

Appendix 3

PRELIMINARY MORPHOLOGICAL DATA

Reedy Creek Stream Restoration Feasibility
Charlotte, North Carolina

VARIABLES (All units are in Feet)	REACH 1 (Existing)		REACH 1 (Design)		NC Piedmont Regional Curves (REACH 1)		REACH 2 (Existing)		REACH 2 (Design)		NC Piedmont Regional Curves (REACH 2)		REACH 3 (Existing)		REACH 3 (Design)		NC Piedmont Regional Curves (REACH 3)		REACH 4 (Existing)		REACH 4 (Design)		NC Piedmont Regional Curves (REACH 4)		Edwards Branch Reference Reach		NORTH MUDDY CREEK - UT4 Reference Reach		Rosgen C4 Reference Reach Data Average Values			
	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Rural	Urban	Min	Max	Min	Max	Min	Max		
1 Stream Type (Rosgen)	F5		C5		--		F6		C5		--		F5		C5		--		G5		C5		--		C4B4c		B4		C4			
2 Drainage Area (Square miles)	0.58		0.58		0.58		0.52		0.52		0.52		0.26		0.26		0.26		0.17		0.17		0.17		0.20		0.12		--			
3 Bankfull Width (W _{bf})	16.9		16.2		9.4 20.4		12.0		16.2		9.0 19.7		11.4		11.8		6.7 15.6		5.8		10.2		5.5 13.6		16.8		4.9		--			
4 Bankfull Mean Depth (d _{bf})	0.9		0.9		1.3 2.0		1.0		0.9		1.2 2.0		0.8		0.8		1.0 1.6		0.9		0.7		0.9 1.4		1.0		0.4		--			
5 Width/Depth Ratio (W _{bf} /d _{bf})	19.4		17.8		7.5 10.0		12.2		17.8		7.4 10.0		13.8		15.7		6.8 10.0		6.6		15.7		6.5 10.0		16.5		12.2		12.0 18.0			
6 Bankfull Cross-Sectional Area (A _{bf})	14.7		14.8		14.8 42.3		11.9		14.8		13.7 39.4		9.5		8.9		8.6 25.1		5.1		6.6		6.4 19.1		17.1		1.9		--			
7 Bankfull Mean Velocity, ft/s (V _{bf})	3.9		3.9		4.1 5.1		4.7		3.8		4.0 5.2		4.3		4.7		3.9 5.2		4.7		3.7		3.9 5.3		3.8		10.2		--			
8 Bankfull Discharge ¹ , cfs (Q _{bf})	57.0		57.0		60.2 217.7		55.8		55.8		55.6 203.2		41.3		41.3		33.8 131.3		24.3		24.3		24.9 100.5		65.8		19.3		--			
9 Bankfull Maximum Depth (d _{bf})	1.2		1.5		--		1.6		1.5		--		1.6		1.3		--		1.1		1.1		--		2.2		0.5		--			
10 Max d _{bf} /d _{bf,ratio}	1.3		1.6		--		1.6		1.6		--		1.9		1.7		--		1.3		1.7		--		2.2		1.2		1.2 1.5			
11 Low Bank Height to Max Bankfull d _{bf} ratio	7.8		1.0 1.0		--		4.2		1.0 1.0		--		4.4		1.0 1.0		--		5.2		1.0 1.0		--		1.0		1.2		--			
12 Width of Flood Prone Area (W _{fp})	19.3		35.0		40.0		14.4		35.0		40.0		15.9		26.0		30.0		8.1		22.0		25.0		38.5		8.8		--			
13 Entrenchment Ratio (W _{bf} /W _{fp})	1.1		2.2		2.5		1.2		2.2		2.5		1.4		2.2		2.5		1.4		2.2		2.5		2.3		1.8		--			
14 Meander Length (L _m)	101.7 146.8		97.2		194.4		98.3 125.7		97.2		194.4		17.6 39.8		70.8		141.6		10.3		29.3		61.2		122.4		168.0		36.4 52.1		--	
15 Ratio of Meander Length to Bankfull Width (L _m /W _{bf})	6.0 8.7		6.0		12.0		8.2 10.4		6.0		12.0		1.5 3.5		6.0		12.0		1.8		5.0		6.0		12.0		10.0		7.5 10.7		9.0 14.0	
16 Radius of Curvature (R _c)	14.2		36.6		40.5 56.7		10.3		47.2		40.5 56.7		9.4		36.3		29.5 41.3		0.9		2.3		25.5 35.7		50.0		60.0		4.0 10.0		--	
17 Ratio of Radius of Curvature to Bankfull Width (R _c /W _{bf})	0.8		2.2		3.5		0.9		3.9		2.5 3.5		0.8		3.2		2.5 3.5		0.2		0.4		2.5 3.5		3.0		3.6		0.8 2.1		2.5 3.0	
18 Belt Width (W _b)	20.8		41.2		16.2 71.3		11.9		24.8		16.2 71.3		11.4		24.6		11.8 51.9		9.2		43.5		10.2 44.9		120.0		17.6		20.4		--	
19 Belt Width Ratio (W _b /W _{bf})	1.2		2.4		1.0 4.4		1.0		2.1		1.0 4.4		1.0		2.1		1.0 4.4		1.6		7.4		1.0 4.4		7.1		3.6		4.2		--	
20 Sinuosity (k) (Stream Length / Valley Length)	1.02		1.05		--		1.03		1.10		--		1.02		1.05		--		1.07		1.10		--		1.10		1.5		--			
21 Valley Slope (S _{valley}) (ft/ft)	0.0050		0.0050		--		0.0155		0.0155		--		0.0152		0.0152		--		0.0120		0.0120		--		0.0053		0.0300		--			
22 Average Stream Slope (S _{avg}) (ft/ft)	0.0049		0.0048		--		0.0151		0.0141		--		0.0149		0.0145		--		0.0112		0.0109		--		0.0048		0.0200		--			
23 Riffle Slope (S _{rf})	0.0053		0.0152		--		0.0339		0.0645		--		0.0263		0.0549		--		0.0113		0.0274		--		0.0014		0.0115		0.0330 0.0510		--	
24 Ratio of Riffle Slope to Avg. Slope (S _{rf} /S _{avg})	1.1		3.1		--		2.2		4.3		--		1.8		3.7		--		1.0		2.4		--		0.3		2.4		1.7 2.6		1.5 2.0	
25 Pool Slope (S _{pool})	0.0000		0.0024		--		0.0003		0.0010		--		0.0000		0.0009		--		0.0000		0.0049		--		0.0002		0.0013		0.0000 0.0130		--	
26 Ratio of Pool Slope to Avg. Slope (S _{pool} /S _{avg})	0.0		0.5		--		0.0		0.1		--		0.0		0.1		--		0.0		0.4		--		0.1		0.3		0.0 0.7		0.2 0.3	
27 Maximum Pool Depth (D _{pool})	2.1		--		--		2.5		--		--		2.4		--		--		1.3		--		--		3.9		0.8		1.1		--	
28 Ratio of Pool Depth to Bkf Depth (D _{pool} /d _{bf})	2.4		--		--		2.5		--		--		2.9		--		--		1.4		--		--		3.8		2.1		2.8 2.5 3.5		--	
29 Pool Width (W _{pool})	13.0		--		--		12.9		--		--		10.7		--		--		6.3		--		--		17.6		5.2		--		--	
30 Ratio of Pool Width to Bankfull Width (W _{pool} /W _{bf})	0.8		--		--		1.1		--		--		0.9		--		--		1.1		--		--		1.1		1.1		1.3 1.7		--	
31 Pool Area (A _{pool})	15.3		--		--		23.7		--		--		13.0		--		--		5.3		--		--		30.8		3.9		--		--	
32 Ratio of Pool Area to Bankfull Area (A _{pool} /A _{bf})	1.0		--		--		2.0		--		--		1.4		--		--		1.0		--		--		1.8		2.1		--		--	
33 Pool to Pool Spacing (p-p)	29.3		94.6		32.4 81.0		46.3		96.7		32.4 81.0		20.8		58.8		23.6 59.0		18.3		49.7		20.4 51.0		46.1		98.7		39.8 45.8		--	
34 Ratio of Pool to Pool Spacing to Bankfull Width (p-p/W _{bf})	1.7		5.6		2.0 5.0		3.8		8.0		2.0 5.0		1.8		5.1		2.0 5.0		3.1		8.5		2.0 5.0		2.7		5.9		8.2 9.4		5.0 7.0	

¹ Historically straightened and ditched channel

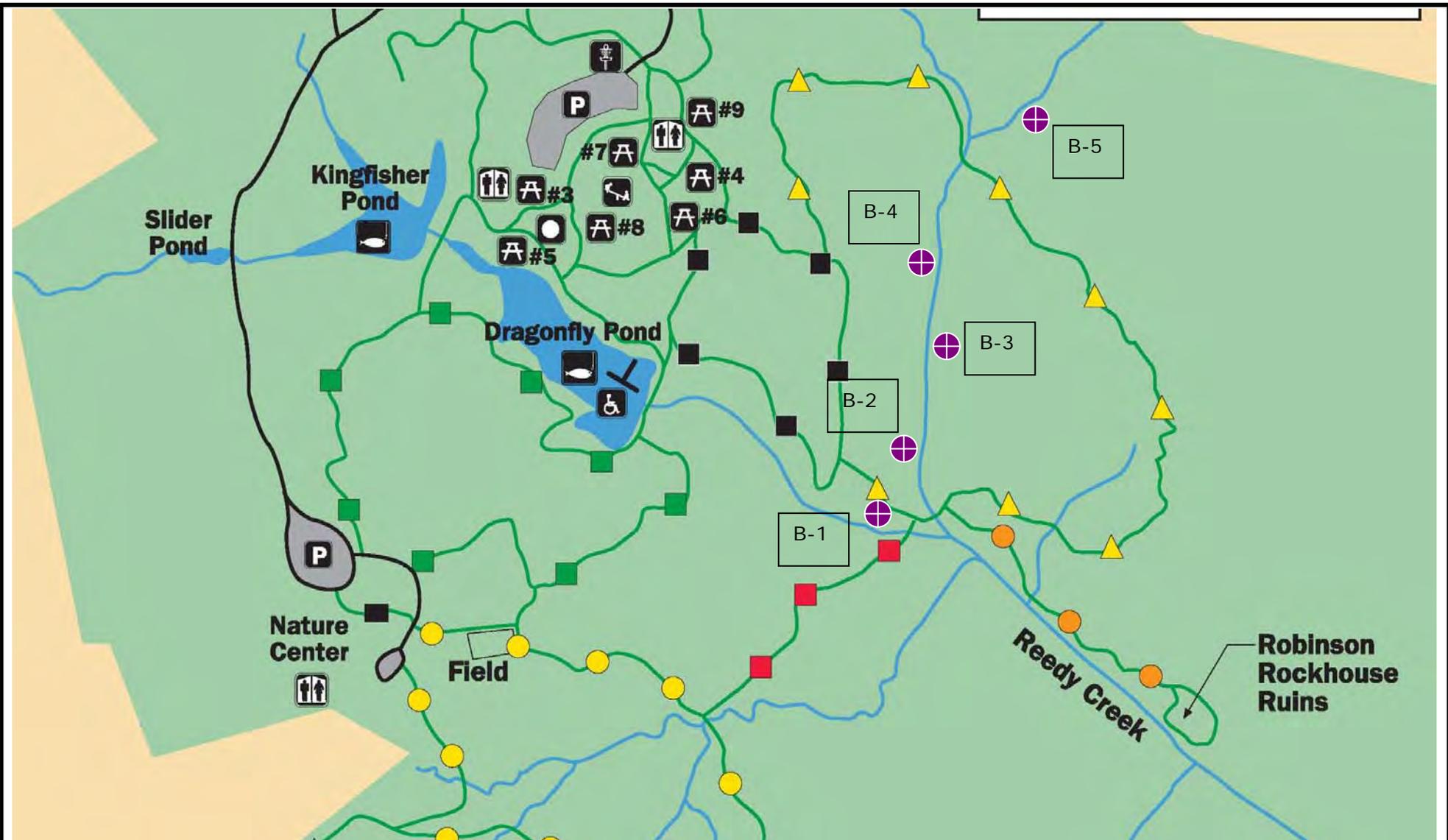
² Based on The River Field Book, Rosgen Stream type and Associated Manning's "n" Coefficient and Relative Roughness / Friction Factor

³ Most of the observed reaches were highly degraded and lacked defined riffle and pool features.

⁴ Dimension data only because the dimension was locally stable due to bedrock control and/or healthy riparian areas.

⁵ Note that Wid ratios can vary by +/- 2.0 units

Appendix 4



Legend


B-x Approximate Location of Soil Test Boring (B-x)

Ref: Boring location plan prepared from 2005 Trail Map of Reedy Creek Park, Mecklenburg Co., NC

NORTH



BOYLE CONSULTING ENGINEERS, PLLC
 Development & Construction Project Services

Boring Location Plan
 Reedy Creek Park
 Stream Restoration
 Charlotte, North Carolina
 BOYLE Project No. 11-003

Date: 5/19/11

Drawn By: MR

Scale: NTS

Figure 1



4340-H Taggart Creek Road
 Charlotte, NC 28208
 Phone: (704) 676-0778
 Fax: (704) 676-0596

**SOIL TEST
 BORING RECORD**

BORING NO.: B-1

GSE*: 100.0

(Cut)/Fill: 0

FG: 100.0

AT GRADE

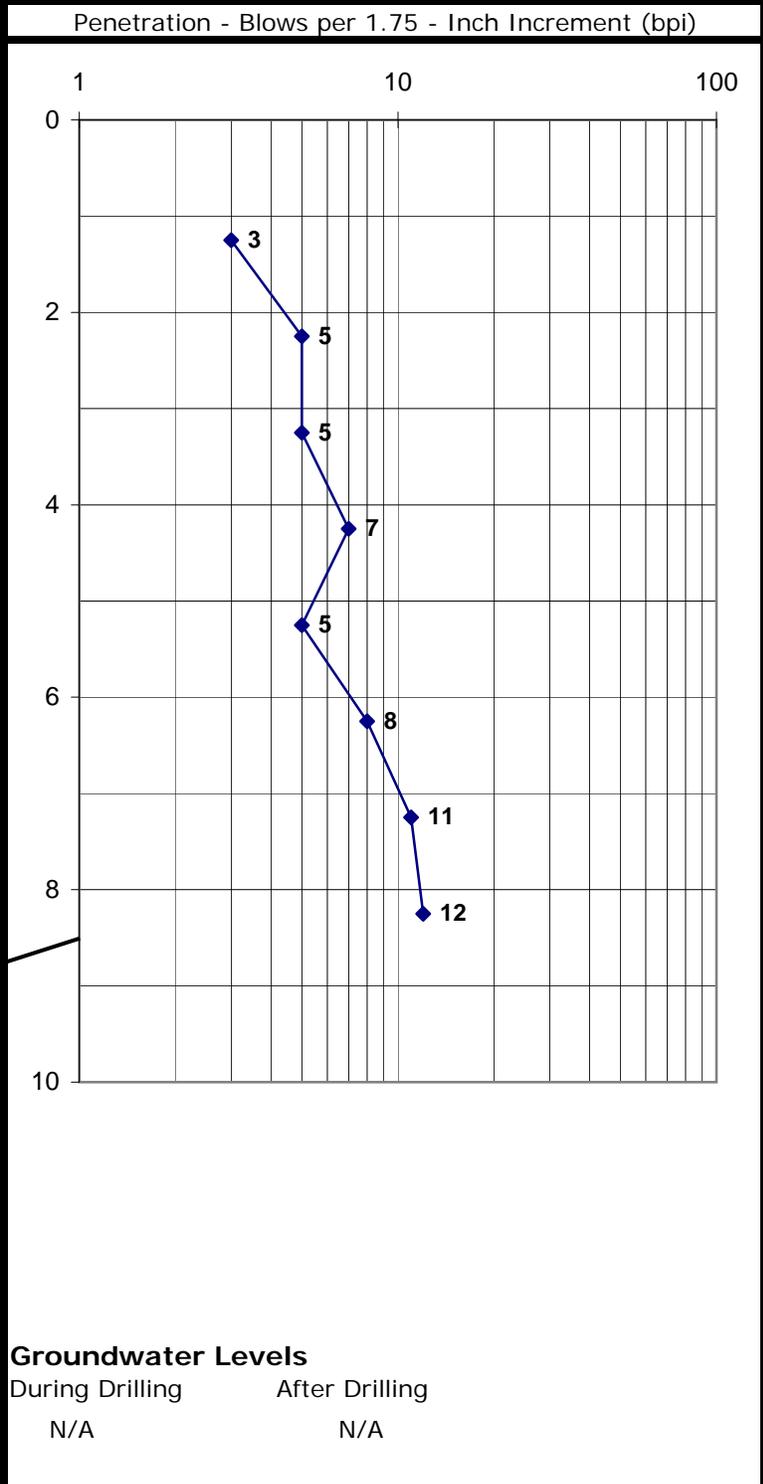
PROJECT INFORMATION

DRILLING INFORMATION

PROJECT: **Reedy Creek Park Stream Restoration**
 SITE LOCATION: **Charlotte, NC**
 BOYLE JOB NO.: **11-003**
 DATE DRILLED: **5/13/2011**

DRILL RIG.:
 DRILLING METHOD: **Hand-Auger**
 SAMPLING METHODS: **ASTM STP-399**
 HAMMER WT./DROP: **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 4 Inches	0.0	100.0
RESIDUUM - Soft yellowish-brown and gray silty sandy CLAY (CL), rootlets, moist	0.3	99.7
----- Firm gray and reddish-brown clayey SILT (ML), fine sand, rootlets, moist	2.0	98.0
----- Firm yellowish-red clayey SILT (ML), moist	4.0	96.0
Loose to medium dense yellowish-red and gray clayey fine SAND (SC)	6.0	94.0
Stiff yellowish-brown and gray sandy CLAY (CL), ferrous staining	8.0	92.0
Boring terminated due to auger refusal in hard clayey soils at 8.5 feet.	8.5	91.5





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**SOIL TEST
 BORING RECORD**

BORING NO.: B-2

GSE*: 100.0

(Cut)/Fill: 0

FG: 100.0

AT GRADE

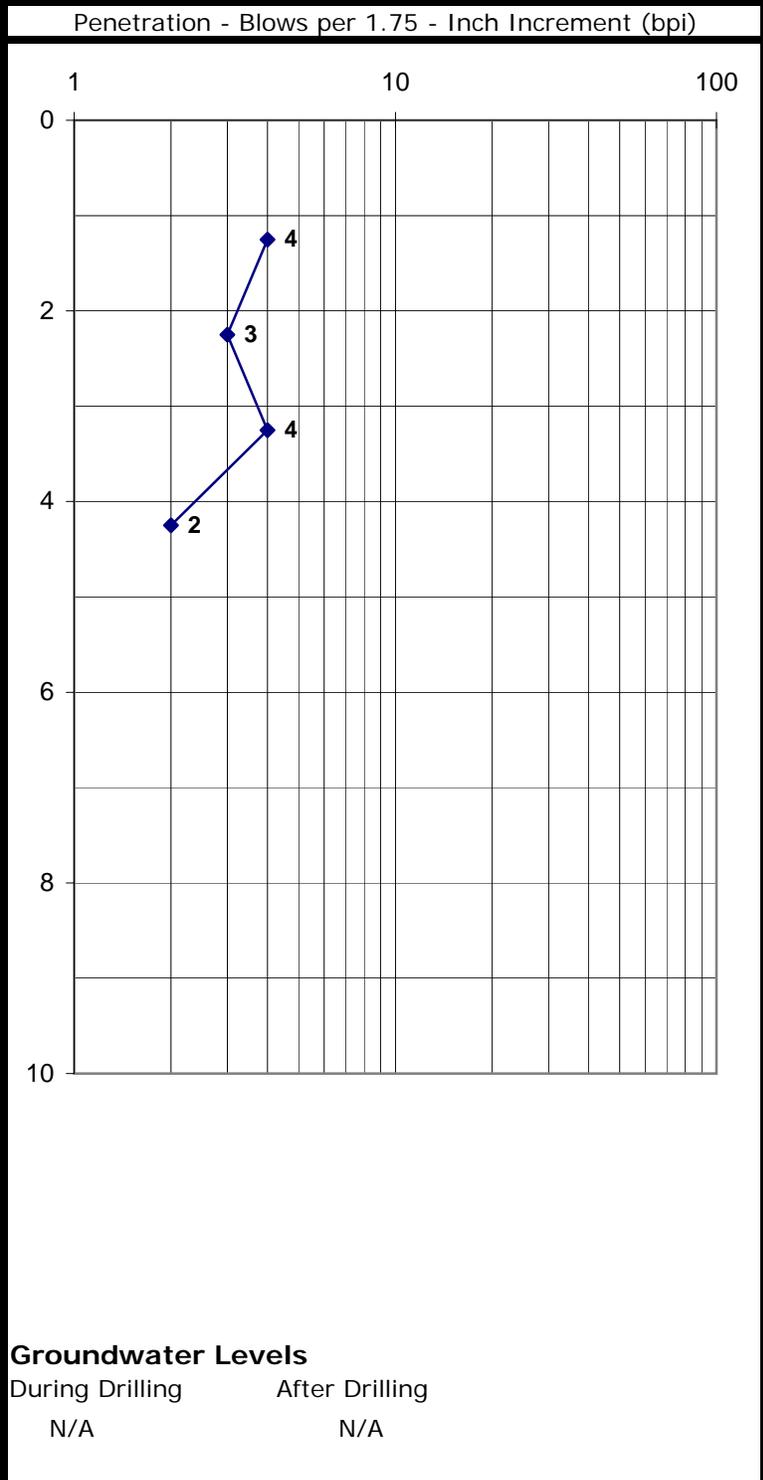
PROJECT INFORMATION

DRILLING INFORMATION

PROJECT: **Reedy Creek Park Stream Restoration**
 SITE LOCATION: **Charlotte, NC**
 BOYLE JOB NO.: **11-003**
 DATE DRILLED: **5/13/2011**

DRILL RIG.:
 DRILLING METHOD: **Hand-Auger**
 SAMPLING METHODS: **ASTM STP-399**
 HAMMER WT./DROP: **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 6 Inches	0.0	100.0
RESIDUUM - Soft yellowish-brown clayey SILT (ML), rootlets	0.5	99.5
----- Soft brown sandy SILT (ML), moist	3.0	97.0
Boring terminated due to auger refusal in hard silty soils at 4.5 feet.	4.5	95.5





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**SOIL TEST
 BORING RECORD**

BORING NO.: B-3

GSE*: 100.0

(Cut)/Fill: 0

FG: 100.0

AT GRADE

PROJECT INFORMATION

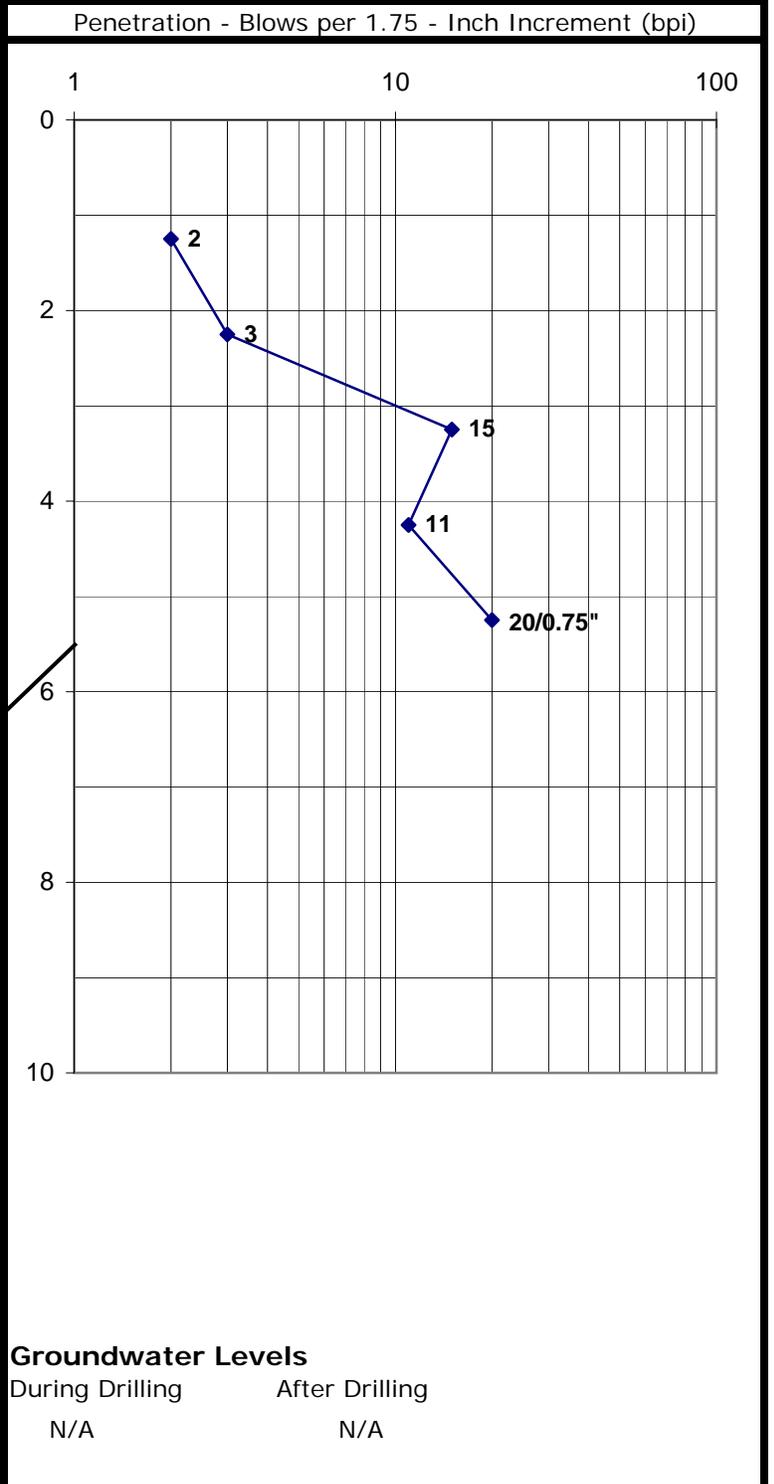
DRILLING INFORMATION

PROJECT: **Reedy Creek Park Stream Restoration**
 SITE LOCATION: **Charlotte, NC**
 BOYLE JOB NO.: **11-003**
 DATE DRILLED: **5/13/2011**

DRILL RIG.:
 DRILLING METHOD: **Hand-Auger**
 SAMPLING METHODS: **ASTM STP-399**
 HAMMER WT./DROP **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 6 Inches	0.0	100.0
RESIDUUM - Soft yellowish-red clayey SILT (ML), rootlets, moist	0.5	99.5
Stiff ⁽¹⁾ dark brown clayey SILT (ML), fine sand, ferrous staining, rock fragments	3.0	97.0
Medium dense grayish-brown clayey fine SAND (SC)	4.0	96.0
Medium dense light brownish-gray fine to medium SAND (SW-SP)	5.0	95.0
Boring terminated due to auger refusal in dense sandy soils at 5.5 feet.	5.5	94.5

(1) Blow count most likely inflated by presence of rock fragments in soil





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**SOIL TEST
 BORING RECORD**

BORING NO.: B-4

GSE*: 100.0

(Cut)/Fill: 0

FG: 100.0

AT GRADE

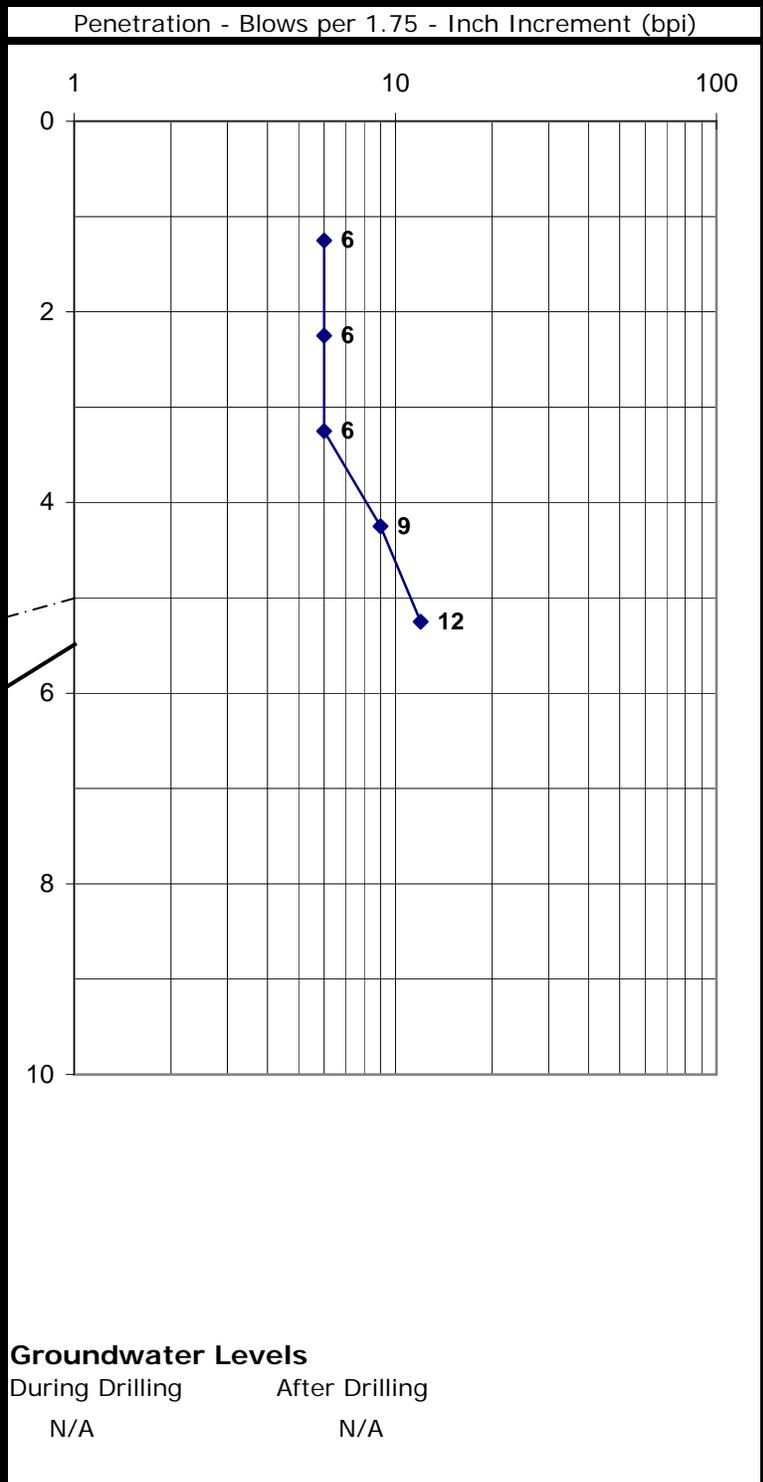
PROJECT INFORMATION

DRILLING INFORMATION

PROJECT: **Reedy Creek Park Stream Restoration**
 SITE LOCATION: **Charlotte, NC**
 BOYLE JOB NO.: **11-003**
 DATE DRILLED: **5/13/2011**

DRILL RIG.:
 DRILLING METHOD: **Hand-Auger**
 SAMPLING METHODS: **ASTM STP-399**
 HAMMER WT./DROP: **15 lb., 20 in.**

Description	Depth	Elevation
Topsoil - 6 Inches	0.0	100.0
RESIDUUM - Firm yellowish-red clayey sandy SILT (ML), rootlets, moist	0.5	99.5
Firm to stiff reddish-brown clayey sandy SILT (ML), ferrous staining, moist	3.0	97.0
Medium dense dark gray slightly silty fine SAND (SP)	4.5	95.5
Medium dense light grayish-brown fine to medium SAND (SW-SP)	5.0	95.0
Boring terminated due to auger refusal in dense sandy soils at 5.5 feet.	5.5	94.5





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**SOIL TEST
 BORING RECORD**

BORING NO.: B-5

GSE*: 100.0

(Cut)/Fill: 0

FG: 100.0

AT GRADE

PROJECT INFORMATION

DRILLING INFORMATION

PROJECT: **Reedy Creek Park Stream Restoration**
 SITE LOCATION: **Charlotte, NC**
 BOYLE JOB NO.: **11-003**
 DATE DRILLED: **5/13/2011**

DRILL RIG.:
 DRILLING METHOD: **Hand-Auger**
 SAMPLING METHODS: **ASTM STP-399**
 HAMMER WT./DROP **15 lb., 20 in.**

Description	Depth	Elevation	Penetration - Blows per 1.75 - Inch Increment (bpi)
Topsoil - 6 Inches	0.0	100.0	
RESIDUUM - Soft yellowish-red clayey SILT (ML), rootlets, moist	0.5	99.5	
Stiff to firm brown slightly sandy clayey SILT (ML), moist	3.0	97.0	
Firm reddish-brown and gray clayey SILT (ML), fine sand, ferrous staining, moist	5.0	95.0	
Loose grayish-brown clayey fine SAND (SC), rock fragments, moist	6.0	94.0	
	6.5	93.5	

Groundwater Levels
 During Drilling: N/A
 After Drilling: N/A

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria		
Coarse-Grained Soils (More than half of the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieves size)	Clean Gravels (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3	
		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW		
		Gravels with fines	GM ^a	d	Silty Gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 Atterberg limits below "A" line with P.I. greater than 7
				u		
	GC	Clayey Gravels, gravel-sand-clay mixtures				
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean Sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3	
		SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW		
		Sands with fines	SM ^a	d	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 Atterberg limits below "A" line with P.I. greater than
				u		
	SC	Clayey sands, sand-clay mixtures				
Fine-Grained Soils (More than half of material is smaller than No. 200 sieve)	Silts and Clays (Liquid Limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity			
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
		OL	Organic silts and organic silty clays of low plasticity			
	Silts and Clays (Liquid Limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
		CH	Inorganic clays of high plasticity, fat clays (i.e. Bull Tallow)			
		OH	Organic clays of medium to high plasticity, organic silts			
	Highly Organic Soils	Pt	Peat and other highly organic soils			

Reference: Winterkorn & Fang, 1975 (ASTM D-2487)

^aDivision of GM and SM groups into subdivision of d and u are for road and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u is used when L.L. is greater than 28.

^bBorderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.



Unified Soil Classification System

REFERENCE NOTES FOR SOIL TEST BORING RECORDS

I. Drilling and Sampling Symbols:

SS:	Split Spoon Sampler	GSE:	Ground Surface Elevation
ST:	Shelby Tube Sampler	PG:	Proposed Grade
RC:	Rock Core; NX, BX, AX	BS:	Bulk Sample of Cuttings
NQ:	Rock Core, 2-1/16" Diameter	PA:	Power Auger (no sample)
PM:	Pressuremeter	HSA:	Hollow Stem Auger
DC:	Dutch Cone Penetrometer	WS:	Wash Sample
REC:	Recovery of Core Run (%)	RQD:	Rock Quality of Core Run

Standard Penetration (Blows/Ft) refers to the blows per foot of a 140 lb hammer falling 30 inches on a 2 inch O.D. split spoon sample, as specified in ASTM D-1586. The blow count is commonly referred to as the N value. Autohammer refers to an automatic hammer as opposed to the manual "Cathead" and rope type. Core Drilling meets ASTM D-2113

II. Correlation of Penetration Resistances to Soil Properties:

Relative Density of Cohesionless Soils

<u>SPT-N</u>	<u>Relative Density</u>
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
51 or more	Very Dense

Consistency of Cohesive Soils

<u>SPT-N</u>	<u>Consistency</u>
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
31 or more	Hard

III. Unified Soil Classification Symbols:

GP:	Poorly Graded Gravel	ML:	Low Plasticity Silts
GW:	Well Graded Gravel	MH:	High Plasticity Silts
GM:	Silty Gravel	CL:	Low Plasticity Clays
GC:	Clayey Gravel	CH:	High Plasticity Clays
SP:	Poorly Graded Sands	OL:	Low Plasticity Organics
SW:	Well Graded Sands	OH:	High Plasticity Organics
SM:	Silty Sands	CL-ML:	Dual Classification (Typical)
SC:	Clayey Sands		

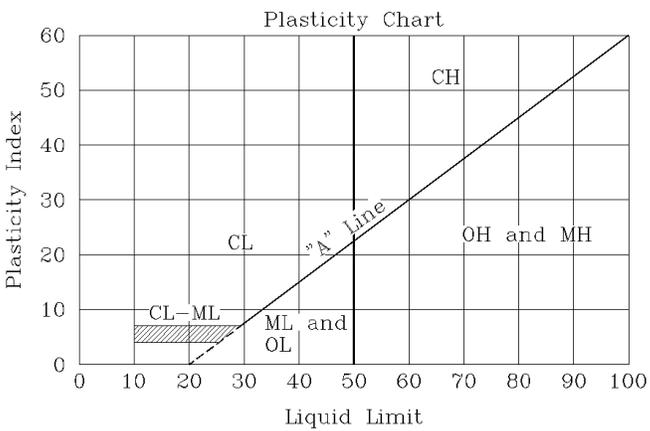
IV. Water Level Measurement Symbols:

	WL: Water Level
	WL: While Sampling
	WD: While Drilling

DCD: Dry Caved Depth

WCD: Wet Caved Depth

The water levels are those water levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clays and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria			
Coarse-Grained Soils (More than half of the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieves size)	Clean Gravels (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines	$C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3	Not meeting all gradation requirements for GW	
		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines				
		Gravels with fines	GM ^a	d	Silty Gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
				u			
	GC	Clayey Gravels, gravel-sand-clay mixtures		Atterberg limits below "A" line with P.I. greater than 7	$C_u = D_{60}/D_{10}$ greater than 6 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3	Not meeting all gradation requirements for SW	
		Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean Sands (Little or no fines)				SW
	SP		Poorly graded sands, gravelly sands, little or no fines				
	Sands with fines		SM ^a	d	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
		u					
	SC	Clayey sands, sand-clay mixtures		Atterberg limits below "A" line with P.I. greater than			
Fine-Grained Soils (More than half of material is smaller than No. 200 sieve)	Silts and Clays (Liquid Limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity				
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		OL	Organic silts and organic silty clays of low plasticity				
	Silts and Clays (Liquid Limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts				
		CH	Inorganic clays of high plasticity, fat clays (i.e. Bull Tallow)				
		OH	Organic clays of medium to high plasticity, organic silts				
	Highly Organic Soils	Pt	Peat and other highly organic soils				

Reference: Winterkorn & Fang, 1975 (ASTM D-2487)

^aDivision of GM and SM groups into subdivision of d and u are for road and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u is used when L.L. is greater than 28.

^bBorderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.



Unified Soil Classification System

REFERENCE NOTES FOR SOIL TEST BORING RECORDS

I. Drilling and Sampling Symbols:

SS:	Split Spoon Sampler	GSE:	Ground Surface Elevation
ST:	Shelby Tube Sampler	PG:	Proposed Grade
RC:	Rock Core; NX, BX, AX	BS:	Bulk Sample of Cuttings
NQ:	Rock Core, 2-1/16" Diameter	PA:	Power Auger (no sample)
PM:	Pressuremeter	HSA:	Hollow Stem Auger
DC:	Dutch Cone Penetrometer	WS:	Wash Sample
REC:	Recovery of Core Run (%)	RQD:	Rock Quality of Core Run

Standard Penetration (Blows/Ft) refers to the blows per foot of a 140 lb hammer falling 30 inches on a 2 inch O.D. split spoon sample, as specified in ASTM D-1586. The blow count is commonly referred to as the N value. Autohammer refers to an automatic hammer as opposed to the manual "Cathead" and rope type. Core Drilling meets ASTM D-2113

II. Correlation of Penetration Resistances to Soil Properties:

Relative Density of Cohesionless Soils

<u>SPT-N</u>	<u>Relative Density</u>
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
51 or more	Very Dense

Consistency of Cohesive Soils

<u>SPT-N</u>	<u>Consistency</u>
0 - 1	Very Soft
2 - 4	Soft
5 - 8	Medium Stiff
9 - 15	Stiff
16 - 30	Very Stiff
31 or more	Hard

III. Unified Soil Classification Symbols:

GP:	Poorly Graded Gravel	ML:	Low Plasticity Silts
GW:	Well Graded Gravel	MH:	High Plasticity Silts
GM:	Silty Gravel	CL:	Low Plasticity Clays
GC:	Clayey Gravel	CH:	High Plasticity Clays
SP:	Poorly Graded Sands	OL:	Low Plasticity Organics
SW:	Well Graded Sands	OH:	High Plasticity Organics
SM:	Silty Sands	CL-ML:	Dual Classification (Typical)
SC:	Clayey Sands		

IV. Water Level Measurement Symbols:

	WL: Water Level
	WL: While Sampling
	WD: While Drilling

DCD: Dry Caved Depth

WCD: Wet Caved Depth

The water levels are those water levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in a granular soil. In clays and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

Reedy Creek Park Stream Restoration
 BOYLE Project No. 11-003

Boring No.	Depths (feet)	Munsell colors (Hue, Value, Chroma)
B-1	0.3-2	10YR 5/1, 10YR 5/6
	2-4	10YR 5/1, 2.5YR 4/4
	4-6	5YR 4/6
	6-8	5YR 4/6, 5Y 6/1
	8-8.5	10YR 5/6, 5Y 6/1
B-2	0.5-3	5YR 4/6
	3-4.5	7.5YR 5/3
B-3	0.5-3	5YR 4/6
	3-4	7.5YR 3/3
	4-5	2.5Y 5/2
	5-5.5	2.5Y 6/2
B-4	0.5-3	5YR 4/6
	3-4.5	5YR 4/4
	4.5-5	7.5YR 4/1
	5-5.5	2.5Y 6/2
B-5	0.5-3	5YR 4/6
	3-5	7.5YR 4/3
	5-6	5YR 4/3, 2.5Y 5/1
	6-6.5	2.5Y 5/2