



City of Duluth

DEPARTMENT OF PUBLIC WORKS/UTILITIES
Engineering Division
211 City Hall • Duluth MN 55802
(218) 730-5200 Fax: (218) 730-5907

Date: April 27, 2010

City of Duluth Bid # 10-0224

Job Description: Reconstruction of Glenwood Street – 43rd Avenue East to 60th Avenue East
City Project No. 0647TR

Addendum #1

Bid Form:

N/A

Specifications:

Please add the enclosed *Soil Boring Log Report* (38 pages) to the Project Proposal. Be sure to acknowledge the addendum on your bid form and please return the *Report* with your Project Proposal.

Plansheets:

N/A

All other items remain the same.

Sincerely,

Matt Decur
Project Manager

SOIL BORING LOG REPORT

**Proposed Glenwood Street Reconstruction
Duluth, MN**

Prepared For:

Salo Engineering, Inc.
4560 Norway Pines Place
Duluth, MN 55811

Prepared By:

EPC Engineering & Testing
539 Garfield Avenue
Duluth, MN 55802

EPC Engineering & Testing

Geotechnical • Environmental • Materials Engineering

539 Garfield Avenue
Duluth, Minnesota 55802

(218) 727-1239
(218) 727-1248 fax

October 16, 2009
EPC#09G0502

Salo Engineering, Inc.
4560 Norway Pines Place
Duluth, MN 55811

Attn: Mr. David Bolf, P.E., Project Manager

Re: Soil Boring Log Report
Glenwood Street Reconstruction
Duluth, MN

Dear: Mr. Bolf:

This letter report is in regard to the 20 soil borings performed by EPC during the time period from September 23 to 30, 2009. All work was performed at the direction of yourself, according to EPC proposal dated July 9, 2009. All borings were staked and numbered in the field by Salo. Boring surface elevations were also determined by Salo. Boring SB-09-19 was offset five feet north of the original mark.

Generally speaking, surficial materials consisted of six to seven inches of bituminous pavement (Borings 1 through 4) or two to six inches of bituminous pavement over four to seven inches of concrete (Borings 5 through 20), generally over silty sand and/or silty clayey sand fill to 1.5 to 2.0 feet below existing pavement surface. Clayey soils were generally encountered below the fill, to termination depths of about 10 feet. In Boring 9 the clay began at about one foot, in Boring 11 sandy clay and what appears to be concrete rubble fill extended to 2.5 feet, and in Boring 14 sandy silty gravel fill extended to three feet. In Boring 18 organic clay (6.1% "organic") extended to three feet, then "slightly organic" clay (2.1 to 1.6%) extended to about six feet. In Boring 19 sandy gravel and broken concrete extended to two feet, then silty clay (3.8 to 2.9% "slightly organic") extended to eight feet. In Boring 20 coal/ash/clinker extended to two feet. Substantial sampler refusal was encountered in Boring 4 at 9.8 feet. Water was observed only in Boring 19, at four feet, during the relatively short drilling process. Boring cave-in levels were observed in Borings 5, 6, 7, 9, 11, 13 and 17 at 7.0 to 8.5 feet. Please refer to the table below and the boring logs and laboratory test reports in the appendix for details.

Boring Number SB-09-	Surface Elevation (ft)	Depth to Bottom of Bituminous Pavement (in)	Depth to Bottom of Concrete (in)	Depth/Elevation to Bottom of Granular Material (ft)	Depth/Elevation to Bottom of Clay / Boring (ft)
1	877.6	7.0	None Observed	2.0 / 875.6	10 / 867.6
2	861.2	6.0	None Observed	1.8 / 859.4	10 / 851.2
3	851.2	7.0	None Observed	1.8 / 849.4	10 / 841.2
4	843.8	7.0	None Observed	1.8 / 842.0	* 9.8 / 834.0

Boring Number SB-09-	Surface Elevation (ft)	Depth to Bottom of Bituminous Pavement (in)	Depth to Bottom of Concrete (in)	Depth/Elevation to Bottom of Granular Material (ft)	Depth/Elevation to Bottom of Clay / Boring (ft)
5	839.3	3.0	8.0	1.8 / 837.5	11 / 828.3
6	834.0	3.0	9.0	1.5 / 832.5	11 / 823.0
7	827.6	2.0	6.0	2.0 / 825.6	10 / 817.6
8	818.9	2.0	6.0	2.0 / 816.9	11 / 807.9
9	806.1	4.0	10	None Observed	11 / 795.1
10	795.8	4.0	10	1.5 / 794.3	11 / 784.8
11	791.2	2.0	8.0	** 2.5 / 788.7	11 / 780.2
12	780.4	3.0	10	2.0 / 778.4	11 / 769.4
13	770.0	4.0	10	None Observed	11 / 759.0
14	761.0	4.0	10	3.0 / 758.0	11 / 750.0
15	749.2	4.0	10	1.5 / 747.7	11 / 738.2
16	725.9	3.0	9.0	1.5 / 724.4	11 / 714.9
17	720.3	2.0	8.0	1.5 / 718.8	11 / 709.3
18	708.3	6.0	12	1.5 / 706.8	*** 11 / 797.3
19	697.2	6.0	None Observed	2.0 / 795.2	**** 10 / 687.2
20	697.8	4.0	6.0	*****2.5 / 695.3	11 / 786.8

* Indicates substantial sampler refusal depth.

** Indicates concrete/cobble fill.

*** Indicates organic clay observed to three feet and slightly organic clay observed to six feet.

**** Indicates slight organic clay observed to eight feet.

***** Indicates 0.5 feet of coal/ash/clinker observed to 2.5 feet.

Two composite samples were laboratory tested for engineering classification and to estimate roadway soil engineering design parameters. One composite sample was of selected visually classified Fat Clay soils and the other was a composite of selected more sandy or silty clay soils.

Soil classification and estimated engineering properties of the soils tested are as follows:

Native Soil Classification:

USCS (CH) Fat Clay and Fat Clay with Sand.

AASHTO A-7-6 Clayey Soil.

Frost Susceptibility/Drainage:

The clay soils are deemed to have a medium to low frost susceptibility and practically impervious drainage characteristics.

Subgrade Strength/Rating:

The clay soils are deemed to have very low subgrade strength and general subgrade rating of poor.

Compressibility:

The compressibility of the clay soils is judged to be high.

CBR/R-Value/K-Value:

Estimated values: CBR 3, R-Value 10 and K-Value 50 pci.

This report completes EPC's work on this project to date. We must caution you that this report, prepared for soils classification and estimated soil engineering parameters only, is not a complete geotechnical engineering report. EPC cannot be responsible for possible misinterpretation of the contents of the boring logs, or the strengths of the soils described in them. Soil samples from this project will be saved for two months from the date of this report unless EPC is directed in writing to do otherwise.

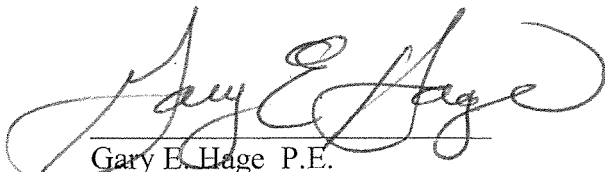
We would like to thank you for allowing EPC to be of service to you on this project. If you have any questions or comments, please call us at (218) 727-1239 (w) or (218) 341-4536 (c).

Sincerely,



Chad R. Lowney
Sr. Engineering Tech.

Reviewed by:

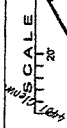


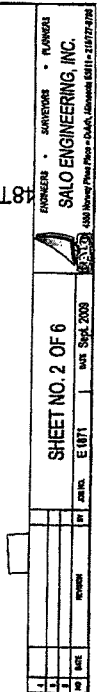
Gary E. Hage P.E.
Principal Engineer

Enclosures: Location Map(s), Boring Logs, Cross-Sections and Laboratory Test Reports

SHEET NO. 1 OF 8

ENGINEERS • SURVEYORS • PLANNERS
SALO ENGINEERING, INC.





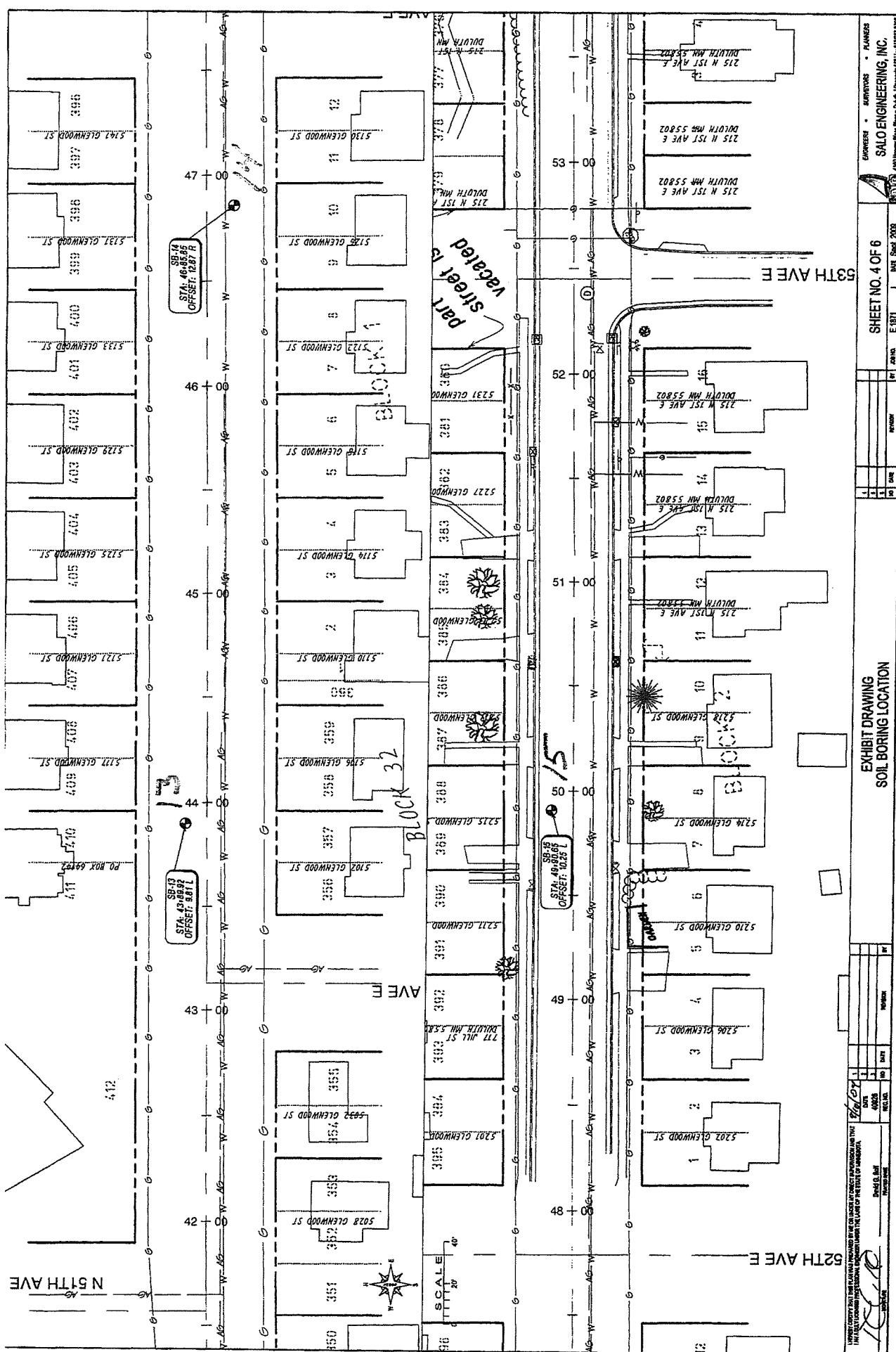
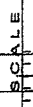


EXHIBIT NO. 4 OF 6 SHEET NO. 4 OF 6 E 181		DATE: 08/01/09 BY: [Signature] CHECKED: [Signature] APPROVED: [Signature]
EXHIBIT DRAWING SOIL BORING LOCATION		PROJECT: [Blank] CLIENT: [Blank] LOCATION: [Blank]
SALO ENGINEERING, INC. 4400 Irving Ave. Suite 200 Duluth, MN 55802 TEL: 763.222.2222 FAX: 763.222.2223 WWW.SALOENGINEERING.COM		PROJECT NO.: [Blank] SHEET NO.: [Blank] DATE: [Blank] BY: [Blank] CHECKED: [Blank] APPROVED: [Blank]



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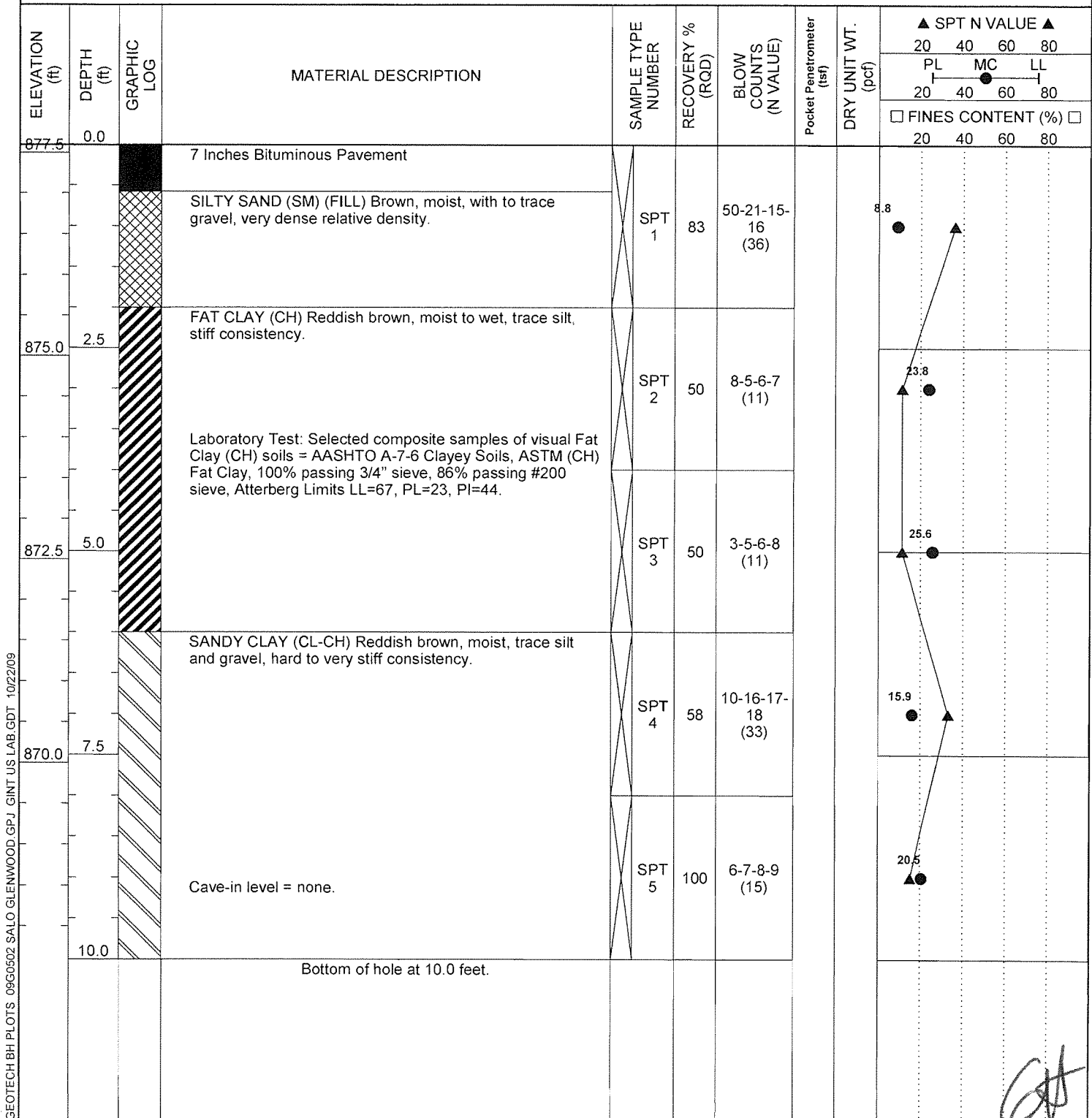
Duluth, Minnesota 55802

BORING NUMBER SB-09-1

PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/24/09COMPLETED 9/24/09GROUND ELEVATION 877.6 ftHOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TSCHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 6+63, 10 L. East of Oakley.AFTER DRILLING ---

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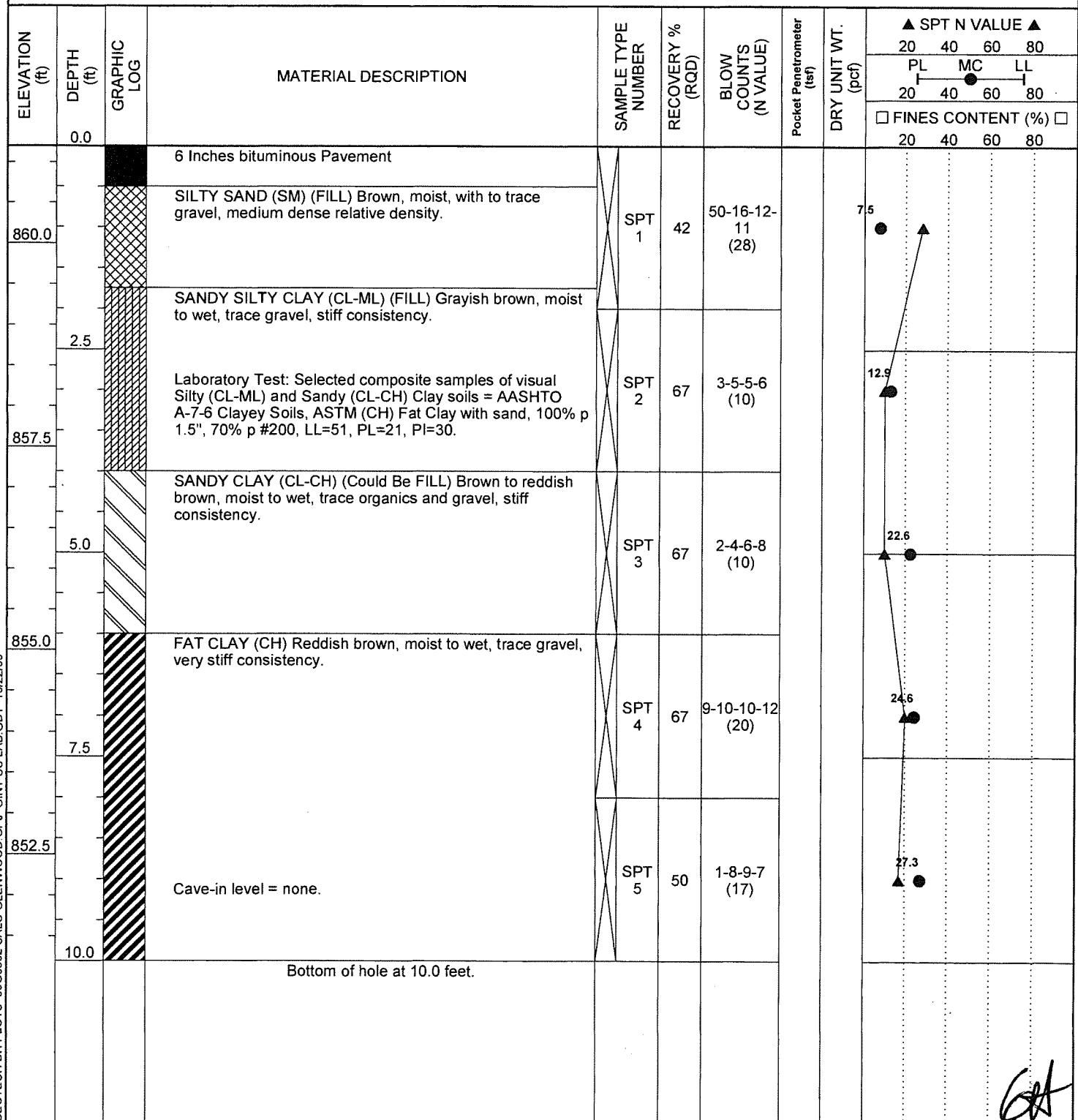
Duluth, Minnesota 55802

BORING NUMBER SB-09-2

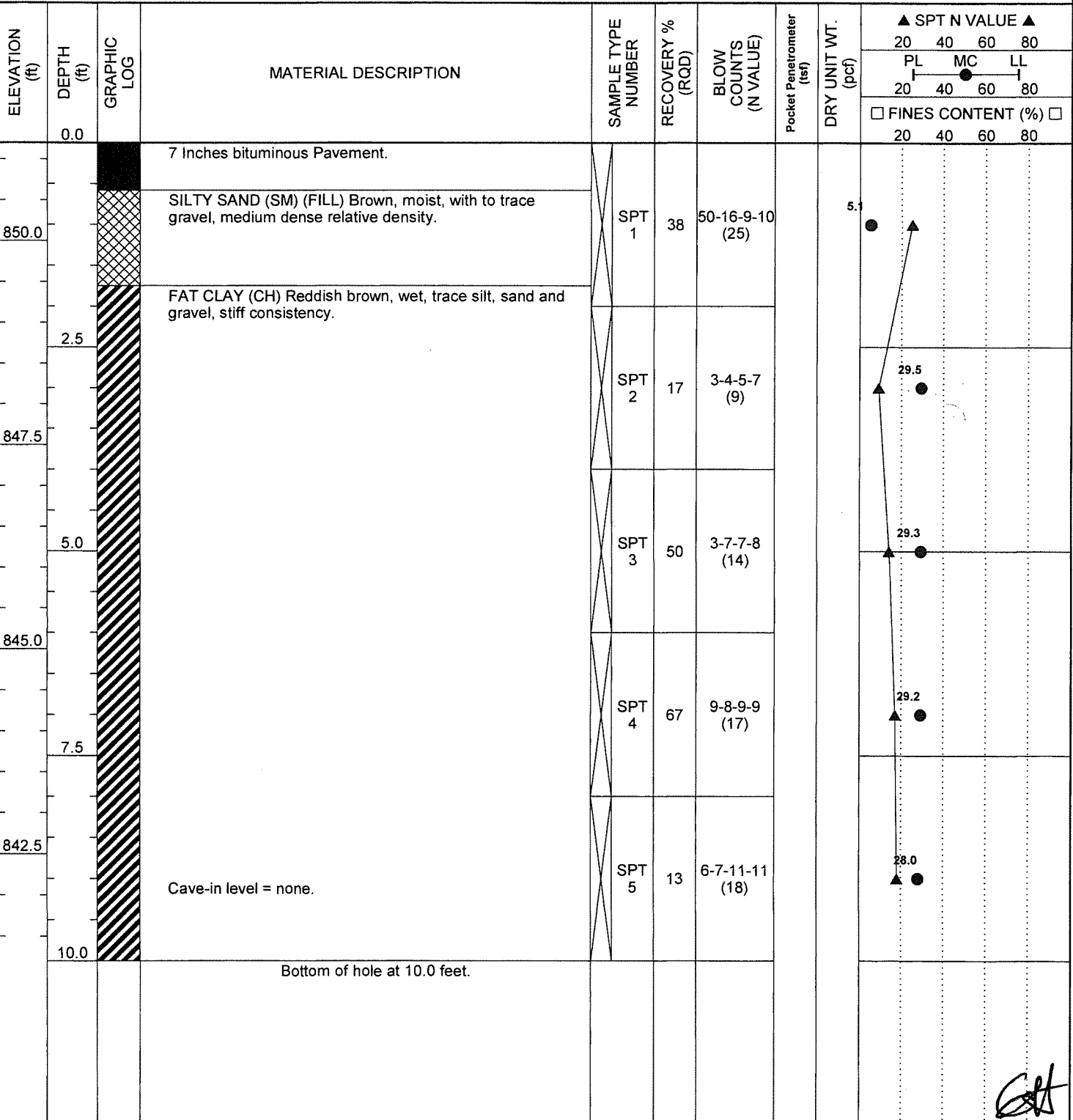
PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/24/09 COMPLETED 9/24/09GROUND ELEVATION 861.2 ft HOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

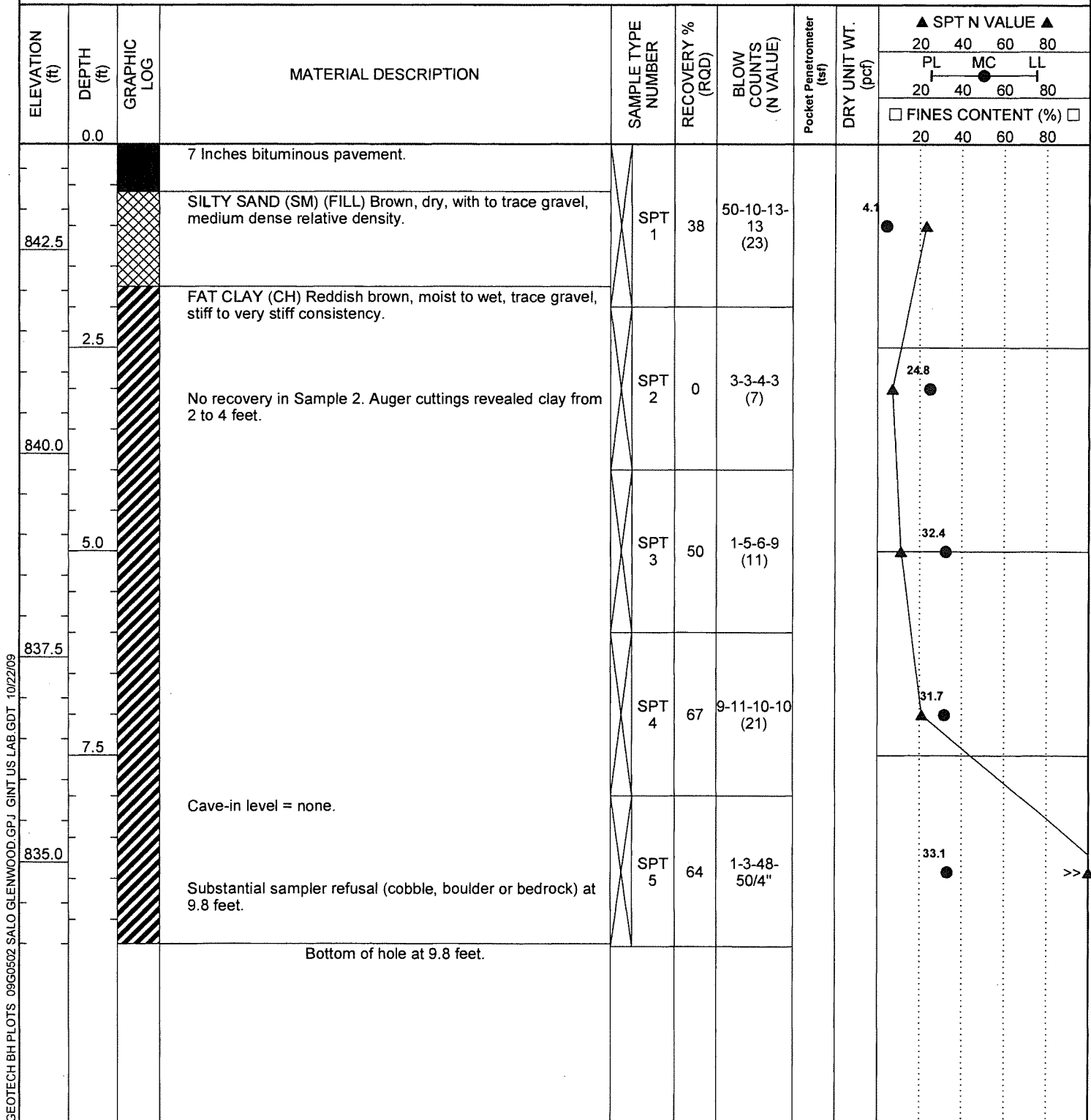
GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TS CHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 9+50, 13.5 R. West of 44th.AFTER DRILLING ---

CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/24/09 COMPLETED 9/24/09 GROUND ELEVATION 851.2 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 12+63, 12 L. East of 44th. AFTER DRILLING ---



CLIENT <u>Salo Engineering, Inc.</u>	PROJECT NAME <u>Glenwood Street Reconstruction</u>
PROJECT NUMBER <u>09G0502</u>	PROJECT LOCATION <u>Duluth, MN</u>
DATE STARTED <u>9/24/09</u> COMPLETED <u>9/25/09</u>	GROUND ELEVATION <u>843.8 ft</u> HOLE SIZE <u>6 inch</u>
DRILLING CONTRACTOR <u>EPC Engineering & Testing</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA</u>	AT TIME OF DRILLING <u>None</u>
LOGGED BY <u>TS</u> CHECKED BY <u>GH</u>	AT END OF DRILLING <u>None</u>
NOTES <u>Sta. 15+74, 13 R. East of 45th.</u>	AFTER DRILLING <u>--</u>



GEOTECH BH PLOTS 09G0502 SALO GLENWOOD.GPJ GINT US LAB.GDT 10/22/09

CLIENT Salo Engineering, Inc.

PROJECT NAME Glenwood Street Reconstruction

PROJECT NUMBER 09G0502

PROJECT LOCATION Duluth, MN

DATE STARTED 9/25/09 COMPLETED 9/25/09

GROUND ELEVATION 839.3 ft HOLE SIZE 6 Inch

DRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSA

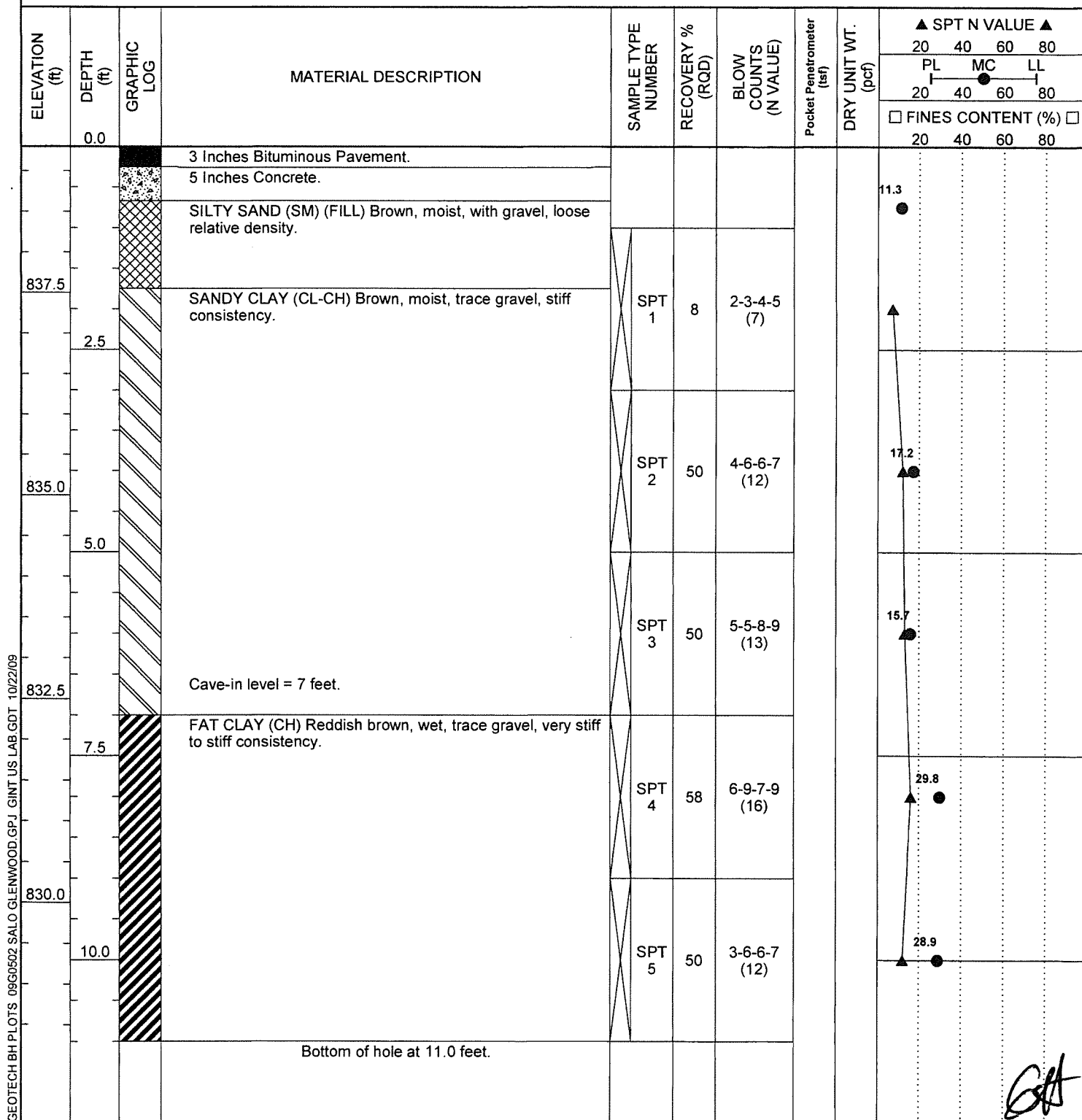
AT TIME OF DRILLING None

LOGGED BY TS CHECKED BY GH

AT END OF DRILLING None

NOTES Sta. 19+85, 12 L. At Crosley Intersection.

AFTER DRILLING ---



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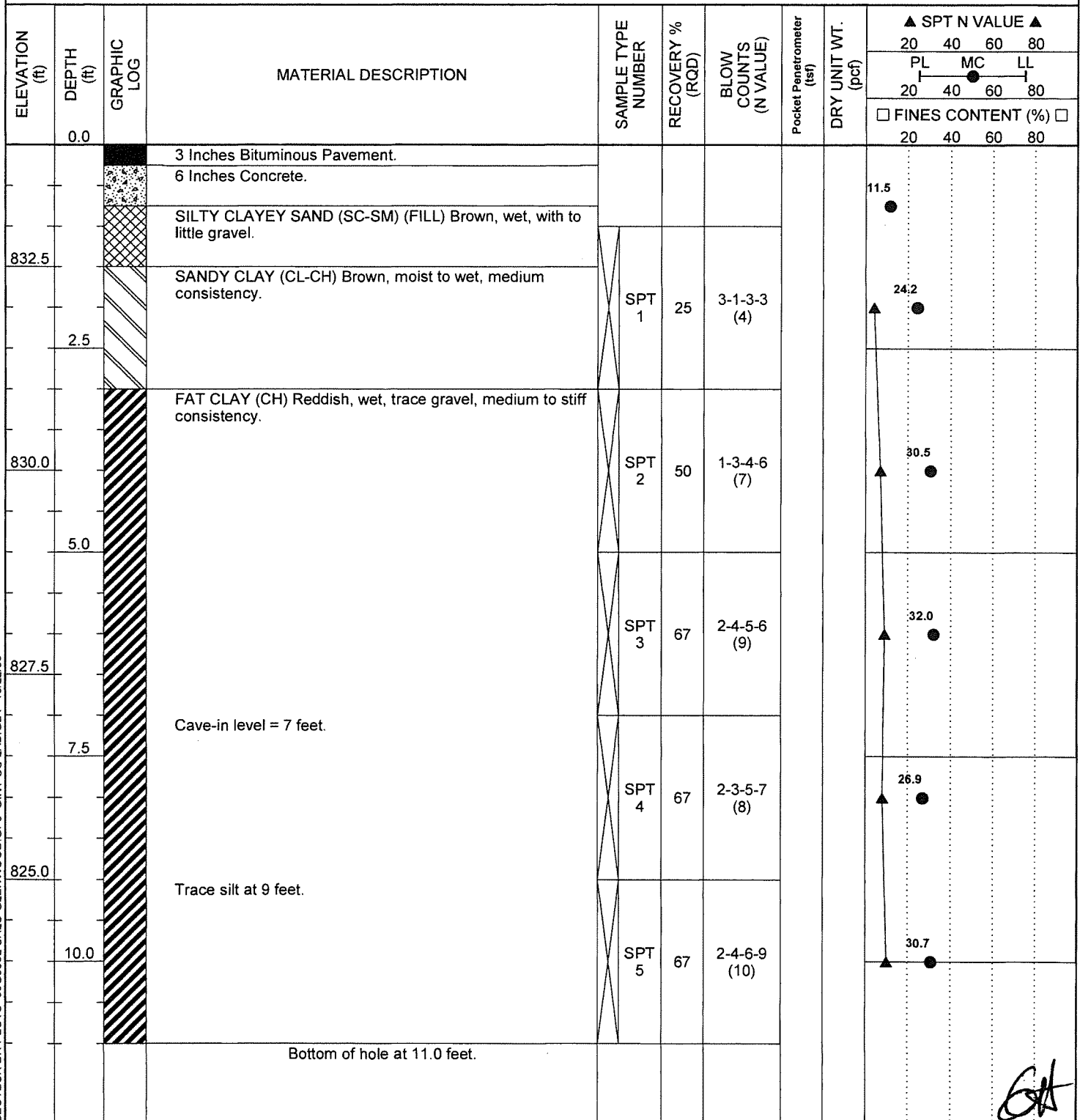
Duluth, Minnesota 55802

BORING NUMBER SB-09-6

PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/25/09 COMPLETED 9/25/09GROUND ELEVATION 834 ft HOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TS CHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 22+80, 12 R. West of 47th.AFTER DRILLING ---

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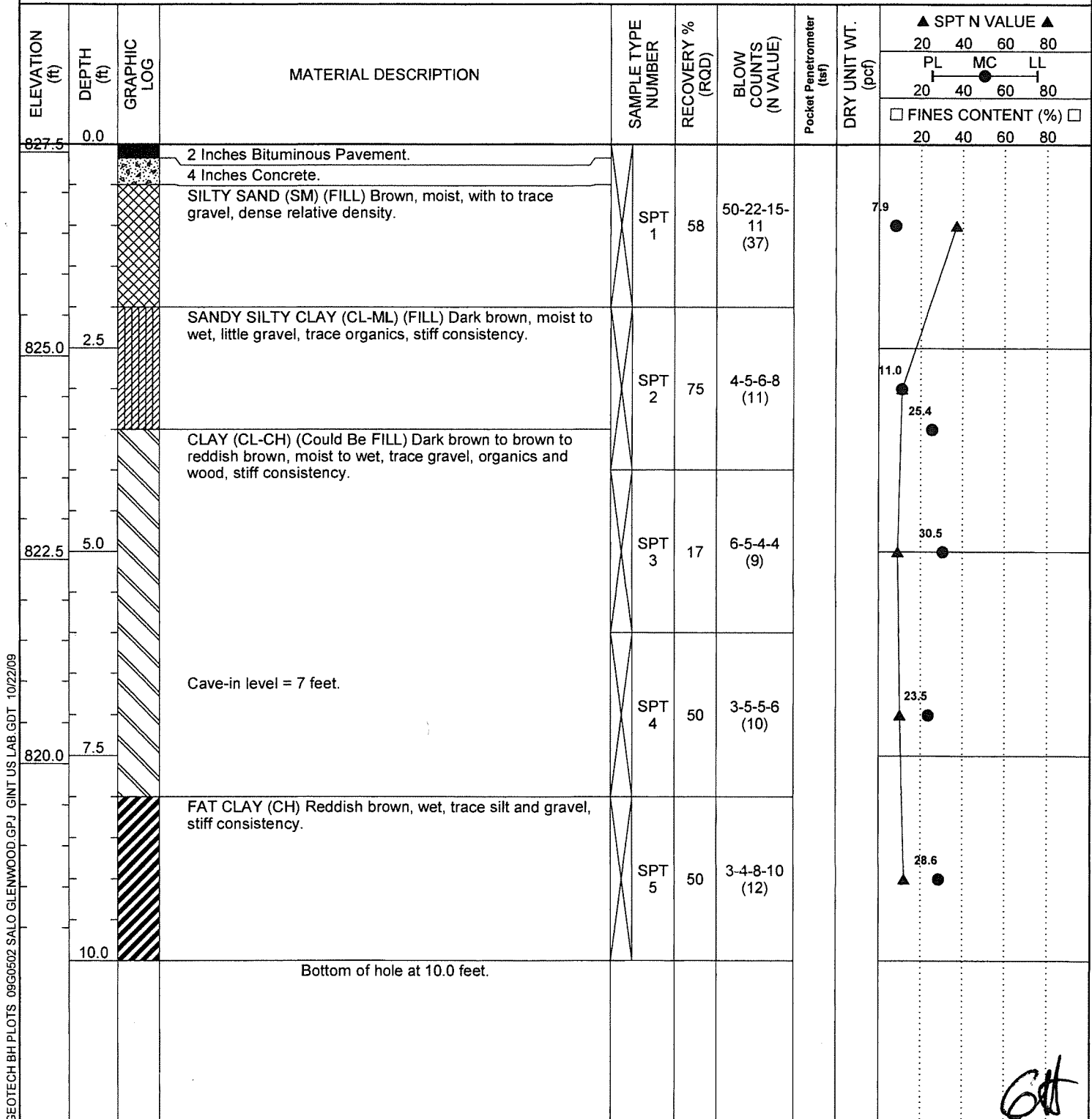
Duluth, Minnesota 55802

BORING NUMBER SB-09-7

PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/30/09 COMPLETED 9/30/09GROUND ELEVATION 827.6 ft HOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TS CHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 25+93, 12 L. East of 47th.AFTER DRILLING --

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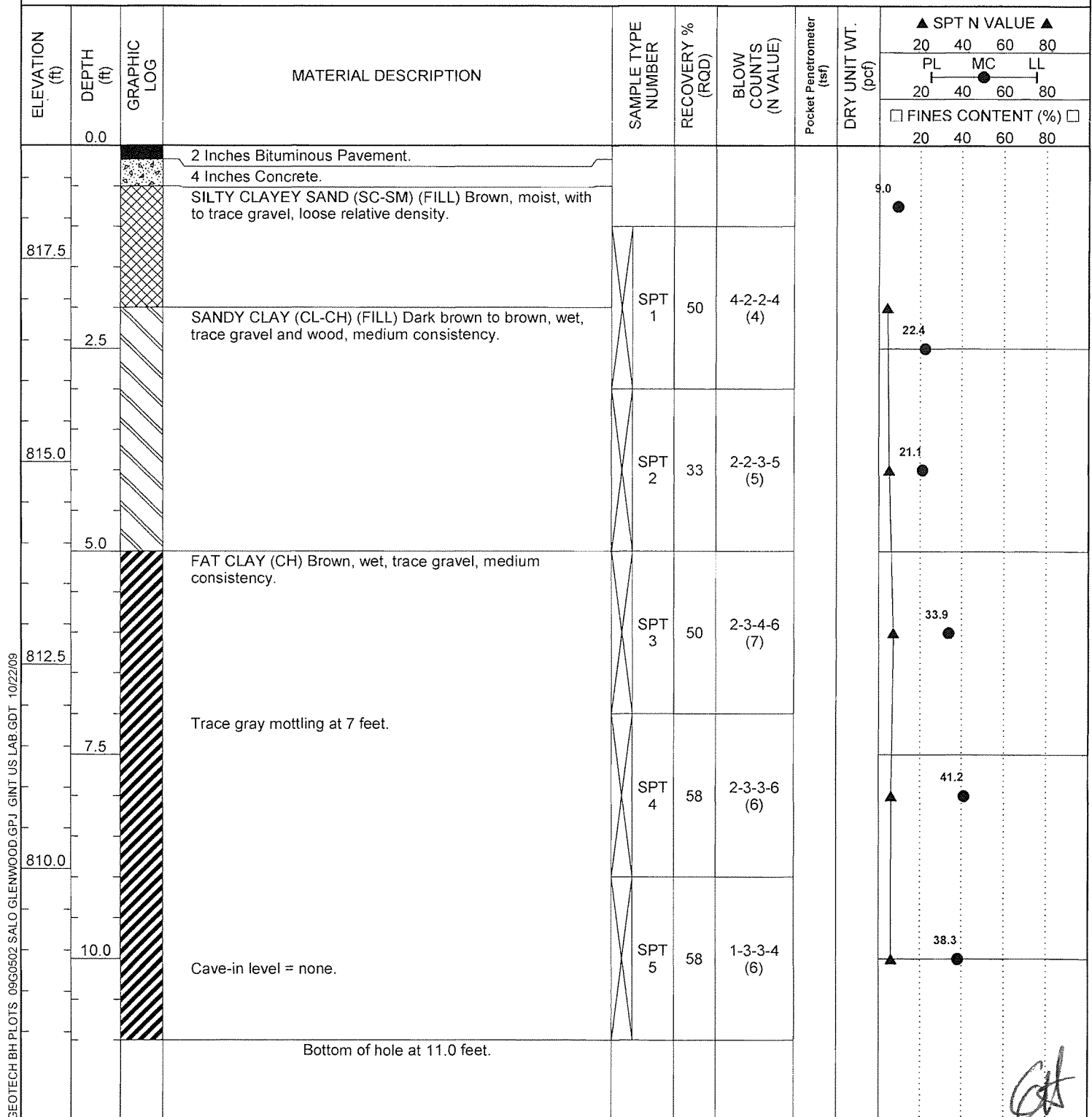
Duluth, Minnesota 55802

BORING NUMBER SB-09-8

PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/27/09 COMPLETED 9/27/09GROUND ELEVATION 818.9 ft HOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TS CHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 28+78.5, 12 R. West of 48th.AFTER DRILLING ---

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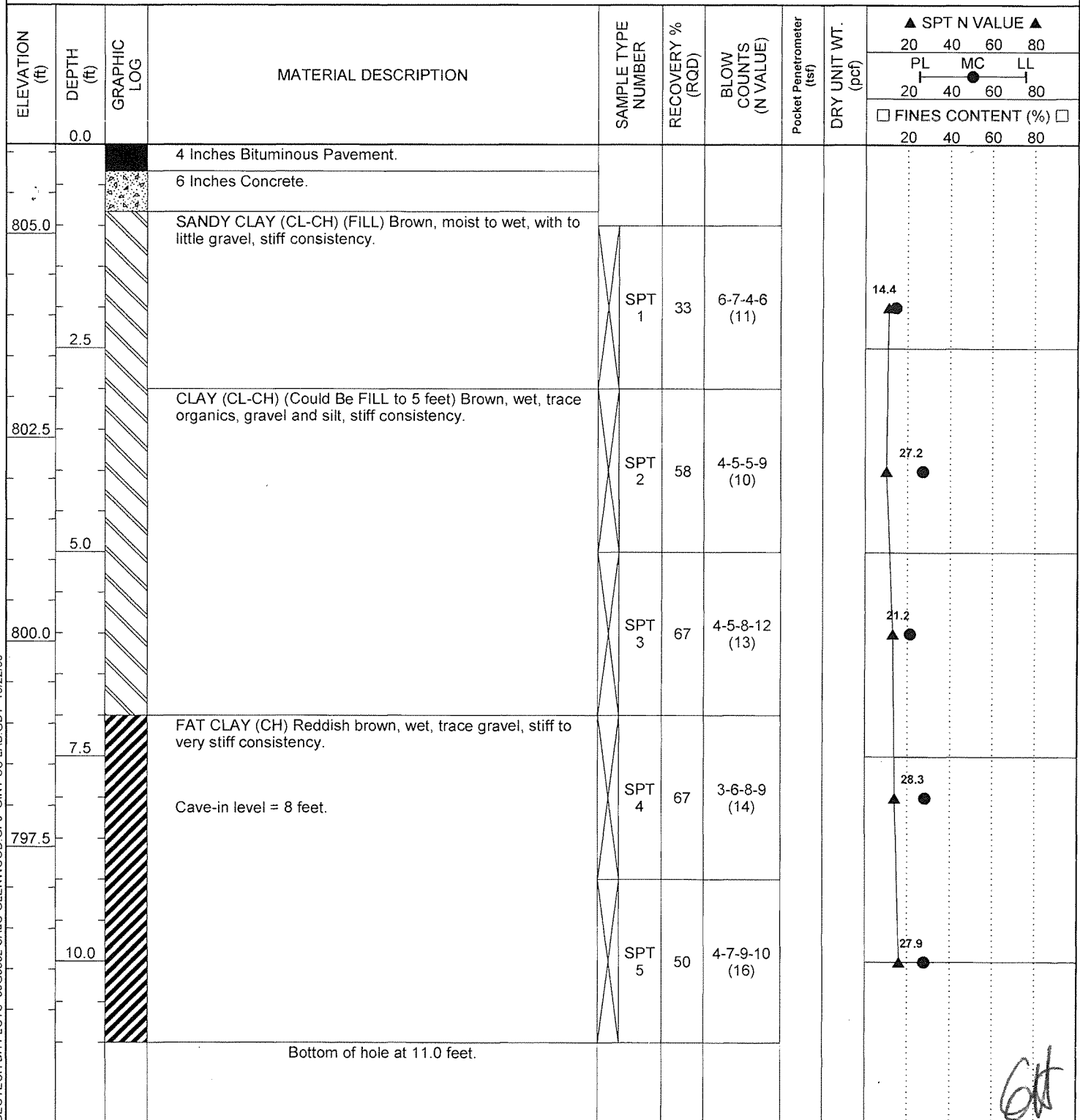
Duluth, Minnesota 55802

BORING NUMBER SB-09-9

PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/30/09COMPLETED 9/30/09GROUND ELEVATION 806.1 ftHOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TSCHECKED BY GHAT END OF DRILLING NoneNOTES Sta 31+80, 10 L. West of 49th.AFTER DRILLING ---

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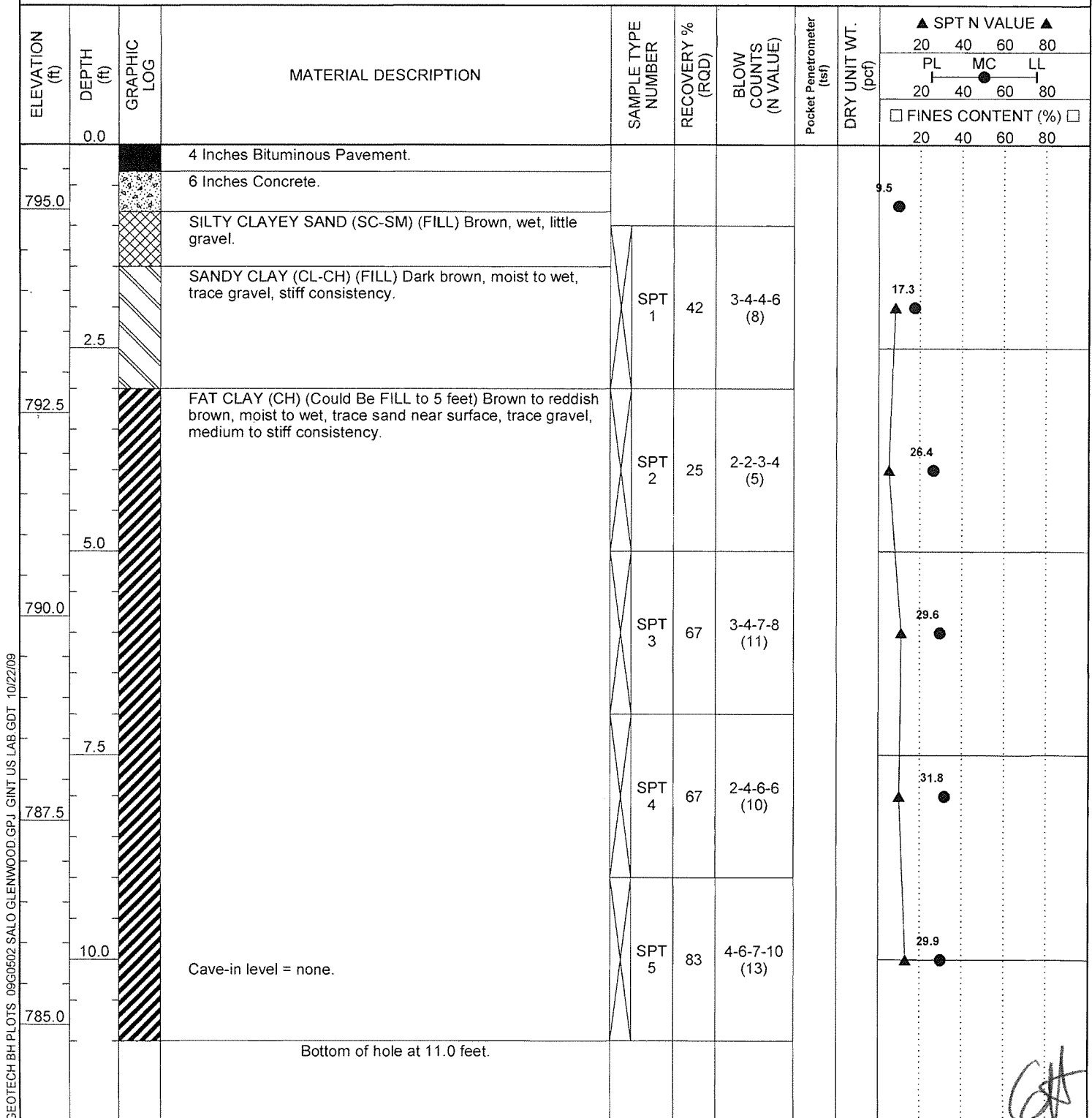
Duluth, Minnesota 55802

BORING NUMBER SB-09-10

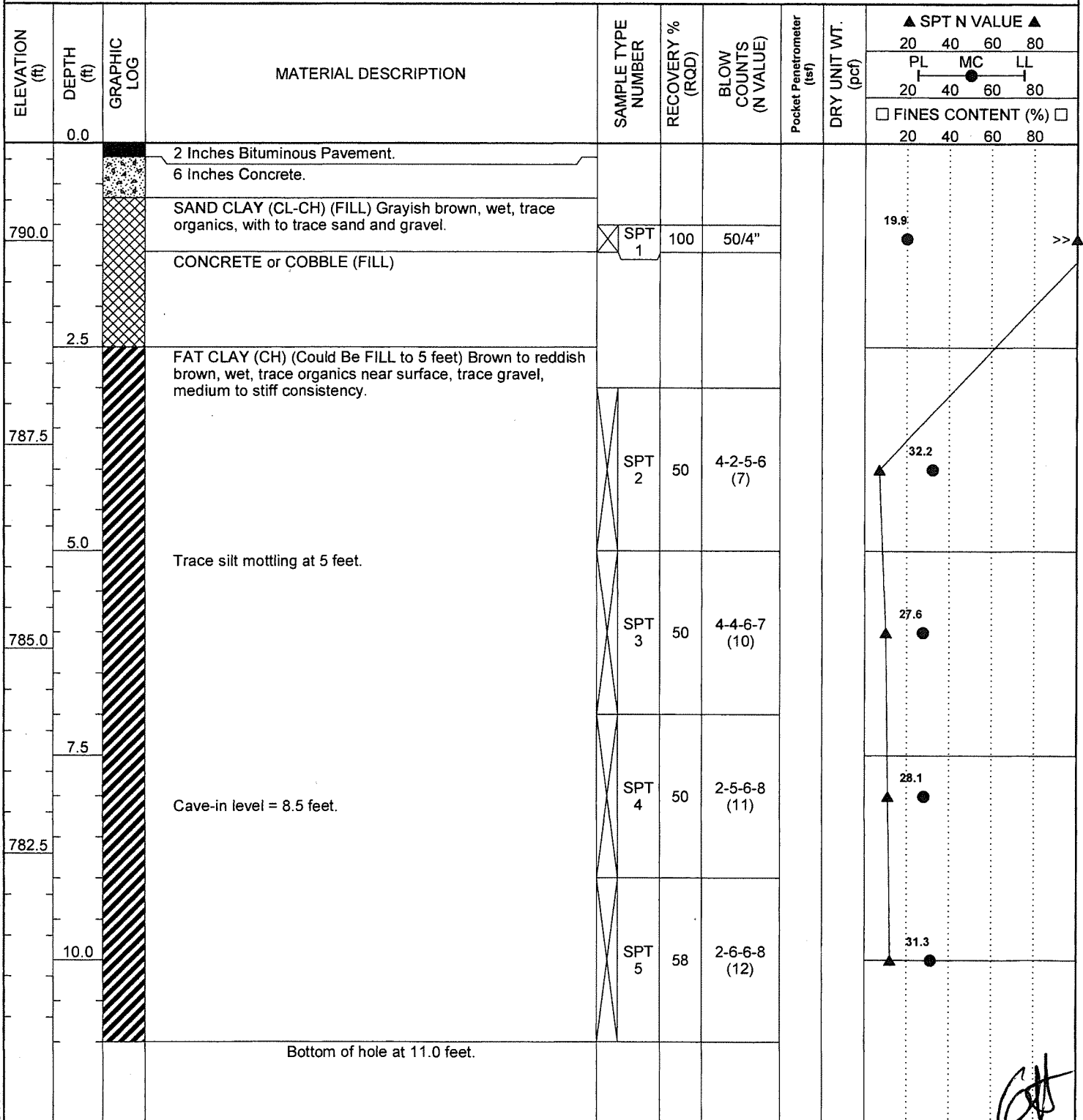
PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/27/09COMPLETED 9/27/09GROUND ELEVATION 795.8 ftHOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

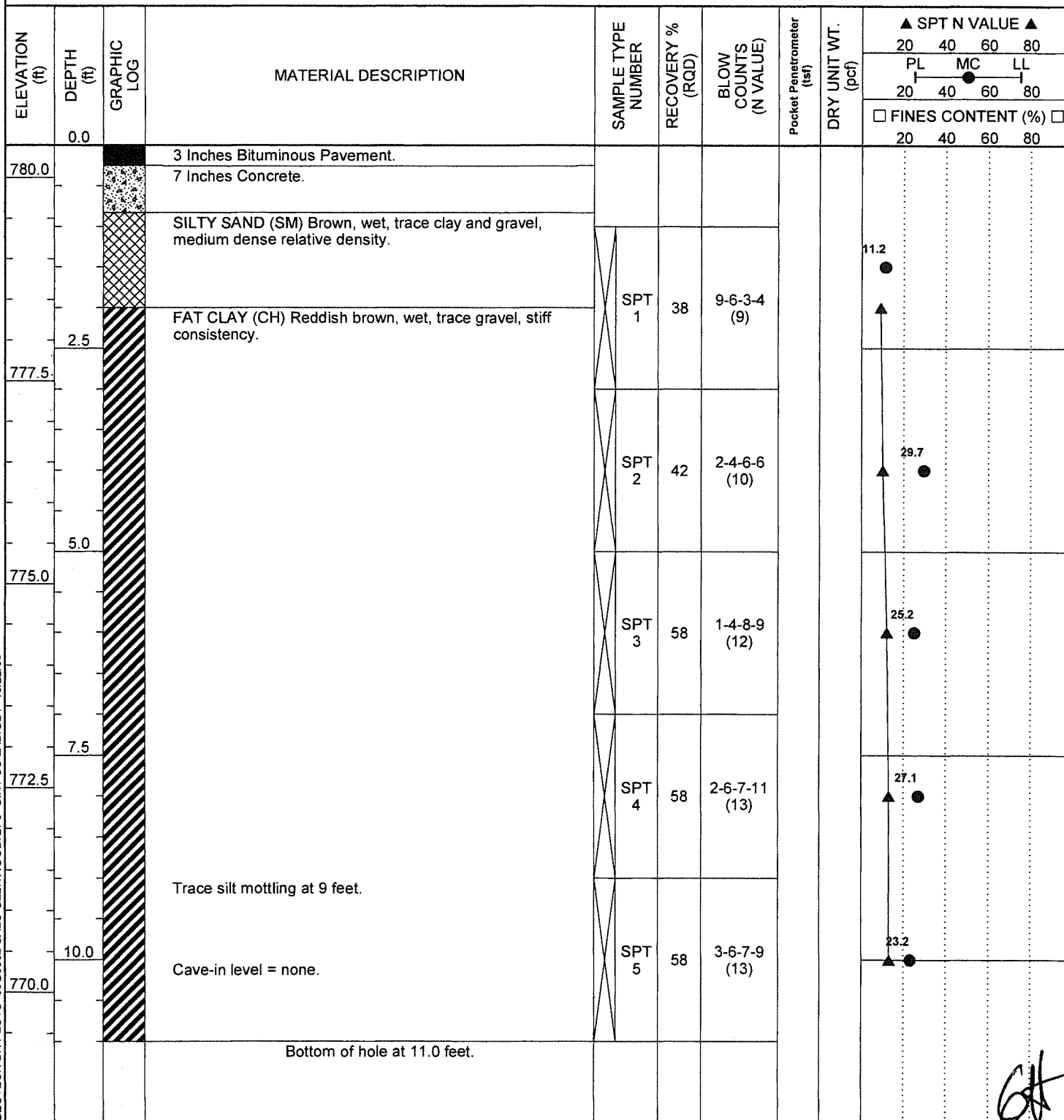
GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TSCHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 34+88, 13 R. West of 49th.AFTER DRILLING ---

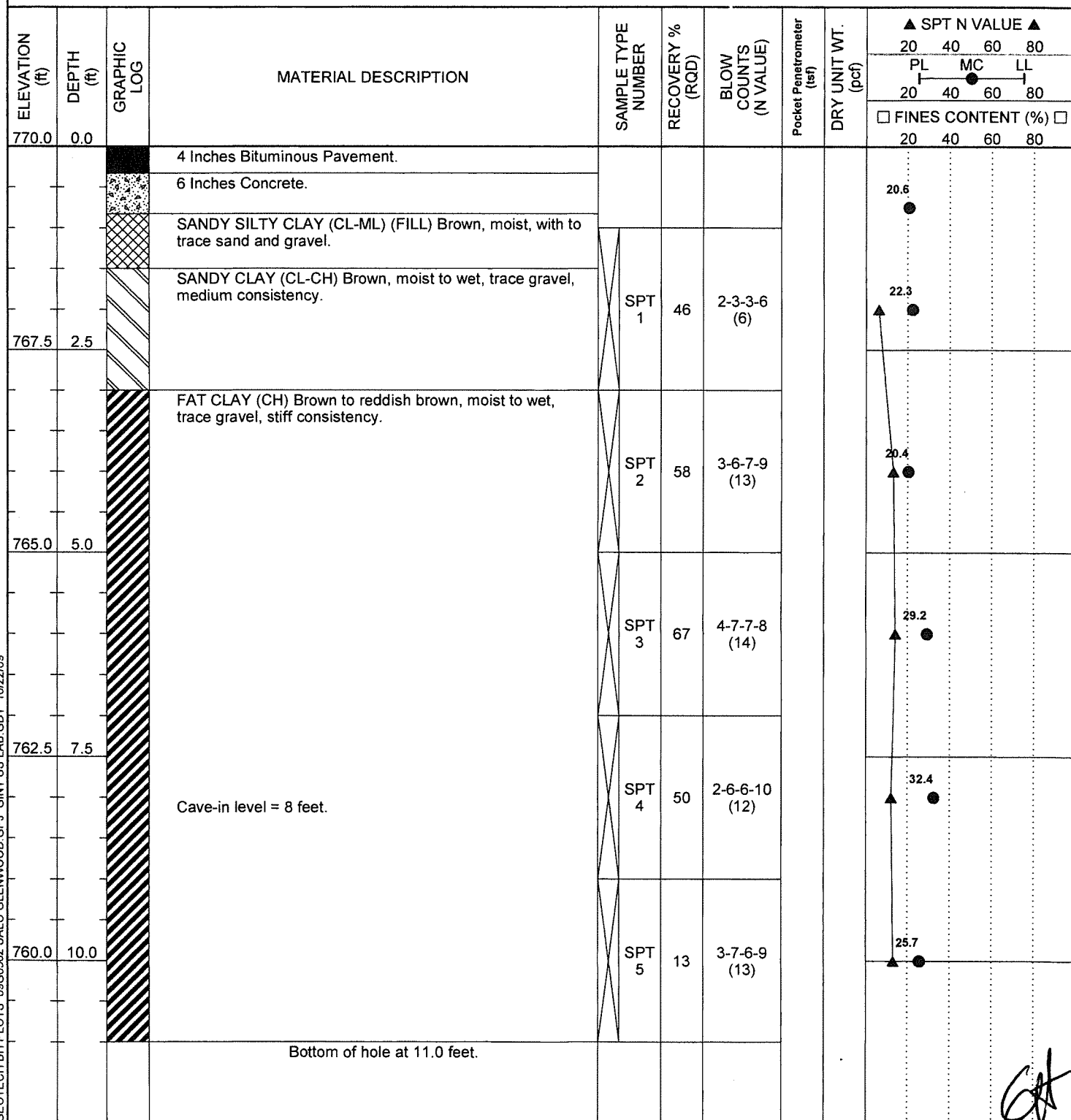
CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/28/09 COMPLETED 9/30/09 GROUND ELEVATION 791.2 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 37+86, 13 L. West of 50th. AFTER DRILLING ---



CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/27/09 COMPLETED 9/27/09 GROUND ELEVATION 780.4 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 40+91, 12 R. West of 51st. AFTER DRILLING ---



CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/28/09 COMPLETED 9/28/09 GROUND ELEVATION 770 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 43+90, 10 L. East of 51st. AFTER DRILLING ---



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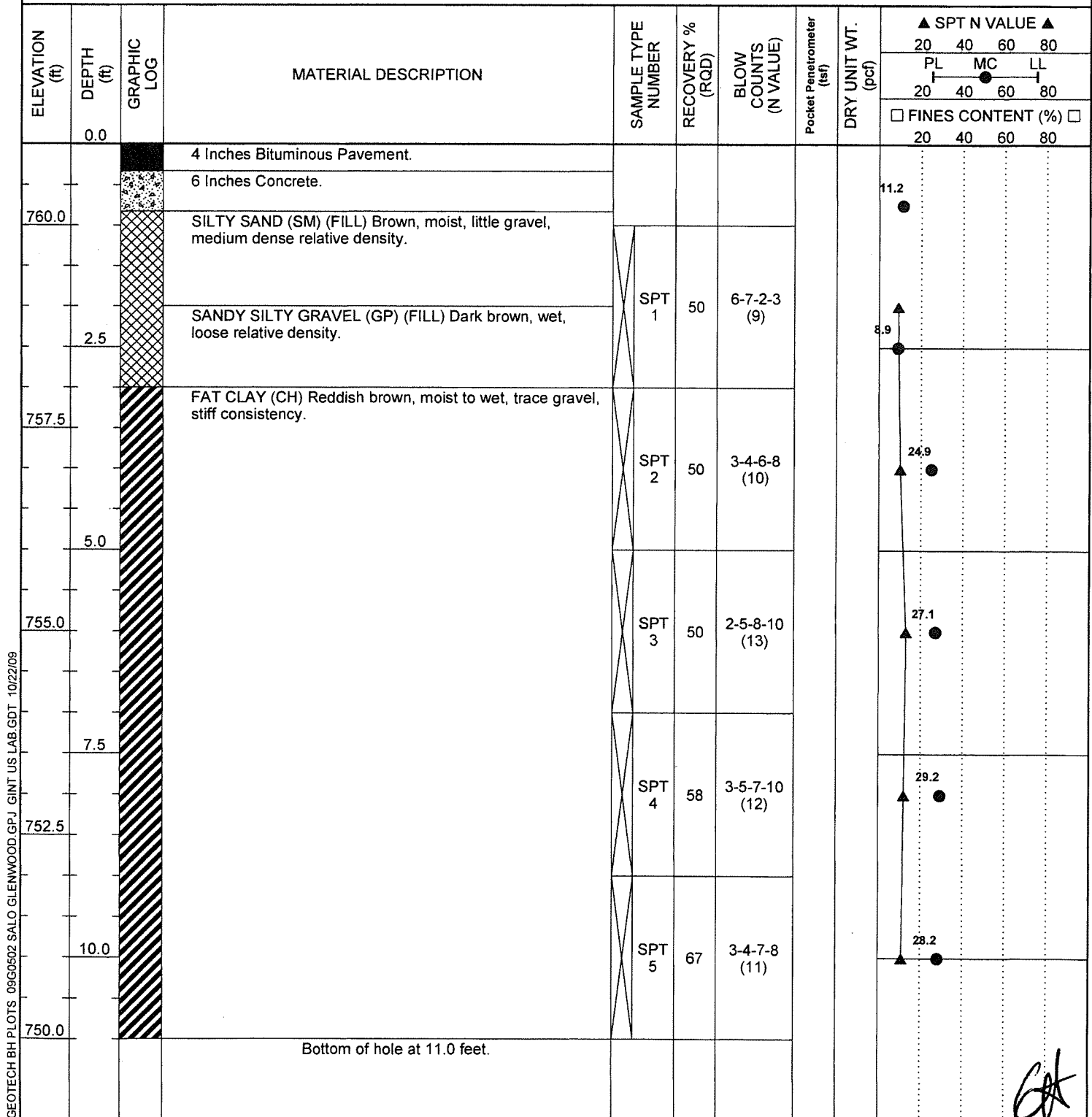
Duluth, Minnesota 55802

BORING NUMBER SB-09-14

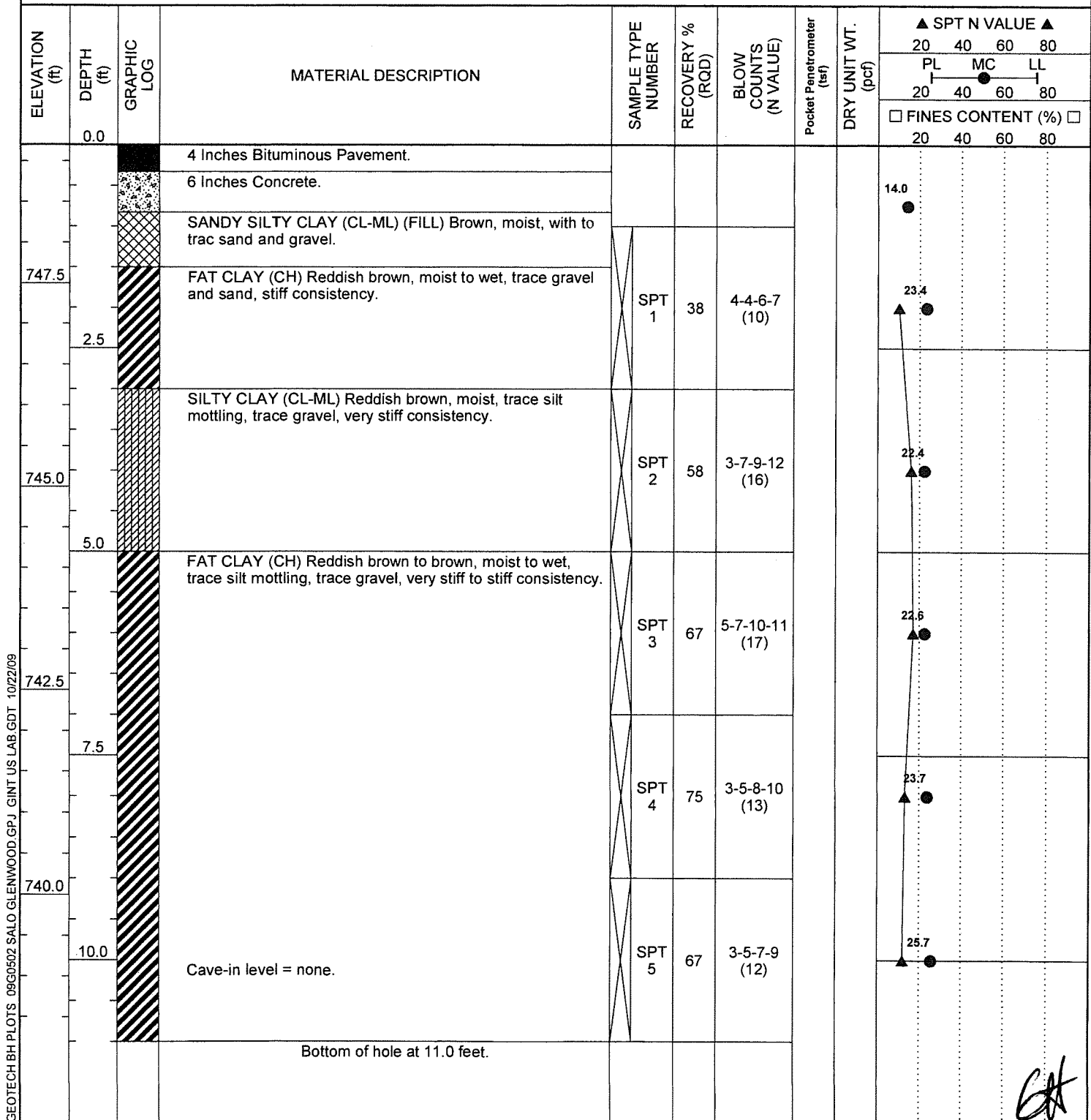
PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/27/09COMPLETED 9/27/09GROUND ELEVATION 761 ftHOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

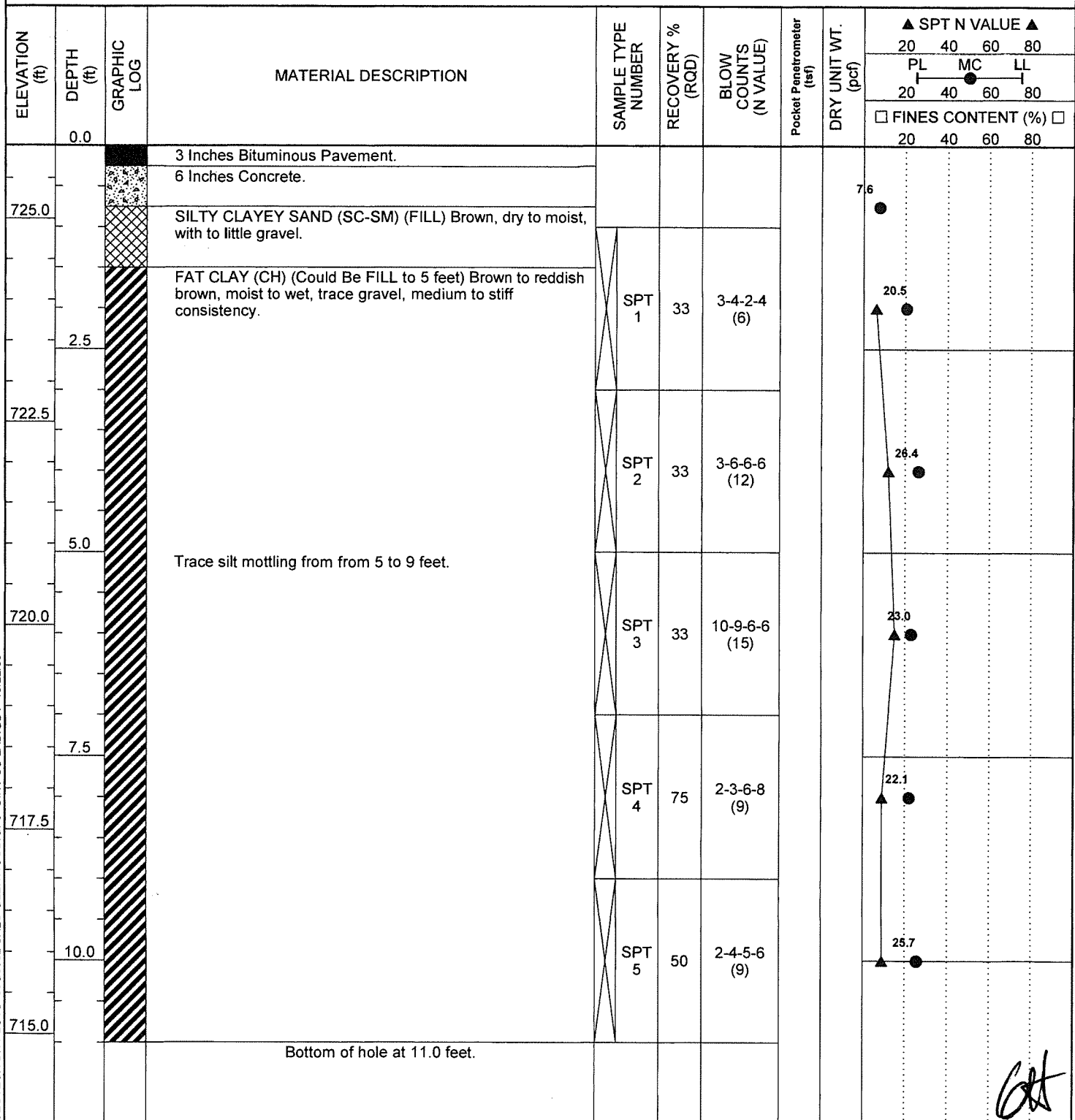
DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TSCHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 46+86, 13 R. West of 52nd.AFTER DRILLING ---

CLIENT <u>Salo Engineering, Inc.</u>	PROJECT NAME <u>Glenwood Street Reconstruction</u>
PROJECT NUMBER <u>09G0502</u>	PROJECT LOCATION <u>Duluth, MN</u>
DATE STARTED <u>9/28/09</u> COMPLETED <u>9/28/09</u>	GROUND ELEVATION <u>749.2 ft</u> HOLE SIZE <u>6 Inch</u>
DRILLING CONTRACTOR <u>EPC Engineering & Testing</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA</u>	AT TIME OF DRILLING <u>None</u>
LOGGED BY <u>TS</u> CHECKED BY <u>GH</u>	AT END OF DRILLING <u>None</u>
NOTES <u>Sta. 49+91, 10 L. East of 52nd.</u>	AFTER DRILLING <u>---</u>

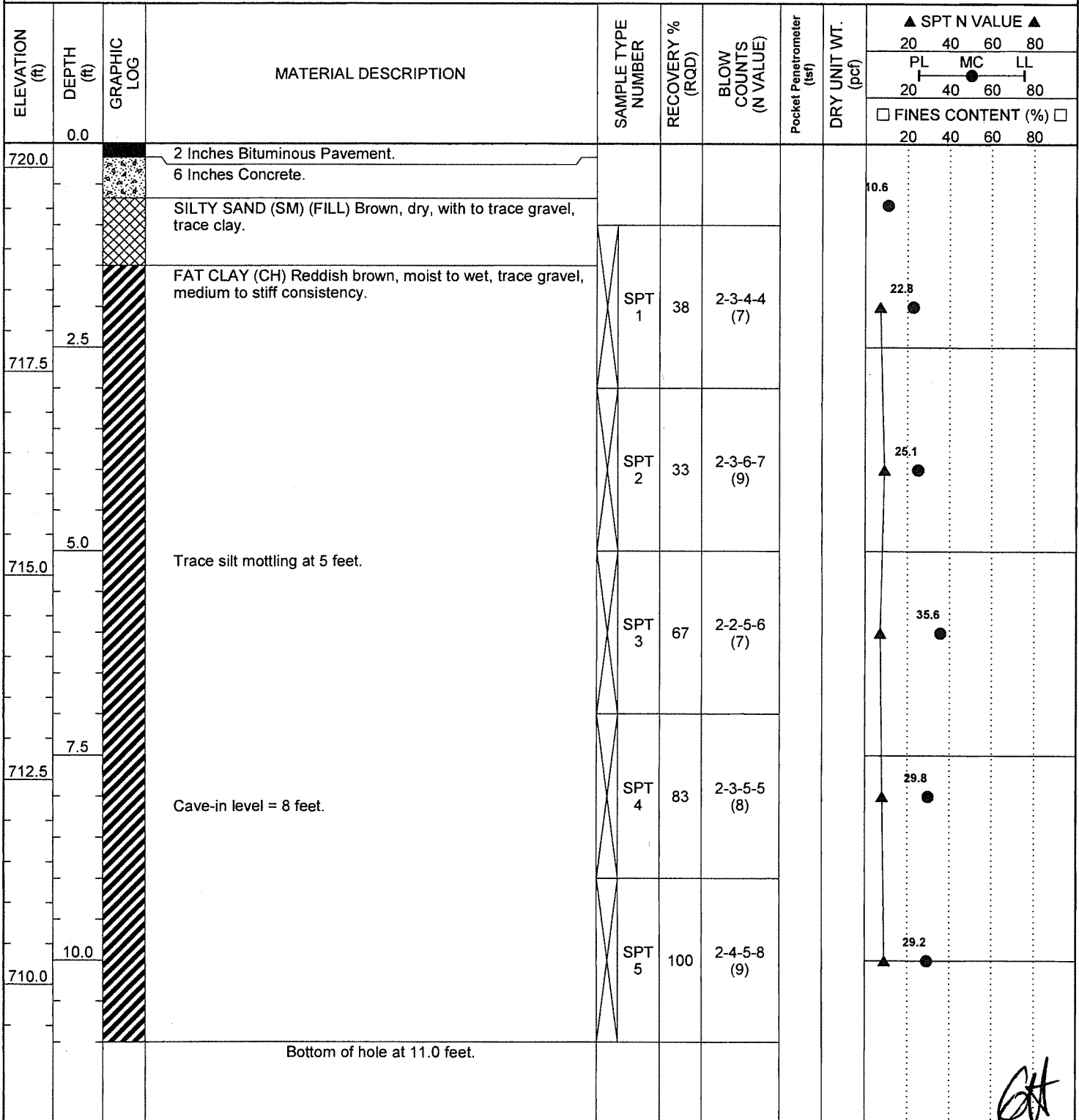


GEOTECH BH PLOTS 09G0502 SALO GLENWOOD.GPJ GINT US LAB.GDT 10/22/09

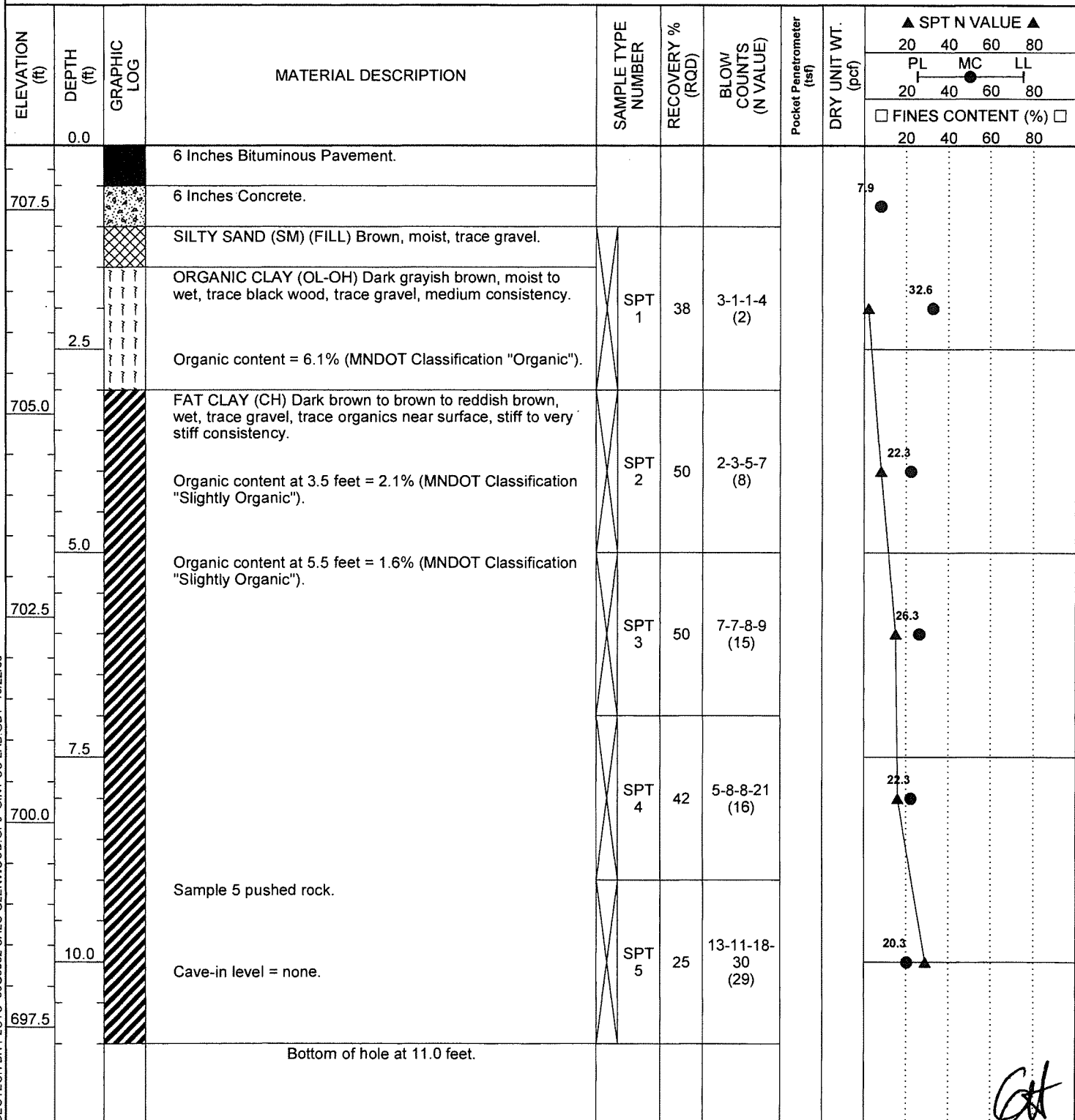
CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/27/09 COMPLETED 9/27/09 GROUND ELEVATION 725.9 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 54+24, 13 R. East of 53rd. AFTER DRILLING ---



CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/27/09 COMPLETED 9/27/09 GROUND ELEVATION 720.3 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 57+26, 7 L. West of 54th. AFTER DRILLING ---



CLIENT Salo Engineering, Inc. PROJECT NAME Glenwood Street Reconstruction
 PROJECT NUMBER 09G0502 PROJECT LOCATION Duluth, MN
 DATE STARTED 9/27/09 COMPLETED 9/27/09 GROUND ELEVATION 708.3 ft HOLE SIZE 6 Inch
 DRILLING CONTRACTOR EPC Engineering & Testing GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING None
 LOGGED BY TS CHECKED BY GH AT END OF DRILLING None
 NOTES Sta. 61+41, 12 R. West of 57th. AFTER DRILLING ---



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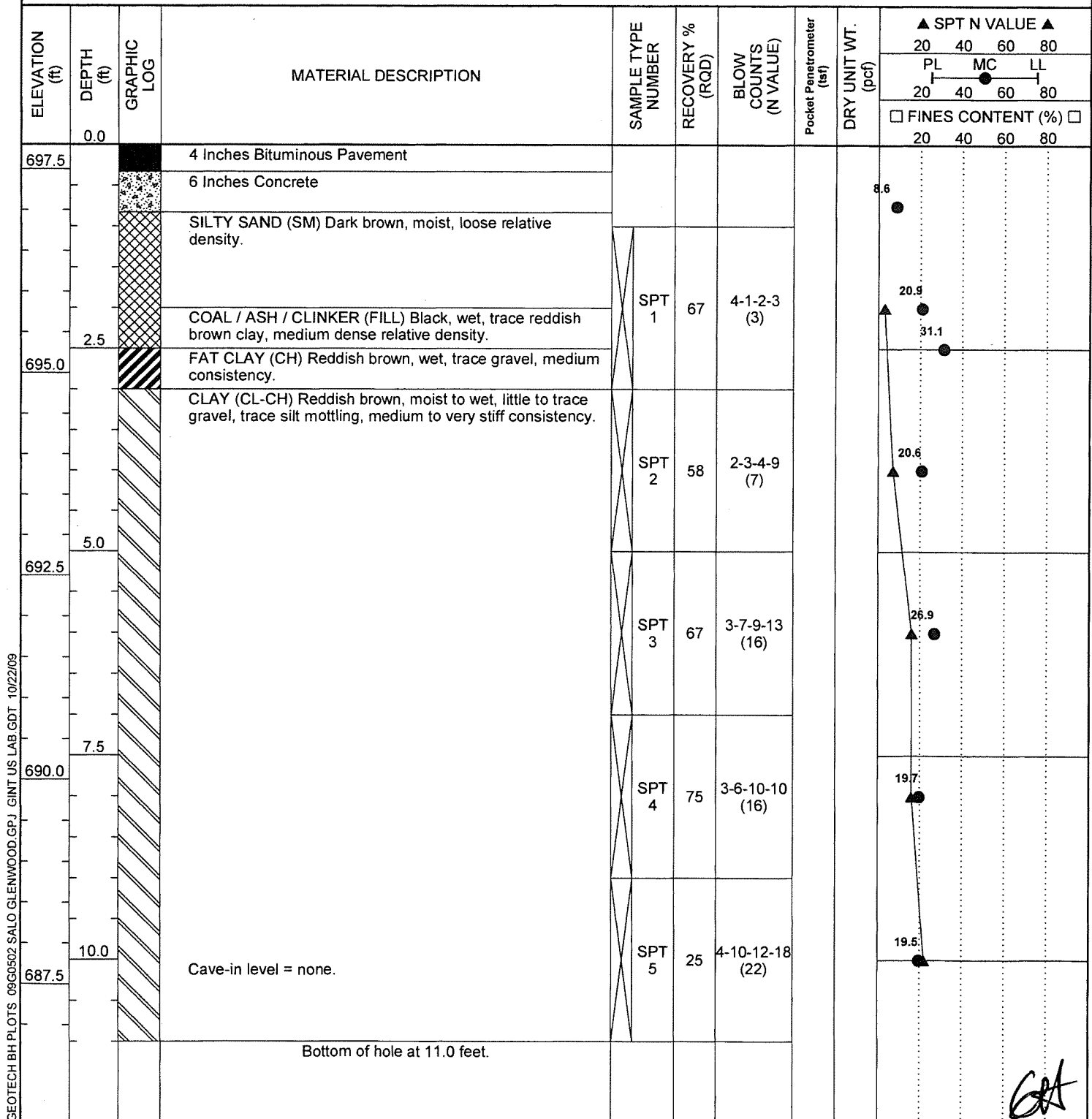
Duluth, Minnesota 55802

BORING NUMBER SB-09-20

PAGE 1 OF 1

CLIENT Salo Engineering, Inc.PROJECT NAME Glenwood Street ReconstructionPROJECT NUMBER 09G0502PROJECT LOCATION Duluth, MNDATE STARTED 9/27/09COMPLETED 9/27/09GROUND ELEVATION 697.8 ftHOLE SIZE 6 InchDRILLING CONTRACTOR EPC Engineering & Testing

GROUND WATER LEVELS:

DRILLING METHOD HSAAT TIME OF DRILLING NoneLOGGED BY TSCHECKED BY GHAT END OF DRILLING NoneNOTES Sta. 70+93, 12 R. West of 60th.AFTER DRILLING --

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539 Garfield Avenue
Duluth, Minnesota 55802

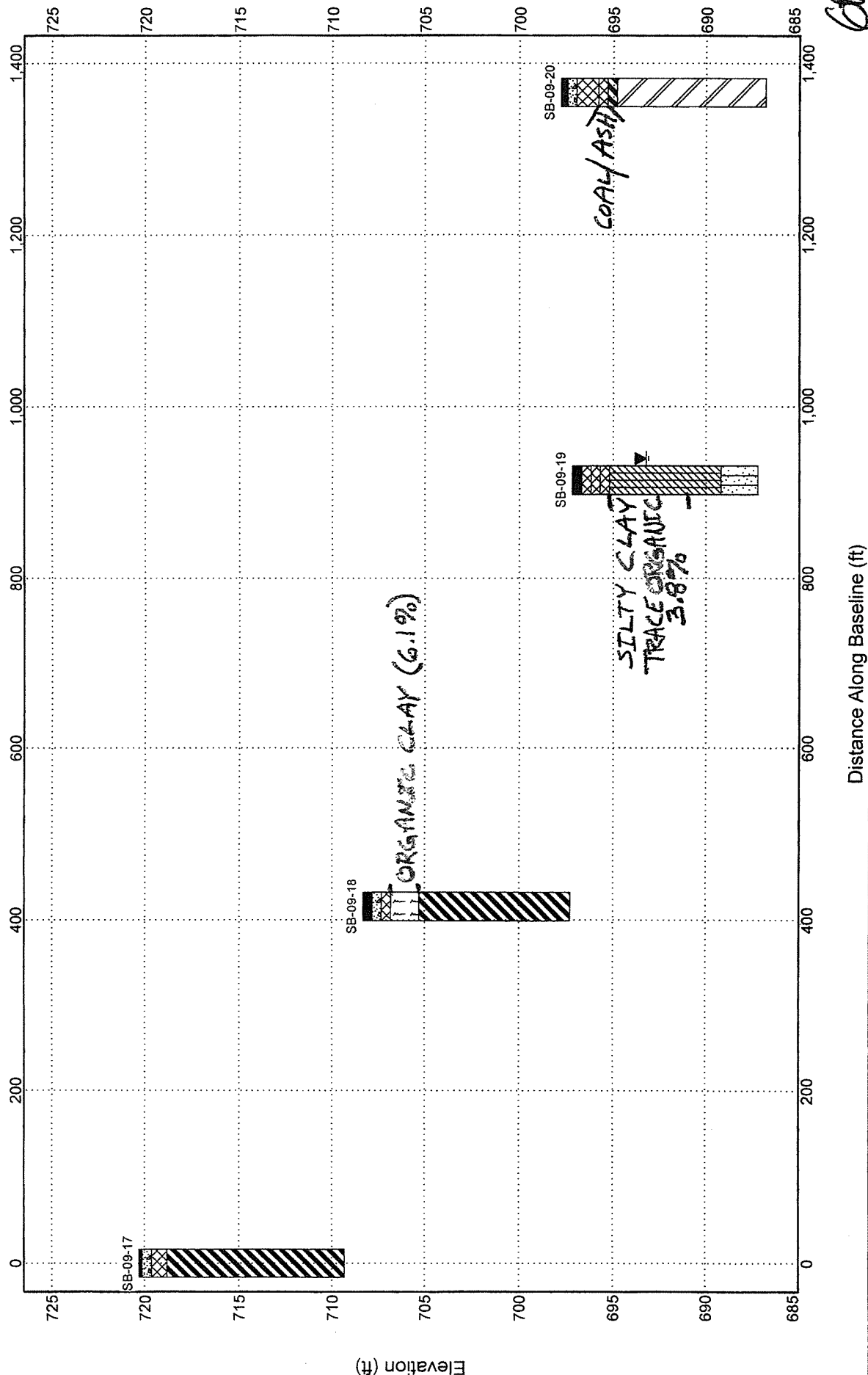
SUBSURFACE DIAGRAM

CLIENT Salo Engineering, Inc.

PROJECT NUMBER 09G0502

PROJECT NAME Glenwood Street Reconstruction

PROJECT LOCATION Duluth, MN



EPC Engineering & Testing
Geotechnical • Environmental • Materials Engineering
539 Garfield Avenue
Duluth, Minnesota 55802

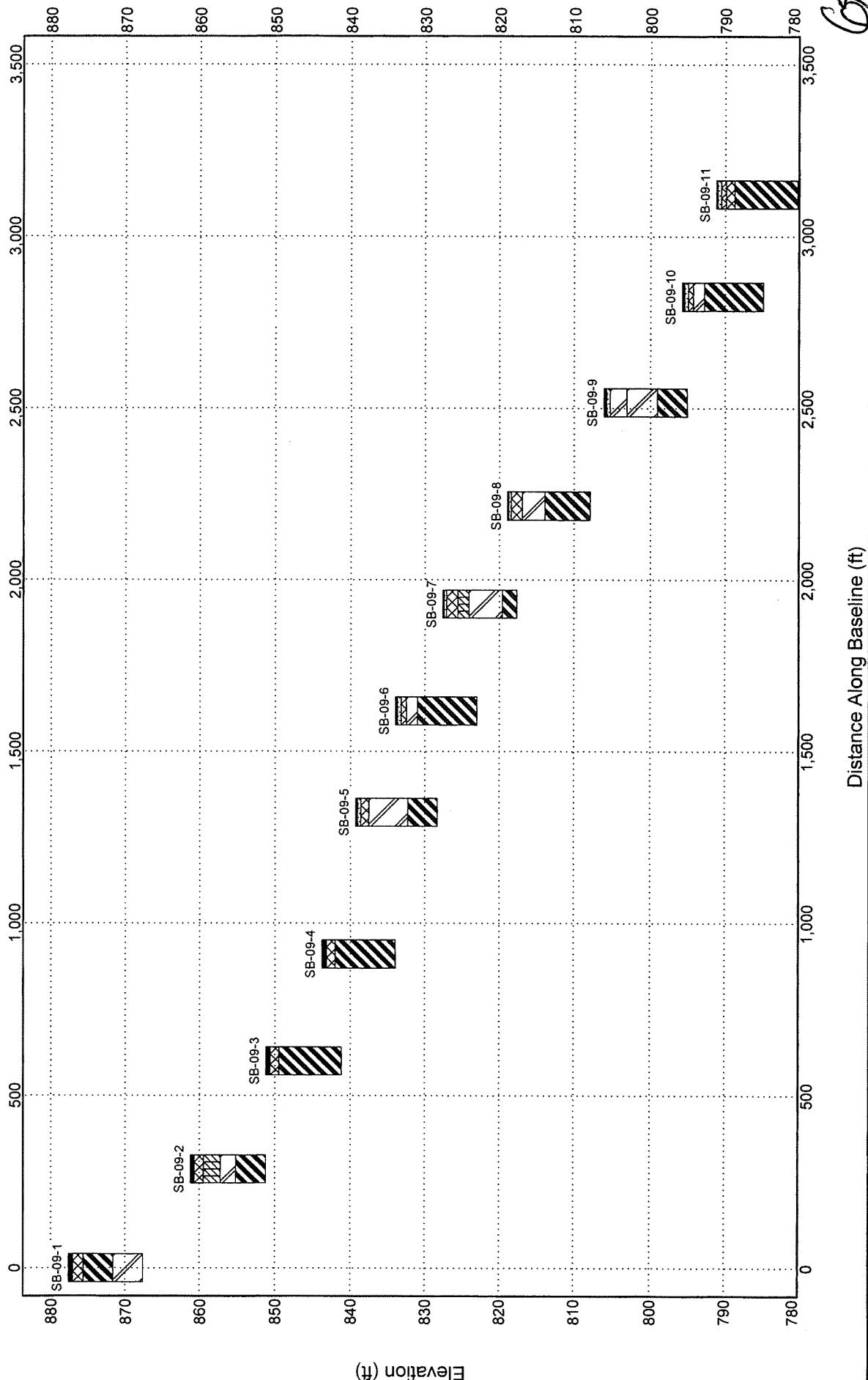
SUBSURFACE DIAGRAM

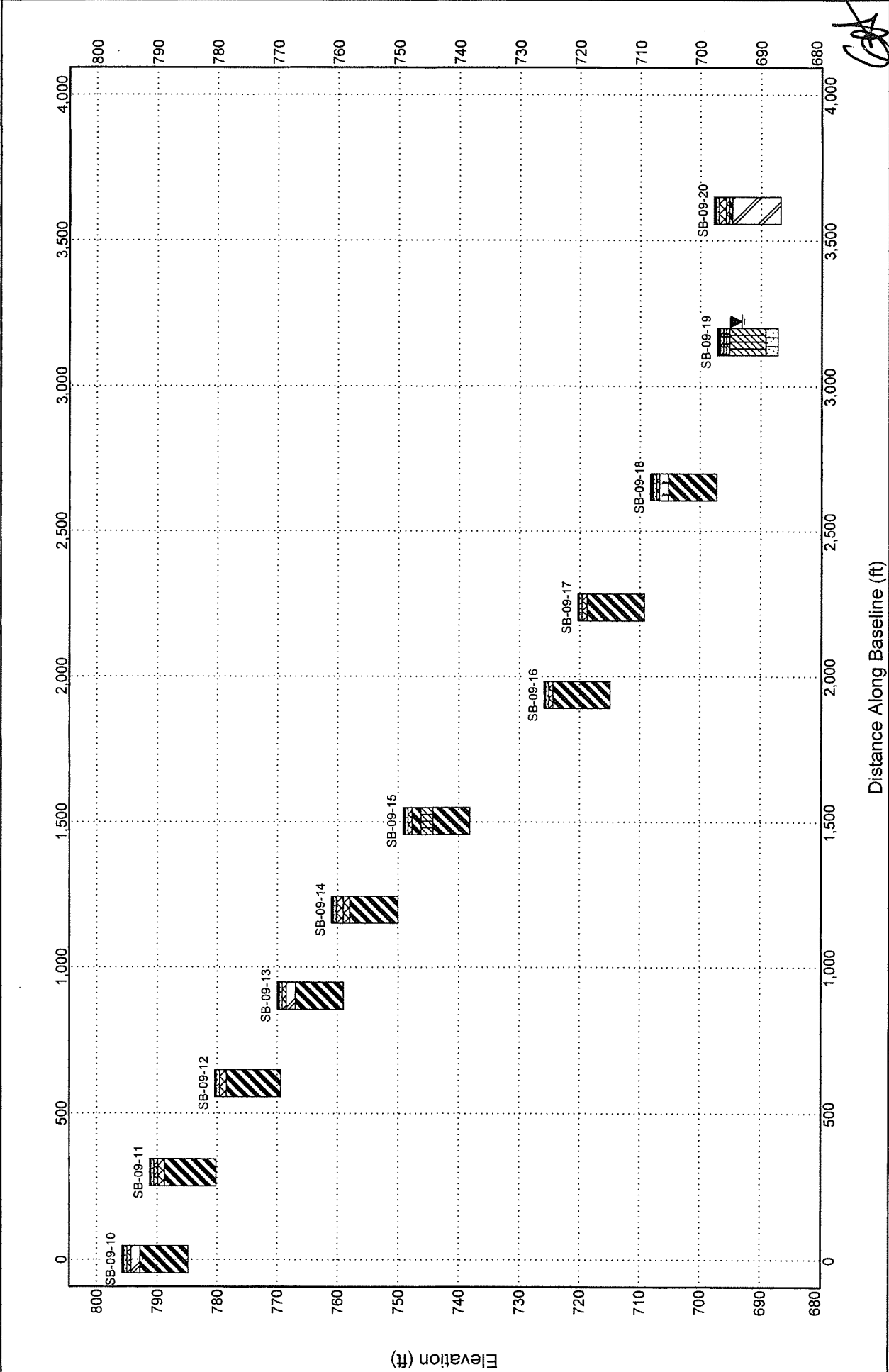
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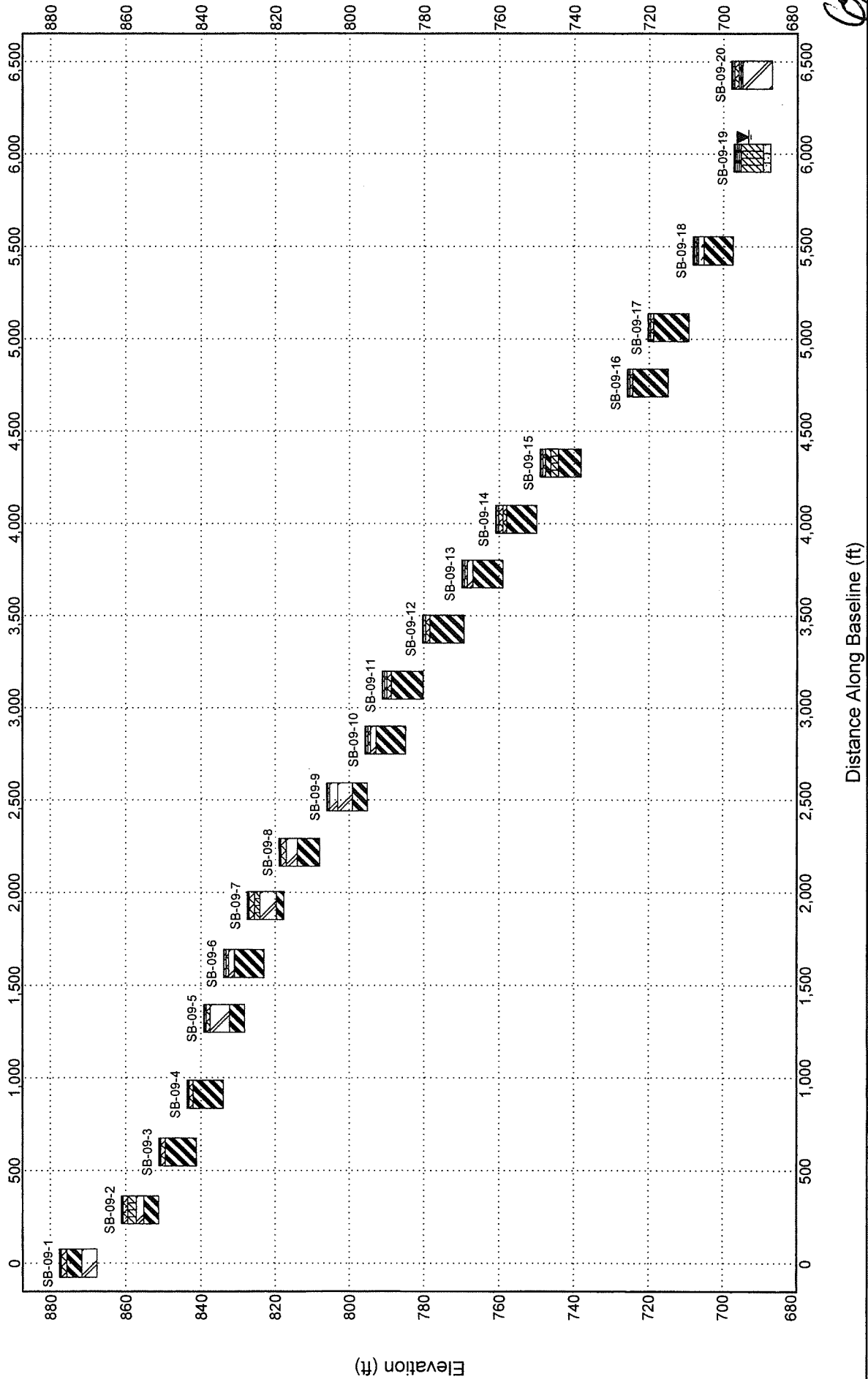
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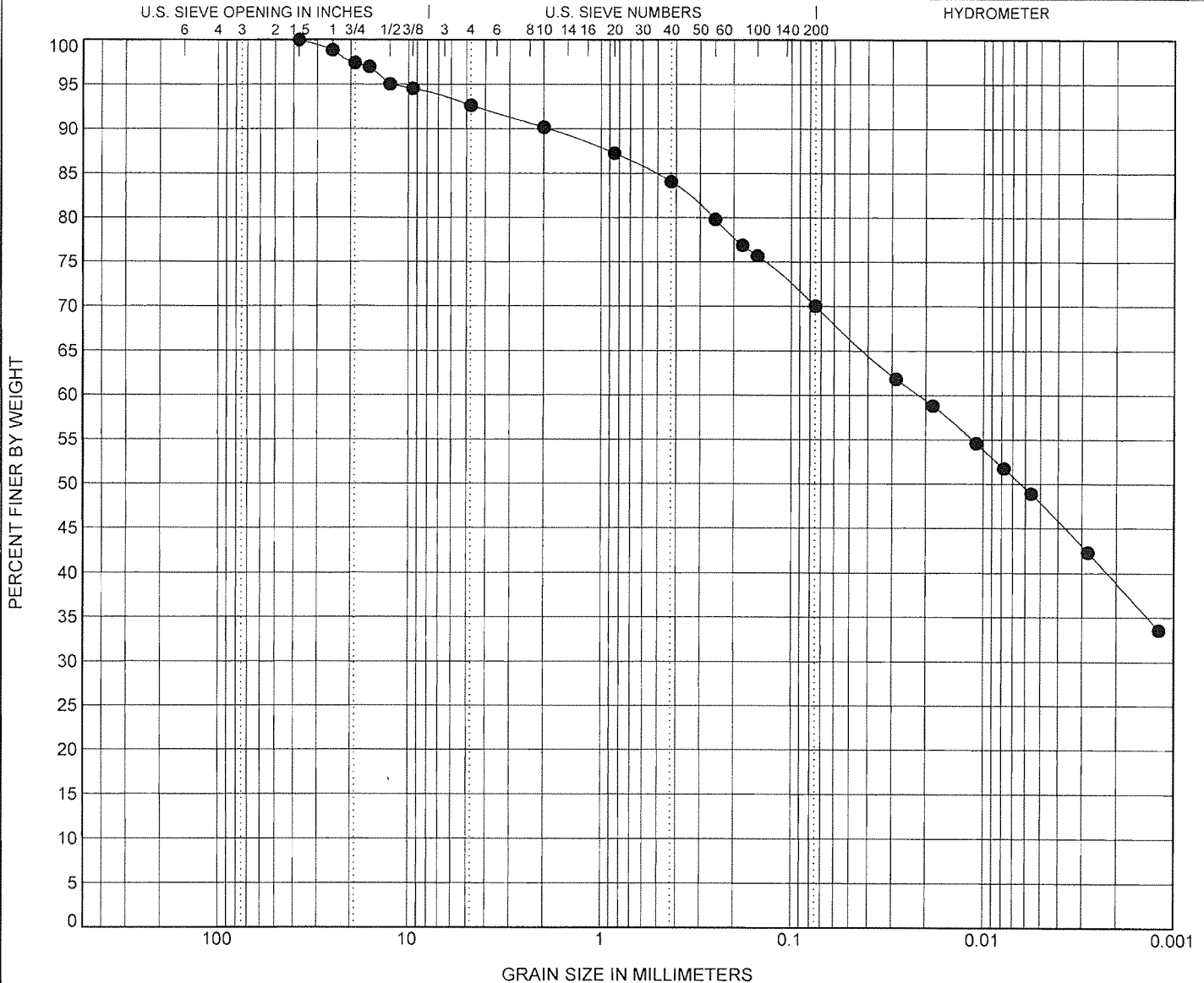


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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

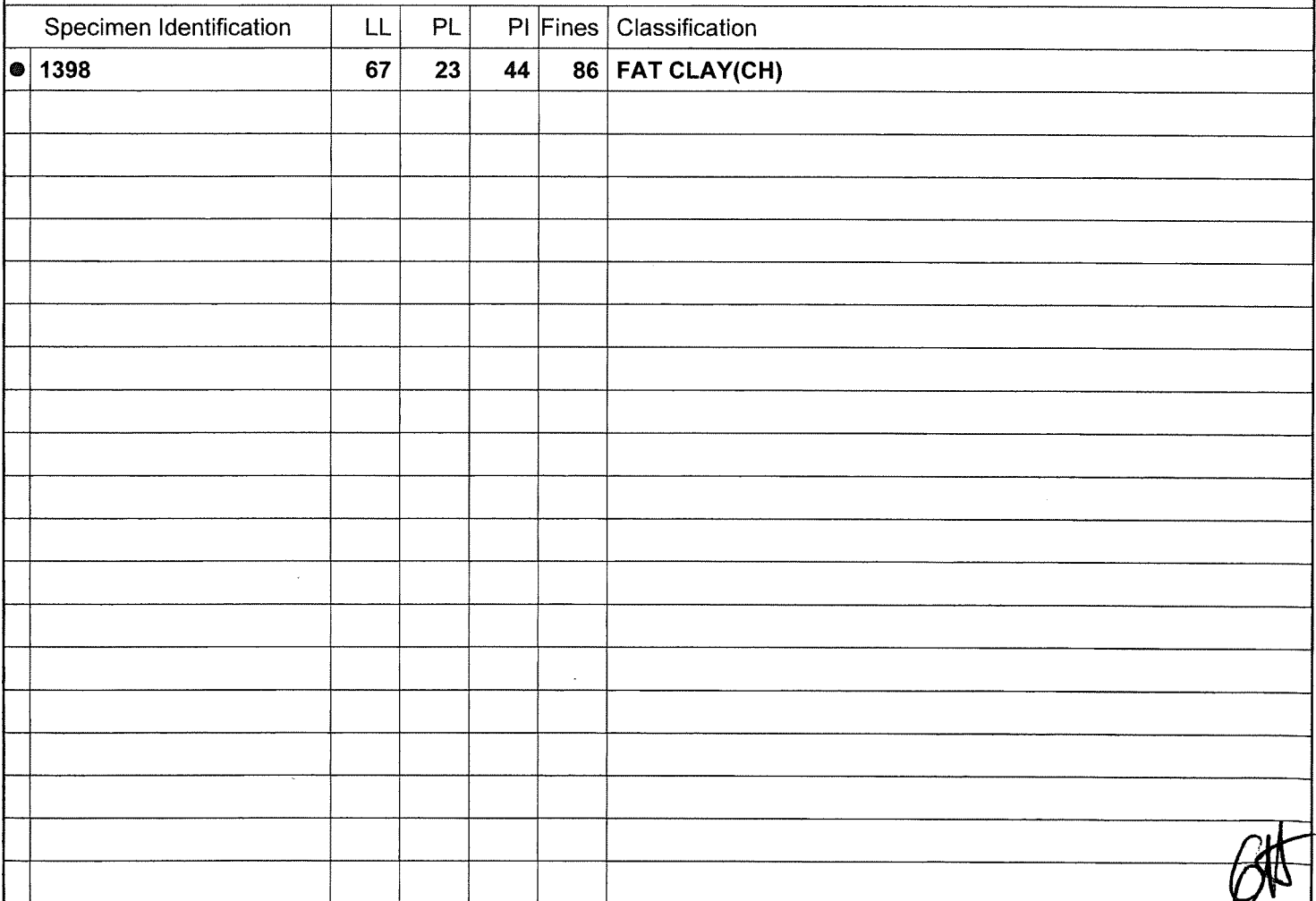
Specimen Identification		Classification					LL	PL	PI	Cc	Cu
●	Lab Sample # 1396	FAT CLAY with SAND(CH)					51	21	30		
		D100	D60	D30	D10	%Gravel	%Sand	%Silt		%Clay	
		37.5	0.022			7.4	22.6	22.2		47.8	
SIEVE	% PASS	SPEC		SIEVE	% PASS	SPEC		NOTES			
3"				#10	90			Composite sample of			
2"				#16				SB-1(6'-10'),			
1.5"	100			#20	87			SB-2(2'-6'), SB-5(3'-7'),			
1"	99			#30				SB-7(3.5'-8'),			
3/4"	97			#40	84			SB-8(2'-5'), SB-9(3'-5'),			
5/8"	97			#50				SB-13(1.5'-3'),			
1/2"	95			#60	80			SB-15(3'-5'),			
3/8"	95			#80	77			SB-18(1.5'-3'),			
#4	93			#100	76			SB-19(2'-8'),			
#8				#200	70.0			SB-20(3'-11')			



ATTERBERG LIMITS' RESULTS

PROJECT NAME Glenwood Street

PROJECT LOCATION Duluth, MN



ATTARBERG LIMITS 09G0502 GLENWOOD STREET.GPJ GINT US LAB.GDT 10/23/09

