

BORING LOG LEGEND

KEY TO DRILLING SYMBOLS

- Spilt Spoon Sample (ASTM D 1586)
- Undisturbed Sample (ASTM D 1587)
- Rock Coreing (ASTM D 2113)
- Roller Core Advanced
- Seepage into Borehole

- Water Table at Time of Drilling
- Water Table after 24 hrs.
- Boring Cave in
- Loss of Drilling Fluid
- Auger Refusal
- Roller Core Refusal
- Approximate Strata Change Depth Different Soil Types
- Approximate Strata Change Depth Similar Soil Types

- H.S.A.** Hollow Stem Auger Drilling
- M.R.** Mud Rotary Wash Drilling
- PP** Pocket Penetrometer (tsf)
- REC** Core Recovery (%)
- RQD** Rock Quality Designator (%)
- SCR** Solid Core Recovery (%)

CORRELATION OF RELATIVE DENSITY AND CONSISTENCY WITH STANDARD PENETRATION TEST RESISTANCE (ASTM D 1586)¹

SPT RESISTANCE (N) IN BLOWS PER FOOT		RELATIVE DENSITY ² SAND & GRAVEL		CONSISTENCY ³ SILT & CLAY	
SPT N	RELATIVE DENSITY	SPT N	RELATIVE DENSITY	SPT N	CONSISTENCY
0 - 4	Very Loose	0 - 2	Very Soft		
5 - 10	Loose	3 - 4	Soft		
11 - 30	Firm	5 - 8	Firm		
31 - 50	Dense	9 - 16	Stiff		
51 +	Very Dense	16 - 30	Very Stiff		
		31 - 50	Hard		
		51 +	Very Hard		

ROCK QUALITY⁴ FRACTURES, JOINT SPACING AND BEDDING

ROD (%)	DIAGNOSTIC DESCRIPTION	ROCK PARAMETER FIELD/LIAS RATIO	SPACING	JOINTS	BEDDING
0 - 25	Very Poor	0.15	Less than 2"	Very Close	Very Thin
25 - 50	Poor	0.20	2" to 1"	Close	Thin
50 - 75	Fair	0.25	1" to 3"	Moderately Close	Medium
75 - 90	Good	0.30 to 0.70	3" to 10"	Wide	Thick
90 - 100	Excellent	0.70 to 1.00	More than 10"	Very Wide	Very Thick

HARDNESS

Very Hard - Breaking specimens requires several hard hammer blows

Hard - Hard hammer blow required to detach specimens

Moderately Hard - Light hammer blow required to detach specimens

Medium - May be scratched 1/16" deep by a knife or nail, breaks into several pieces by light hammer blow

Soft - Can be gouged readily by knife or nail, corners and edges broken by finger pressure

Very Soft - May be carved with a knife and readily broken by finger pressure

WEATHERING

Fresh - Fresh rock, bright crystals, no staining

Slightly - Minimum staining and discoloration, open joints contain clay

Moderately - Significant portions of rock shows staining and discoloration, strong rock fragments

Very Severe - All rock shows staining, rock fabric evident but reduced strength with strong rock fragments remaining

Complete - Rock reduced to soil with rock fabric not discernable

Atterberg Limits

PARTICLE SIZE IDENTIFICATION

BOULDERS: Greater than 300 mm (12 in.)

COBBLES: 75 mm to 300 mm (3 - 12 in.)

GRAVEL: Coarse - 1.90 mm to 75 mm (0.75 - 3 in.)
Fine - 4.75 mm to 75 mm (0.1875 - 3 in.)

SANDS: Coarse - 4.75 mm to 4.75 mm
Medium - 0.425 mm to 0.425 mm
Fine - 0.075 mm to 0.425 mm

SILTS & CLAYS: Less than 0.075 mm

PLASTICITY INDEX (PI) & SHRINKAGE SWELL POTENTIAL

PI < 4 - None
PI 4 - 15 - Slight or Low
PI 15 - 30 - Medium or High
PI > 30 - High to Very High

ADDITIONAL RELATIVE DESCRIPTIVE VALUES

Flow < 10% - None
Flow < 20% but > 10% - Slight to Low
Flow > 20% - High to Very High

SOIL CLASSIFICATION CHART (ASTM D 2487)

MAJOR DIVISIONS		SYMBOLS GRAPH LETTER		TYPICAL DESCRIPTIONS	
COARSE GRAINED SOILS <small>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</small>	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
	SAND AND SANDY SOILS <small>MORE THAN 50% OF COARSE FRACTION REMAINED ON NO. 4 SIEVE</small>	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SP	POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND - SILT MIXTURES	
		CLAYEY SANDS, SAND - CLAY MIXTURES	SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
FINE GRAINED SOILS <small>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</small>	LOW PLASTICITY LIQUID LIMIT LESS THAN 50	INORGANIC SILTS, CLAYEY SILTS, SILTY FINE SAND MIXTURES, ROCK FLOUR	ML		
		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTY, & LUMPY CLAYS	CL		
		ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY	OL		
		INORGANIC SILTS AND MICACEOUS, DIATOMACEOUS AND ELASTIC SILTY SOILS	MH		
	HIGH PLASTICITY LIQUID LIMIT GREATER THAN 50	INORGANIC CLAYS OF HIGH PLASTICITY; FAT CLAYS	CH		
		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY; ORGANIC	OH		
		PEAT, HUMUS, MUCK, SWAMP SOILS WITH VERY HIGH ORGANIC CONTENTS	PT		
		DISTURBED SOILS WITH POSSIBLE DEBRIS AND RUBBLE, OLD CONSTRUCTION WASTES, NON-ENGINEERED BACKFILLS			
OTHER SOILS	TRANSITIONAL MATERIAL BETWEEN SOIL AND ROCK WHICH MAY RETAIN THE RELICT STRUCTURE OF THE PARENT ROCK				

TEST BORING RECORD

GeoEnvironmental Resources, Inc. Geotechnical, Environmental, Hazardous Materials, Groundwater & Industrial Engineering Consultants

Project: Additions to SACT Headquarters GER Project Number: 110-4599 Boring No. **CBR-1**
 Location: NSA, Norfolk, VA Driller: Fishburne Sheet No. 1 of 1
 Date Drilled: 6/27/2007

Client: HBA Drill Method: 57 mm HSA

Elevation	Depth	Penetration Resistance	Material Description	Ground Water	Comments
ft	m	(blows/0.3 m)			
0	0	25	125 mm topsoil		
1	1	12	FILL as clayey sand, firm, brown, fine, trace crushed stone		
1	1	17	FILL as silty sand, firm to loose, grey, fine to medium		
1	1	7	FILL as clayey sand, loose, dark brown, fine to medium, trace organics and fine gravel		
1	1	6	Slightly Silty SAND (SP-SM) Loose, grey to brown, fine to medium		
1	1	5			
3	3		Boring terminated at 3.05 meters.		

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 Telefax: 757-493-3080
 gema@geronline.com

TEST BORING RECORD

GeoEnvironmental Resources, Inc. Geotechnical, Environmental, Hazardous Materials, Groundwater & Industrial Engineering Consultants

Project: Additions to SACT Headquarters GER Project Number: 110-4599 Boring No. **CBR-2**
 Location: NSA, Norfolk, VA Driller: Fishburne Sheet No. 1 of 1
 Date Drilled: 6/27/2007

Client: HBA Drill Method: 57 mm HSA

Elevation	Depth	Penetration Resistance	Material Description	Ground Water	Comments
ft	m	(blows/0.3 m)			
0	0	25	125 mm topsoil		
1	1	12	FILL as clayey sand, firm to very loose, brown to dark grey, fine to medium, trace crushed stone		
1	1	3	Slightly Silty SAND (SP-SM) Loose to very loose, tan to grey, fine to medium, trace fine to coarse gravel		
1	1	5			
3	3		Boring terminated at 3.05 meters.		

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TEST BORING RECORD

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Project: Additions to SACT Headquarters GER Project Number: 110-4599 Boring No. **CBR-3**
 Location: NSA, Norfolk, VA Driller: Fishburne Sheet No. 1 of 1
 Date Drilled: 6/27/2007

Client: HBA Drill Method: 57 mm HSA

Elevation	Depth	Penetration Resistance	Material Description	Ground Water	Comments
ft	m	(blows/0.3 m)			
0	0	25	125 mm topsoil		
1	1	11	FILL as silty sand, firm, brown and grey, fine, trace shell and gravel		
1	1	17	FILL as slightly silty sand, firm, tan with orange and grey, fine		
1	1	15	FILL as silty sand, firm, grey, fine, trace shell		
3	3		Boring terminated at 2.19 meters.		Refusal on concrete

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TEST BORING RECORD

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Project: Additions to SACT Headquarters GER Project Number: 110-4599 Boring No. **CBR-4**
 Location: NSA, Norfolk, VA Driller: Fishburne Sheet No. 1 of 1
 Date Drilled: 6/27/2007

Client: HBA Drill Method: 57 mm HSA

Elevation	Depth	Penetration Resistance	Material Description	Ground Water	Comments
ft	m	(blows/0.3 m)			
0	0	25	100 mm topsoil		
1	1	13	FILL as silty sand, firm, brown, fine to medium, trace stone and clay		
1	1	9	Slightly Silty SAND (SP-SM) Loose to very loose, tan with orange, fine to medium		
1	1	6			
3	3		Boring terminated at 3.05 meters.		

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 Telefax: 757-493-3080
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DATE: _____
 SHEET: _____

SUBMITTED BY: *Joseph D. B...*
 DATE: 2.04.11

APPROVED: _____
 DATE: _____

ACTIVITY - SATISFACTORY TO: _____
 DATE: _____

APPROVED: _____

FOR COMMANDER NAVFAC: _____
 DATE: _____

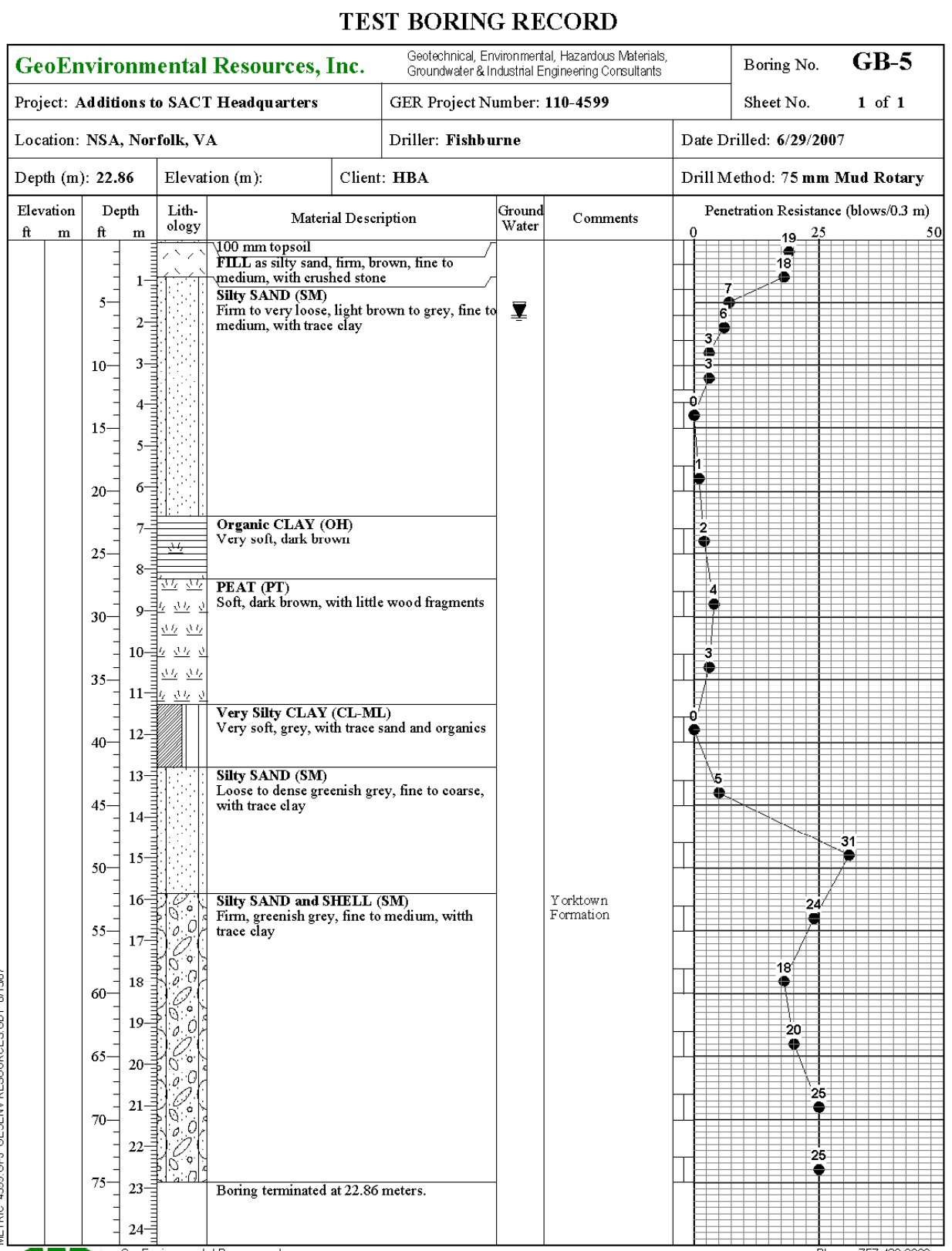
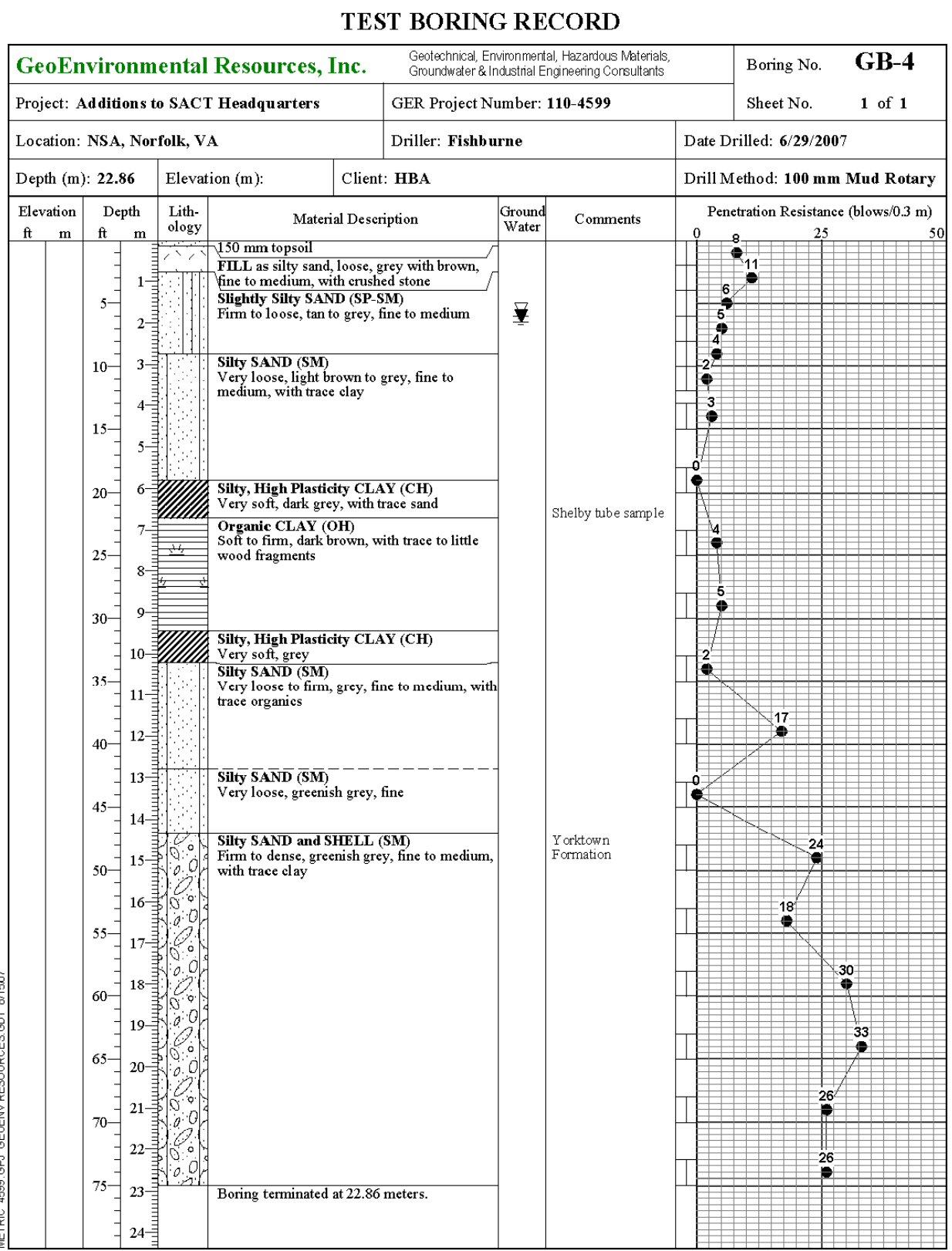
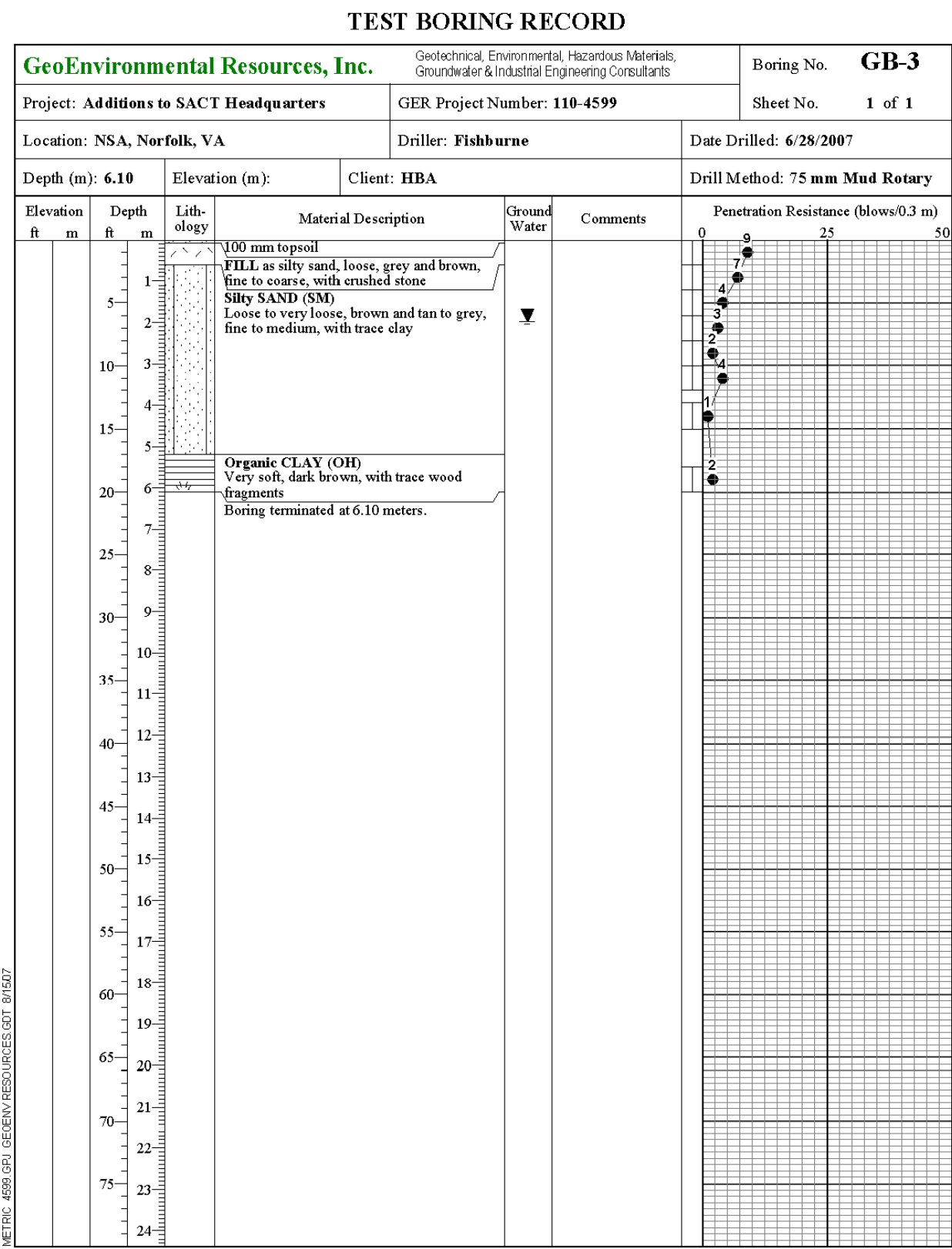
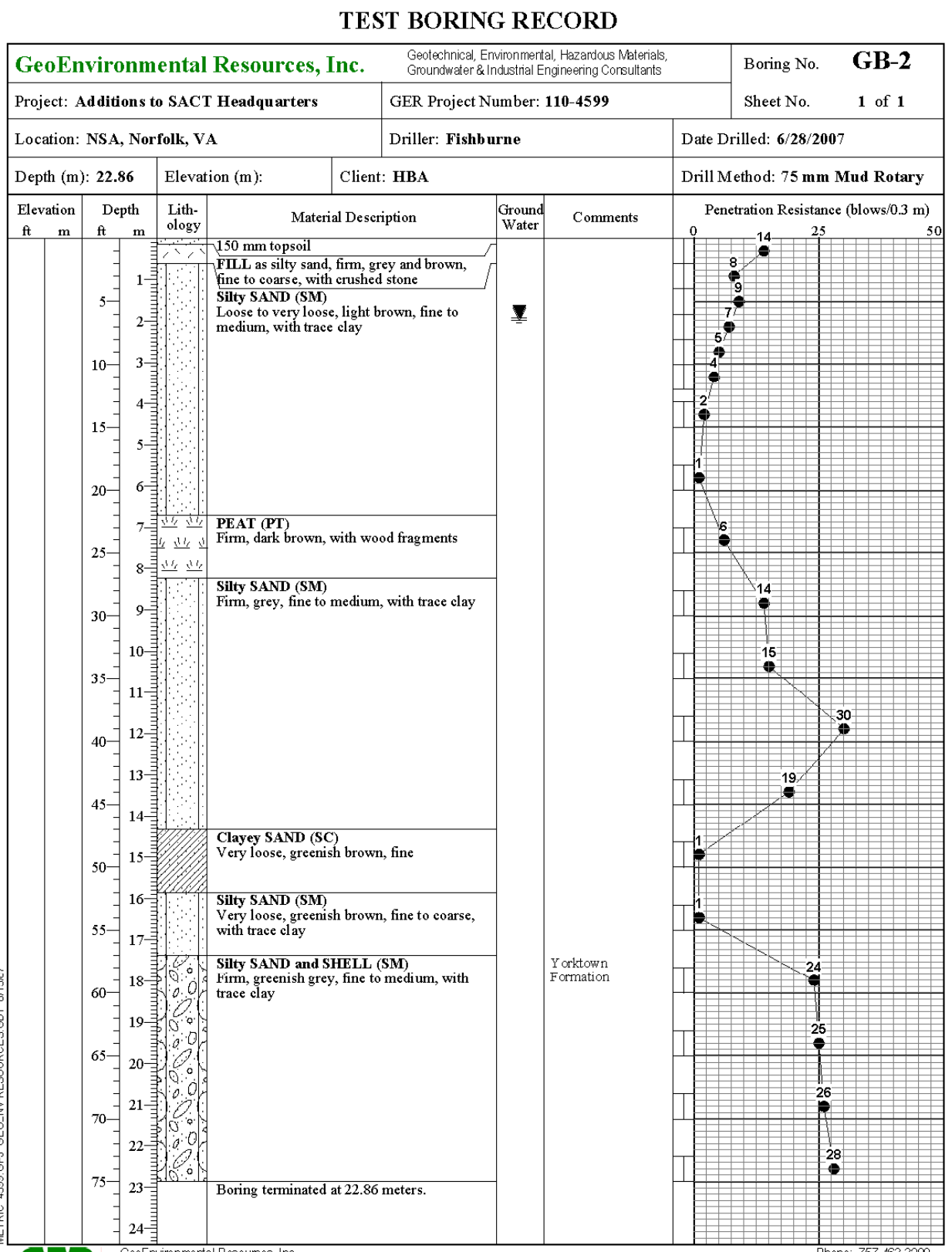
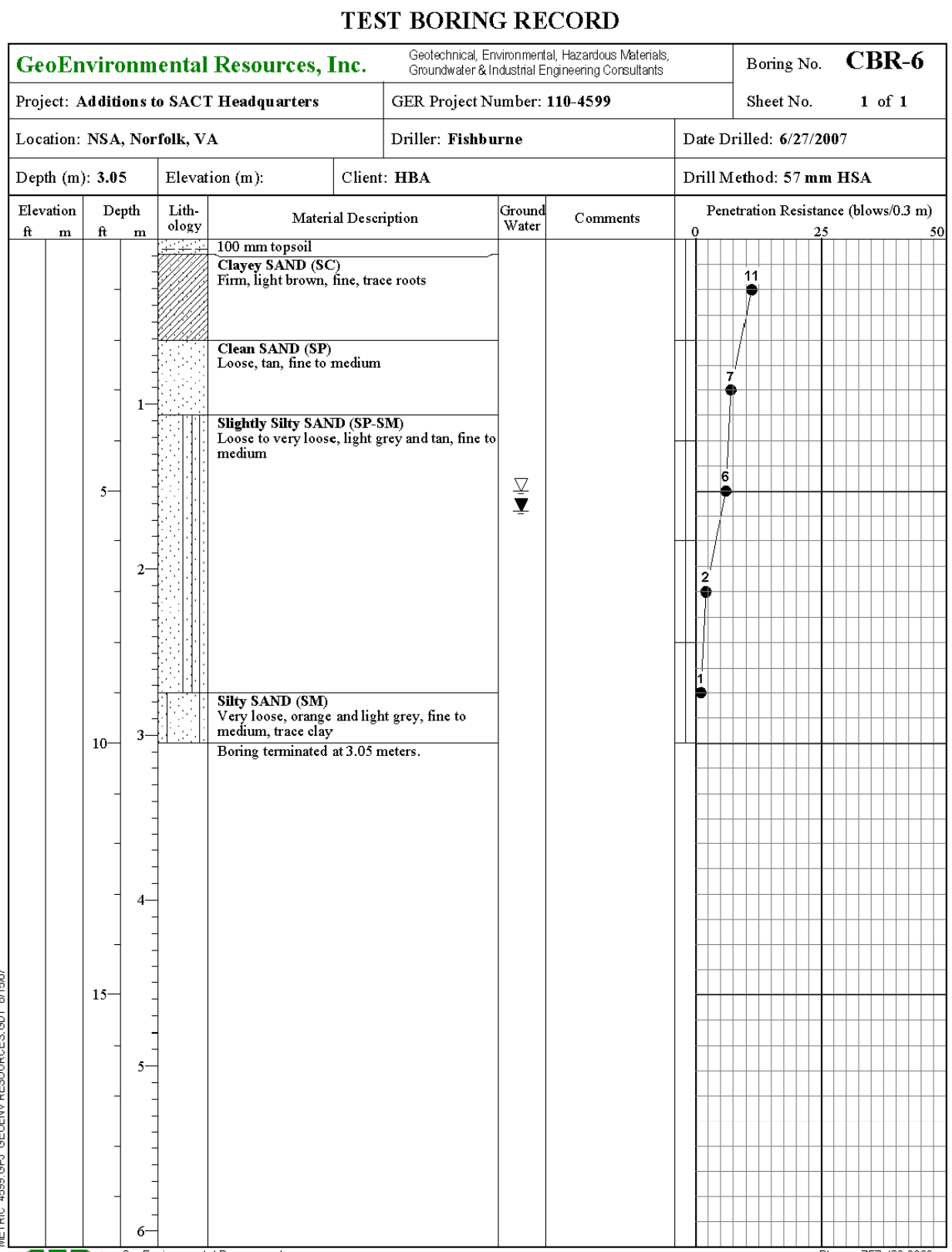
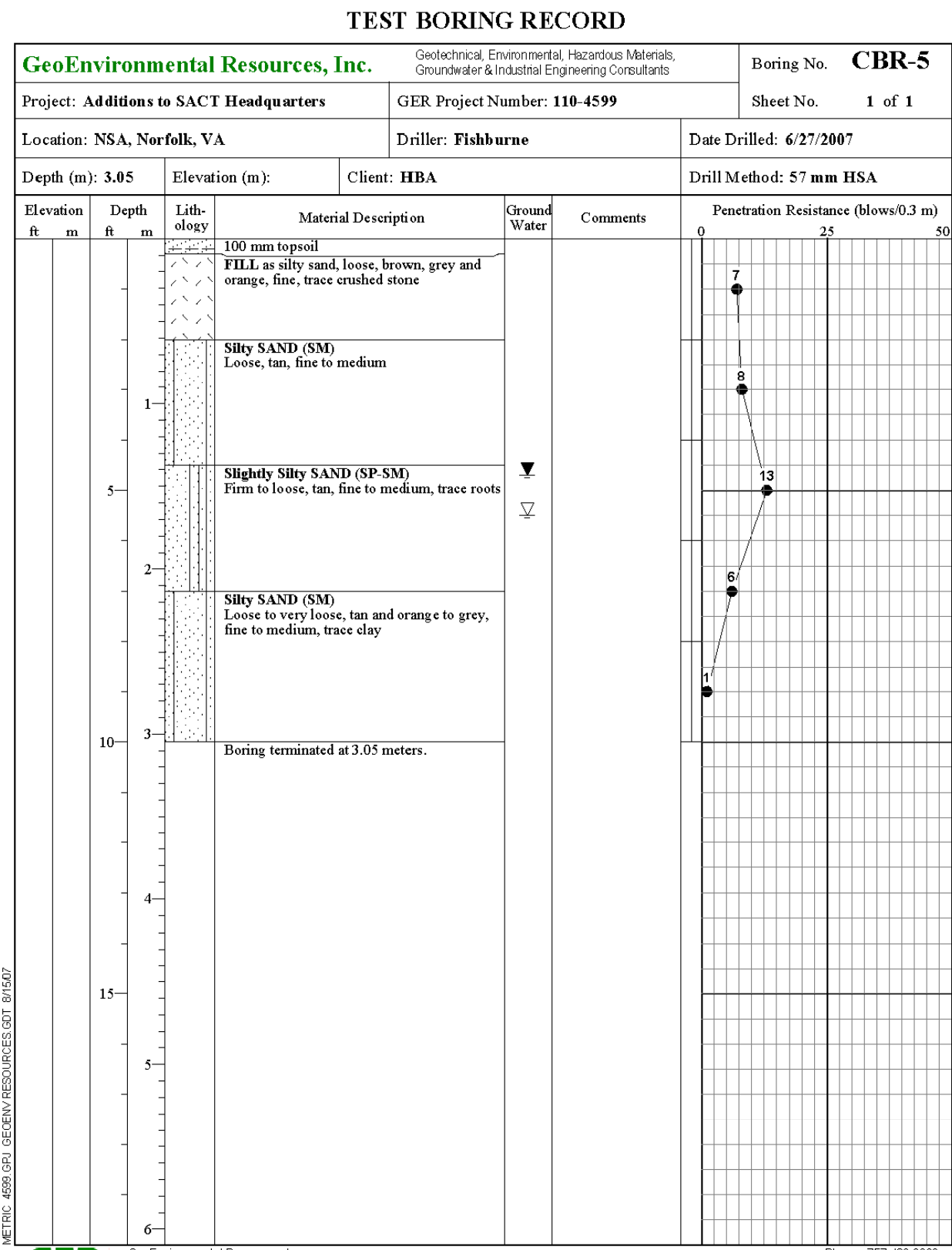
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CHK	BAL	OC	

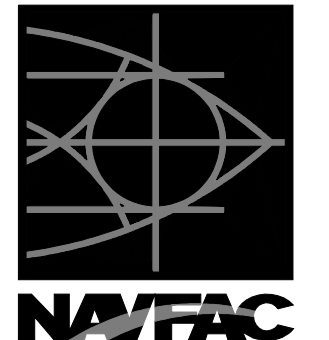
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 REVIEWED BY: _____
 OC: _____
 DESIGN MANAGER: _____
 FIRE PROTECTION: _____
 BRANCH MANAGER: _____
 ENGINEERING DIR.: _____

DEPARTMENT OF THE NAVY
 NAVAL FACILITIES ENGINEERING COMMAND - MID-ATLANTIC
 NAVAL STATION - NORFOLK, VIRGINIA
 NAVAL SUPPORT ACTIVITY
ADDITIONS TO HEADQUARTERS, SUPREME ALLIED COMMANDER TRANSFORMATION (SACT)
 GEOTECHNICAL BORING LOGS

CODE ID NO. 80091 SIZE D
 SCALE: GRAPHIC
 MAXIMO NO. K44YX
 JOB ORDER NO. 9A6200
 WORK ORDER NO. 518388
 CONSTR. CONTR. NO. N40085-06-R-6104
 NAVFAC DRAWING NO. 12515068
 SHEET 75 OF 509

B-101
DRAWING REVISION: 01 AUGUST 2004





NAVFAC

SUBMITTED BY: *Joseph D. B...*
 FIRM MEMBER: _____ DATE: 2.04.11
 APPROVED: _____
 ACTIVITY - SATISFACTORY TO: _____ DATE: _____
 APPROVED: _____

FOR COMMANDER NAVFAC: _____ DATE: _____
 DES: WCV DR: RBP
 CHK: BAL OC
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 FIRE PROTECTION: _____
 BRANCH MANAGER: _____
 ENGINEERING DIR.: _____

DEPARTMENT OF THE NAVY
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 SHEET 76 OF 509
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