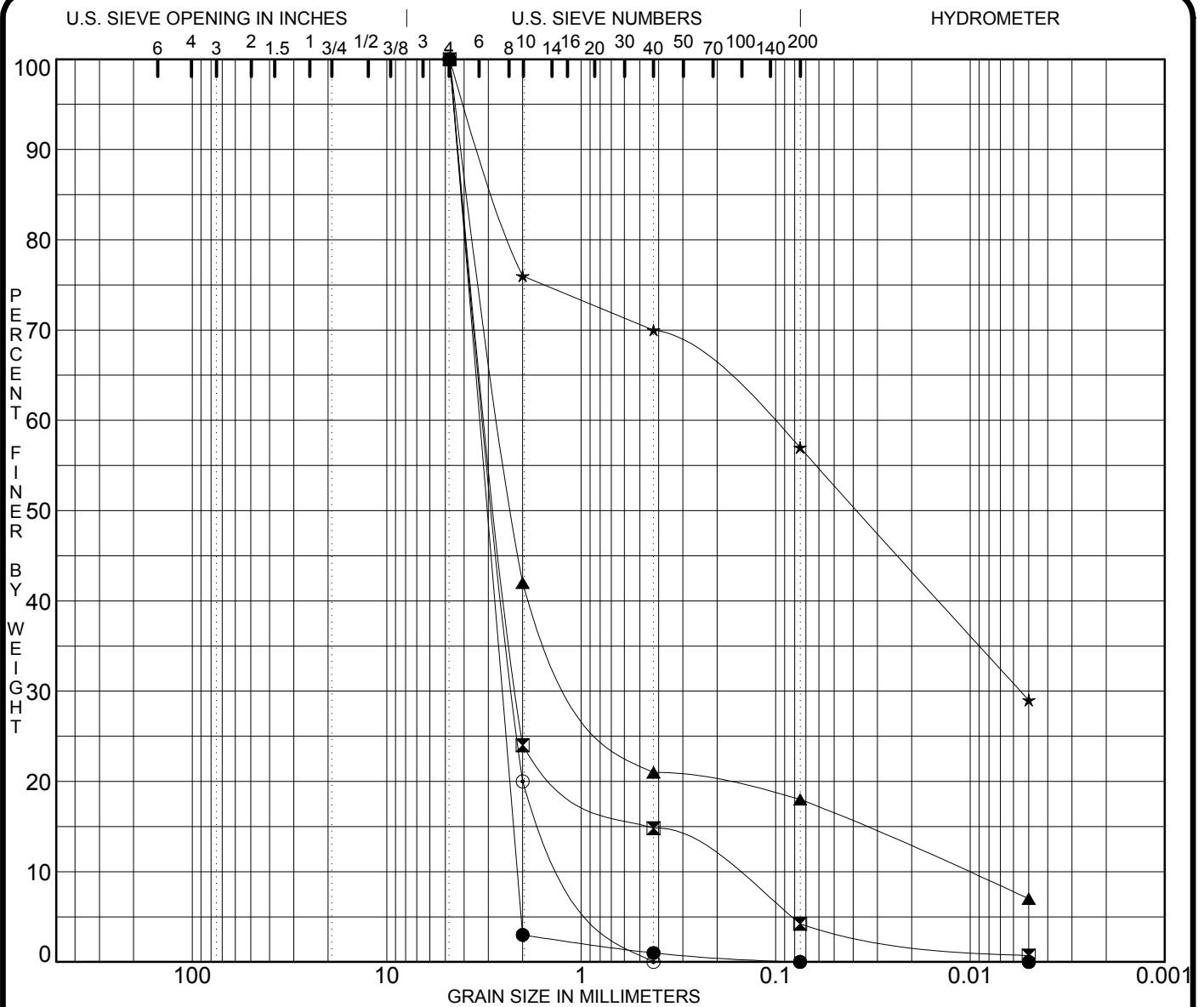
Specimen Identification	Depth	Classification				MC%	LL	PL	PI	Cz	Cu
● B-005-S-57	11.0	A-3a				13	NP	NP	NP	1.90	20.3
⊠ B-005-S-57	16.0	A-1-a				10	NP	NP	NP	10.13	37.8
▲ B-005-S-57	21.0	A-1-a				11	NP	NP	NP	5.11	10.3
★ B-009-S-57	9.0	A-1-b				17	NP	NP	NP	13.26	69.7
⊙ B-009-S-57	15.0	A-1-b				10	NP	NP	NP	2.71	122.5

Specimen Identification	D95	D50	D30	D10	%Gravel		%Sand		%Silt	%Clay
					coarse	fine	coarse	fine		
● B-005-S-57	3.866	0.265	0.120	0.0194	0.0	21.0	17.0	44.0	16.0	2.0
⊠ B-005-S-57	4.453	2.491	1.467	0.0750	0.0	67.0	15.0	8.0	9.0	1.0
▲ B-005-S-57	4.480	2.648	2.096	0.2891	0.0	74.0	14.0	9.0	2.0	1.0
★ B-009-S-57	3.625	0.781	0.449	0.0148	0.0	16.0	56.0	9.0	15.0	4.0
⊙ B-009-S-57	4.150	0.837	0.202	0.0111	0.0	32.0	32.0	14.0	17.0	5.0

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GRADATION CURVES
Resource International, Inc



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

Specimen Identification	Depth	Classification				MC%	LL	PL	PI	Cz	Cu
● B-001-S-57	36.0	A-1-a				8	NP	NP	NP	0.91	1.6
⊠ B-001-S-57	41.0	A-1-a				13	NP	NP	NP	7.89	15.6
▲ B-001-S-57	45.0	A-1-b				7	NP	NP	NP	24.89	250.0
★ B-001-S-57	50.0	A-6a				18	24	12	12		
⊙ B-005-S-57	6.0	A-1-a				11	NP	NP	NP	1.75	3.3

Specimen Identification	D95	D50	D30	D10	%Gravel		%Sand		%Silt	%Clay
					coarse	fine	coarse	fine		
● B-001-S-57	4.543	3.041	2.544	2.1288	0.0	97.0	2.0	1.0	0.0	0.0
⊠ B-001-S-57	4.487	2.689	2.141	0.1928	0.0	76.0	9.2	10.6	3.5	0.7
▲ B-001-S-57	4.409	2.253	0.825	0.0105	0.0	58.0	21.0	3.0	11.0	7.0
★ B-001-S-57	3.967	0.038	0.006		0.0	24.0	6.0	13.0	28.0	29.0
⊙ B-005-S-57	4.500	2.766	2.228	0.9220	0.0	80.0	20.0	0.0	0.0	0.0

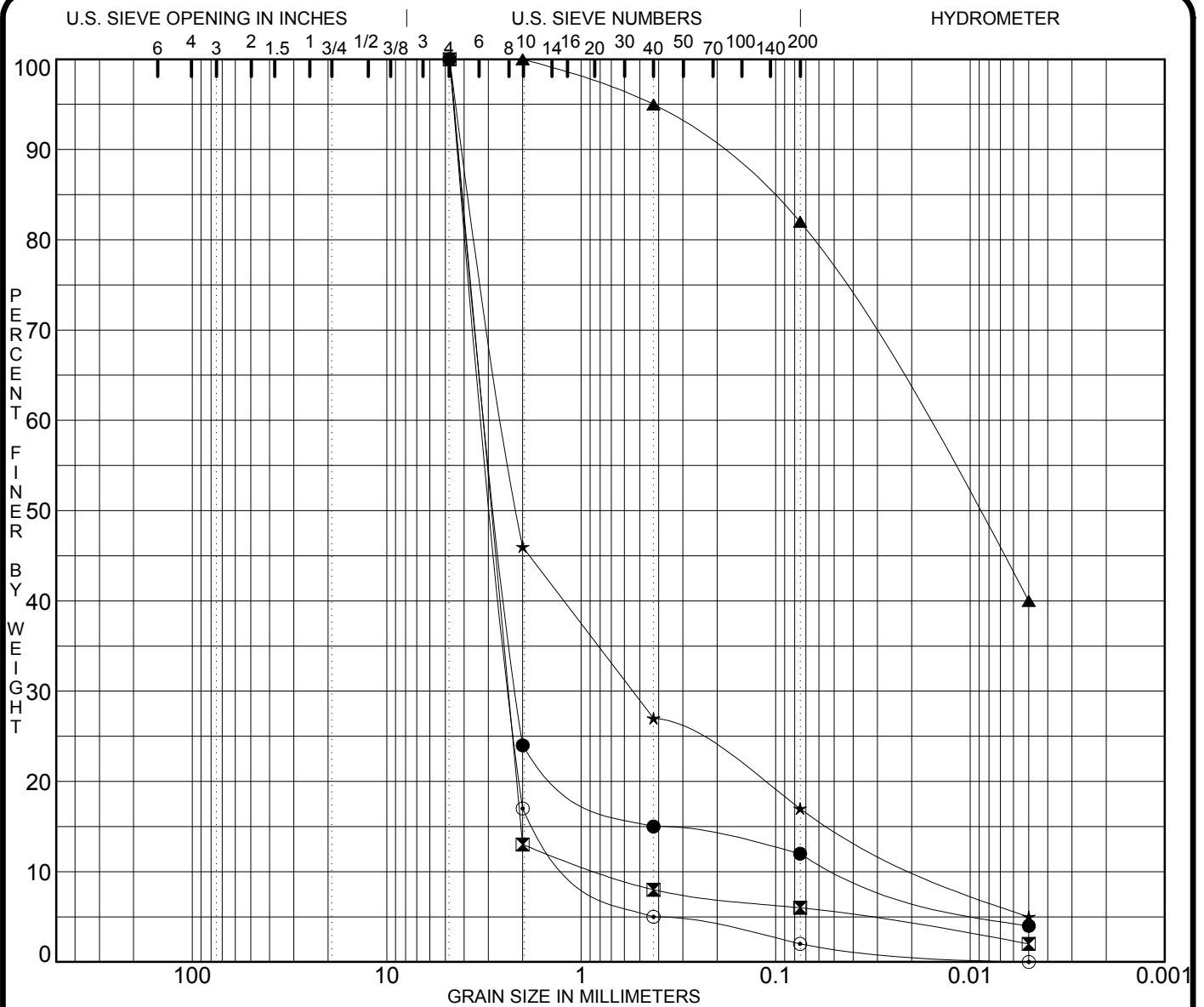
PROJECT FRA-70-1321R

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DATE _____

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GRADATION CURVES

Resource International, Inc



COBBLES	GRAVEL		SAND		SILT OR CLAY
	coarse	fine	coarse	fine	

Specimen Identification	Depth	Classification				MC%	LL	PL	PI	Cz	Cu
● B-001-S-57	11.0	A-1-a				11	NP	NP	NP	39.94	79.1
⊠ B-001-S-57	15.0	A-1-a				7	NP	NP	NP	2.23	4.0
▲ B-001-S-57	20.0	A-6b				24	35	15	20		
★ B-001-S-57	25.0	A-1-b				12	NP	NP	NP	7.62	162.0
⊙ B-001-S-57	31.0	A-1-a				14	NP	NP	NP	2.07	3.9

Specimen Identification	D95	D50	D30	D10	%Gravel		%Sand		%Silt	%Clay
					coarse	fine	coarse	fine		
● B-001-S-57	4.487	2.689	2.141	0.0381	0.0	76.0	9.0	3.0	8.0	4.0
⊠ B-001-S-57	4.520	2.889	2.368	0.7897	0.0	87.0	5.0	2.0	4.0	2.0
▲ B-001-S-57	0.425	0.010			0.0	0.0	5.0	13.0	42.0	40.0
★ B-001-S-57	4.384	2.132	0.543	0.0155	0.0	54.0	19.0	10.0	12.0	5.0
⊙ B-001-S-57	4.509	2.821	2.290	0.8103	0.0	83.0	12.0	3.0	2.0	0.0

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