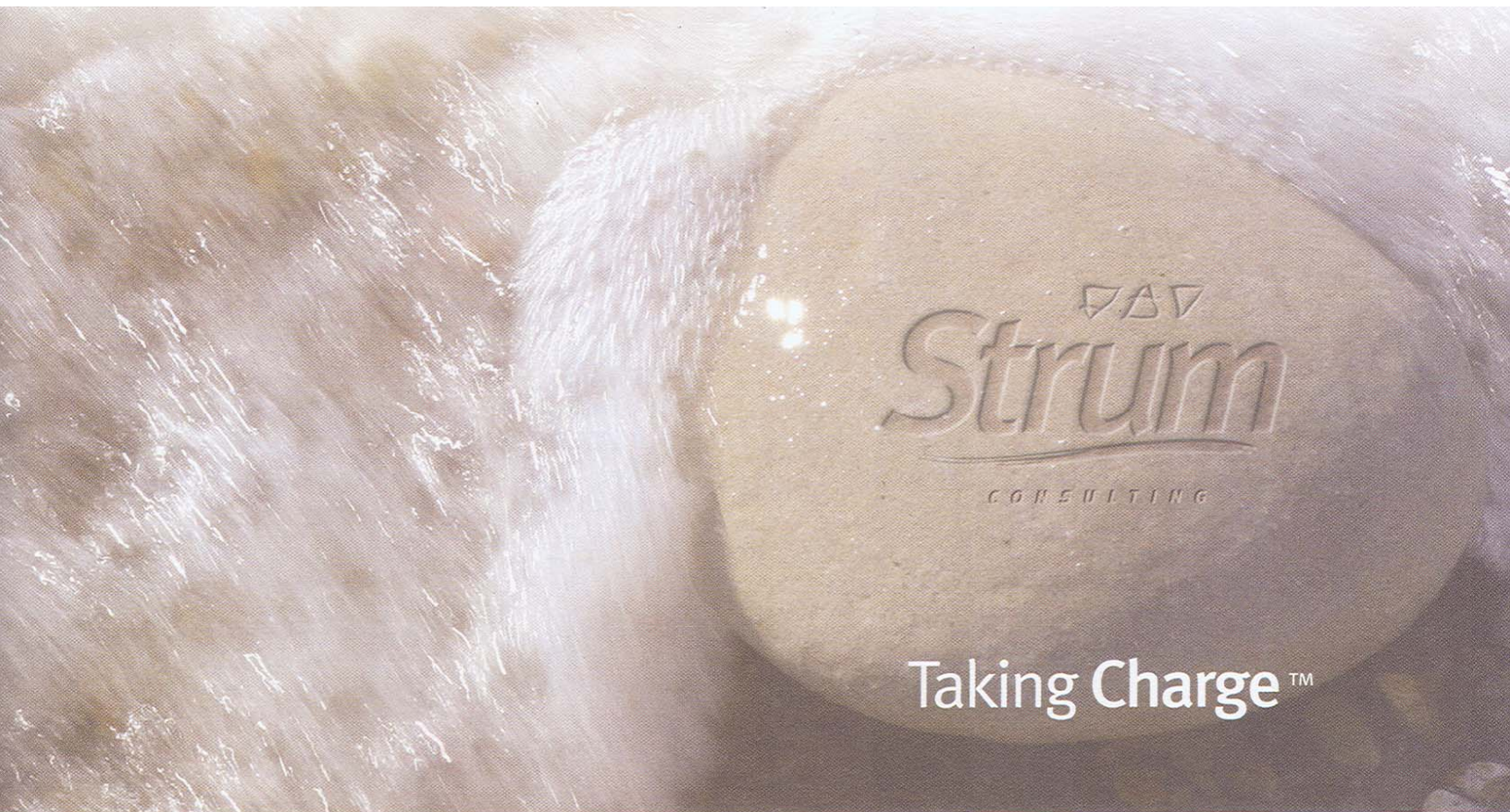




**D R A F T**

**GEOTECHNICAL INVESTIGATION  
CP REIT NS Properties  
Elmsdale Site – Potential Development  
295 Highway 214  
Elmsdale, NS**

**March 8. 2016**



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## **1.0 INTRODUCTION**

Strum Consulting was retained to perform a preliminary geotechnical investigation for the proposed site development of the area adjoining the existing Superstore in Elmsdale. It is understood the plans for development of the site have not been finalized to date. The site development however is anticipated to include potentially seven (7) new buildings (including a 4 story hotel) and related parking lots.

The geotechnical investigation was performed in addition to an environmental site assessment (ESA).

The field investigation consisted of an assessment of the subsurface conditions using a total of fifteen (15) boreholes put down at the site. The purpose of the geotechnical investigation was to provide information for general site development. The boreholes were located to provide areal coverage of the site. It should be noted, that three additional boreholes, BH 14, BH 15 and BH 16, were put down for the environmental site assessment but are not included in the geotechnical report. These three holes were located in the area of the existing service station.

The following report summarizes the subsurface conditions at the site and provides preliminary geotechnical parameters for design of the buildings and traffic areas. The report also includes recommendations for construction.

## **2.0 SITE DESCRIPTION**

The project site is the property located adjoining the existing Atlantic Superstore and related parking and traffic areas in Elmsdale, Nova Scotia. The Atlantic Superstore is located on the north side of the intersection of Highway 102 and the Highway 214 overpass, Exit 8. The off ramp from Hwy 102 to Hwy 214 borders the south corner of the site.

The Atlantic Superstore site is the high point in the relatively flat topography of the surrounding area. The local topography slopes down gently to the southeast, southwest and northwest. The northeast side of the site is immediately bounded by the Nine Mile River.

It appears the top of the site was excavated to create a level site, with the existing development located in the west corner. The ground surface of the project site has been stabilized with grass vegetation. A berm borders the northeast side of the site with a steep, treed slope down to the Nine Mile River on the far side. The southeast side of the site slopes down to the Highway 102. A drainage ditch bisects the site on the southeast side leading from the Superstore parking lot to a stormwater retention pond. The stormwater retention pond is located adjacent Highway 102, at the start of the off ramp for Exit 8.

The existing site development includes a Petro-Canada service station located by Highway 214, at the entrance to the Atlantic Superstore parking lot.

A Site Location Plan (Drawing 1) is provided in Appendix A.

### **3.0 REVIEW OF EXISTING INFORMATION**

The surficial geology in the Elmsdale area is mapped as silty till plain and drumlins according to Surficial Geology of the Province of Nova Scotia, Map 92-3 by R. Stea, H. Conley and Y. Brown of the Nova Scotia Department of Natural Resources (NSDNR). The topography is described as flat to rolling with the silty till having a higher fines content including red clay in the drumlins. The thickness of the till, according to the mapping, ranges from 3 m to 30 m. It is noted that alluvial deposits are mapped adjoining the adjacent Nine Mile River.

Search of the NSDNR database did not show any more detailed mapping of the surficial geology in the Elmsdale area. The NSDNR map, Surficial Geology Shubenacadie Area (NTS Sheet 11E/03) OFM 1998-003 by R. Stea and C. Kennedy, extends southwest of Milford Station fairly close to the project site. It identifies the surficial deposits as Hants Till which is described as a reddish brown to brown till with a silty sand matrix.

The NSDNR open file map ME 2009-5, Bedrock Geology Map of the Grand Lake Area, Part of NTS Sheet 11D/13 (Sheet 4 of 4), Halifax and Hants Counties, Nova Scotia, by R. Horne, R. Ryan, M. Corey and D. Fox, maps the bedrock geology in the area of the project site. The site is underlain by bedrock of the Windsor Group, the Carrols Corner Formation near the contact with the MacDonald Road Formation. The Carrols Corner Formation is described as anhydrite, gypsum with minor dolostone and mudstone in thin beds. The MacDonald Road Formation is described as gypsum, anhydrite and minor halite, with interbeds of grey and maroon siltstone and sheet-like carbonate members.

The Nova Scotia government database was searched for data that would provide information on any site alteration during construction of Highway 102. In a black and white 1966 air photo, clearing for twinning of Highway 102 appears to have been started. The earliest topographic mapping available however was a 1:2400 scale topographic plan based on 1975 air photos, after twinning of Highway 102 had been completed.

### **4.0 FIELD INVESTIGATION METHODOLOGY**

To investigate the subsurface conditions at the site, a total of fifteen (15) boreholes were put down at the site. The boreholes were located to provide areal coverage of the site to provide information for general site development. As previously indicated, three additional boreholes, BH 14, BH 15 and BH 16, were put down for an environmental site assessment but are not included in the geotechnical report.

The locations of the boreholes are indicated on the Site Plan and Investigation Locations drawing (Figure 1) attached in Appendix A.

The field work was performed in two stages. Boreholes BH 5 and BH 7 were drilled using a truck mounted CME-75 drill rig on January 21, 2016. Due to the soft ground surface, the remaining boreholes were put down using a CME 45 drill rig, mounted on a tracked carrier, between February 1 and February 3, 2016. Both drill rigs were supplied and operated by Logan Drilling of Stewiacke, Nova Scotia.

The boreholes were advanced through the overburden soils in the boreholes with solid stem augers (4.5 inches OD). The overburden was sampled ahead of the augers in Standard Penetration Tests (SPT), using a 50 mm OD split spoon sampler advanced with an automatic safety hammer. The N-values from the SPT provide an indication of the relative density or consistency of the soil sampled.

The field investigation was supervised by a Strum technologist, experienced in subsurface investigations, who logged the holes and collected representative samples. The samples were transported to the Strum office located in Bedford, Nova Scotia for detailed inspection. Based on this review, representative samples of the soil were selected for lab testing by a sub-consultant testing laboratory.

The ground surface elevation at each borehole location was surveyed relative to geodetic datum.

## **5.0 SUBSURFACE CONDITIONS**

As indicated, most of the site is relatively level with some grading to promote surface drainage. Ground surface elevations measured at the boreholes locations in 13 of the 15 boreholes ranged from 24.57 m in BH 1 to 25.79 m in BH 18. The ground surface elevations at boreholes BH 12 and BH13, located closest to the stormwater retention pond, were 22.14 m and 23.90 m, respectively.

The subsurface conditions encountered at each borehole location are summarized in the borehole logs attached in Appendix B. It should be noted that the boreholes are a random sampling of the subsurface and subsurface conditions between the test hole locations may vary from those encountered at the borehole locations. The lab test results, for the representative samples of the till, have been attached in Appendix C.

### **5.1 Overburden**

At each borehole location, a thin layer of topsoil, up to 10 cm thick, was encountered overlying the native till.

The till stratum extended to the full depths investigated in the boreholes, which ranged from 9.7 m and 9.1 m, respectively in Boreholes BH 1 and BH2 to 6 m to 6.7 m in the other boreholes. The till at the site, based on the samples collected, is a brown sandy silty clay with a trace to some gravel. Tests for gradation were performed on three representative samples of the till and showed 5 to 14 percent gravel, 20 to 27 percent sand and 63 to 75 percent fines. The moisture content of the three samples tested ranged from 10.0 % to 13.1 %. Tests for Atterberg limits performed on two of

the samples, indicated a liquid limit of 22.4 to 24.9 and a plastic limit of 13.5 to 15 resulting in a plasticity index of 8.9 to 9.9. This indicates the fines are an inorganic clay of low plasticity.

Over most of the site, N-values from the SPT, below 1.5 m depth were 14 or greater, indicating the consistency of the till was very stiff. The boreholes in the southeast corner of the site however, boreholes BH 10, BH 11, BH 12 and BH 13, displayed N-values from the SPT, ranging from 7 to 13 below 1.5 m depth, indicating the consistency of the till was less and would be considered stiff. In borehole BH11, the lower N-values extended to 5.2 m depth.

## **5.2 Groundwater**

The depth to groundwater in each borehole is noted on the borehole logs. These were the depths noted in the open borehole. No stand pipes were installed for this investigation. The depth to ground water noted while advancing the boreholes ranged from 1.4 m depth in borehole BH 9 to 4.2 m in BH 7. Generally the groundwater was identified at a depth below ground surface ranging from 1.8 m to 2.4 m.

## **6.0 DISCUSSION AND RECOMMENDATIONS**

The stiff to very stiff native till would be suitable as a bearing stratum for foundations for the proposed structures

For foundation design, the following recommendations should be noted:

- perimeter footings should be founded at least 1.5 m below the final exterior finished grade for frost protection.
- interior column footings should be founded at least 0.6 m below finished slab elevation for confinement.

Foundations bearing on the undisturbed, very stiff till, or on an engineered fill bearing on the till at least 1.5 m below existing grade, over most of the site can be designed for an allowable bearing pressure of 150 KPa.

As indicated, in the southeast portion of the site, the consistency of the till was less, based on N-values from the SPT. The till in this area in the top 3 m depth would only be considered stiff. Examination of the samples from the boreholes in this area showed no obvious disruption of the fabric of the till that would indicate that it had been disturbed in previous development at the site. Some vegetative fibres or rootlets were however identified in samples up to 3 m depth in this area. Foundations bearing on the stiff till in the southeast portion of the site, 1.5 m to 3 m below existing grade, should be designed for a reduced allowable bearing pressure of 100 KPa. That is the area investigated by boreholes BH 10, BH 11, BH 12 and BH 13.

It should be noted that the allowable bearing capacities provided assume the buildings are being founded on level ground. If the structures are located on or near slopes, the bearing capacity of foundations may be reduced. This reduction in bearing capacity would depend on the angle of the slope and the proximity of the foundation to the face of slope.

The base of excavations to the design subgrade should all be inspected by an experienced geotechnical inspector to confirm the bearing stratum. Local areas which exhibit excessive displacement during proof-rolling should be over-excavated and backfilled in compacted lifts with approved structural fill to the satisfaction of the geotechnical inspector.

If used, an engineered fill should consist of a well-graded sand and gravel with less than 10 % fines. The granular fill should be placed in lifts, not to exceed 200 mm in compacted thickness. Each lift of fill should be compacted to 98% of the maximum dry density determined by the Standard Proctor test (ASTM D698), before placing the next lift of fill. The engineered fill should extend outside the foundation far enough to contain the 1 to1 splay below the edge of the footing.

A value of 25,000 kN/m<sup>3</sup> can be used for the modulus of sub-grade reaction for the design of the slab on grade. This assumes it will be constructed over a minimum thickness of 150 mm of compacted Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Type 1 Granular bearing on the approved proof-rolled till subgrade. The subgrade should be proof-rolled with a loaded tandem truck in the presence of the experienced geotechnical inspector.

The seismic site classification to govern the building design would be “Site Class D – Stiff Soil”.

## **6.1 Site Development**

The topsoil should be stripped from any areas to be developed for structures or traffic areas. It can be stock piled for use in landscaping in non-traffic areas.

If any temporary excavations exceeding 1.2 m depth are required for construction, a maximum temporary side slope of 1 : 1 (H : V) should be maintained on excavation walls in accordance with provincial Occupational Health and Safety Regulations.

Measures for erosion prevention and sedimentation control should be undertaken during construction to prevent sediments from being transported to natural water courses.

The ground surface around excavations should be graded to direct surface water flow away from the excavation. The base of excavations should be graded to drain to sumps, preferably located outside of the structure footprint. Any soil in the subgrade softened due to exposure to water, or frozen, should be removed before the placement of any backfill or concrete.

Due to its fine grained nature, the till will be difficult to work with in wet or freezing conditions. Placement of a mud mat over the approved subgrade is advised to prevent softening under construction traffic. If construction is performed during winter conditions, the subgrade for foundations should be prevented from freezing by insulation or heating.

It is anticipated that the control of water in excavations, due to perched groundwater or precipitation, should be able to be accomplished with standard de-watering techniques such as pumping from sumps and/or gravity drainage using diversion trenches.

Finished grades, on completion of construction, should direct surface water flow away from the structure.

It is recommended that vibratory compactors not be used on the till subgrade. The vibration during compaction increases the pore pressure in the till, resulting in softening of the subgrade. Roller



compactors should be used without vibration until a granular layer of sufficient thickness has been placed and compacted over the till subgrade.

## **6.2 Backfilling of Structure**

It is recommended that backfilling of perimeter foundation walls be placed alternating lifts on each side of the wall, to prevent unbalanced lateral pressure on the wall. Structural backfill should consist of well graded sand and gravel with less than 10% fines. The native till at the site is not suitable to be used as backfill for the foundations.

The granular backfill should be placed in lifts, not to exceed 200 mm in compacted thickness. Each lift of fill should be compacted to 98% of the maximum dry density determined by the Standard Proctor test (ASTM D698) before placing the next lift of fill.

If required for design, a unit weight of 21.5 kN per cubic metre can be used for the granular backfill. The coefficient of earth pressure at rest should be 0.44. The active pressure coefficient for lateral earth pressure should be 0.28. The passive earth pressure coefficient should be 3.55.

The coefficient of the resistance to sliding for mass concrete against the till would be 0.40. The coefficient of the resistance to sliding for mass concrete foundations against a well graded granular fill would be 0.55. The friction factor for formed concrete walls against the granular backfill would be 0.40.

## **6.3 Traffic Areas**

The in situ till at the site will provide a suitable subgrade for pavement structures in traffic areas.

After excavation to the design subgrade elevation, the surface of the till subgrade should be proof-rolled with a loaded tandem truck in the presence of the experienced geotechnical inspector. Any local areas which exhibit excessive displacement during proof-rolling should be over-excavated and backfilled in compacted lifts with approved structural fill to the satisfaction of the geotechnical inspector.

To extend the service life of pavement structures, a geosynthetic separator could be placed over the till prior to placing the granular fill. A non-woven needle punched geotextile would be best for this purpose.

It is assumed that the parking areas will be subjected primarily to light traffic, mainly passenger vehicles and light trucks with no heavy vehicles. In areas with only cars or light truck traffic a pavement structure design of 75 mm of asphalt concrete over 150 mm of granular base course and 300 mm of granular subbase should be adequate. This design takes into account the frost-susceptible nature of the till subgrade.

In areas of heavy truck traffic, such as lanes to loading docks, a pavement structure design of 75 mm of asphalt concrete over 250 mm of granular base course and 300 mm of granular subbase course is recommended.

Construction methods and materials should meet the Nova Scotia Transportation and Infrastructure Renewal (NSTIR) standard specifications. The asphalt concrete should be NSTIR Type C-HF with



PGAB 58-28 binder. The granular base course should consist of a clean, crushed sand and gravel aggregate such as the NSTIR Type 1 granular. The granular subbase course should consist of a clean, crushed sand and gravel aggregate such as the NSTIR Type 2.

In areas of stands for heavy trucks, or areas where shoving may occur due to tight turns by heavy trucks, the use of Portland cement concrete slabs could be considered for increased pavement strength.

The design of the traffic areas should include ditching or drains to keep water out of the pavement structure.

## **7.0 CLOSURE**

The above comments and recommendations are made in accordance with our present understanding of the project, and are based on the findings at the test locations described herein, which are a limited sampling of the site.

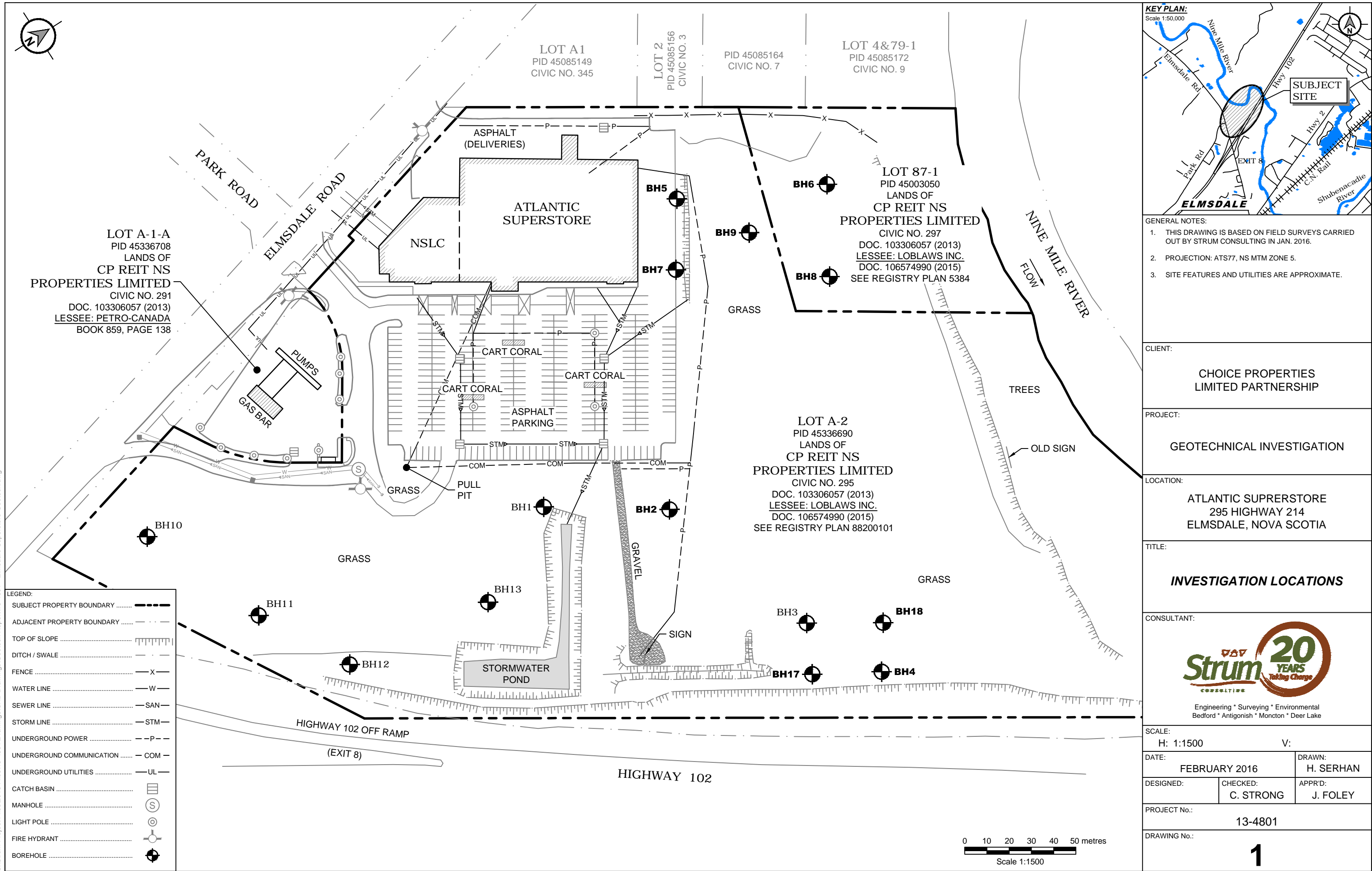
As indicated, the subsurface conditions between test locations may vary. Should any conditions at the site be encountered which differ from those described at the test locations, we request an opportunity to examine the site and review the recommendations presented in this report.

We trust that this geotechnical report satisfies your current requirements.

# **Appendix A**

## **Figure**

S:\Strum Project Files\2013 Files\13-4801\Drawings\Geotech Report\13-4801 - Elmsdale Superstore Geotech.dwg



## **Appendix B**

### **Borehole Logs**

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

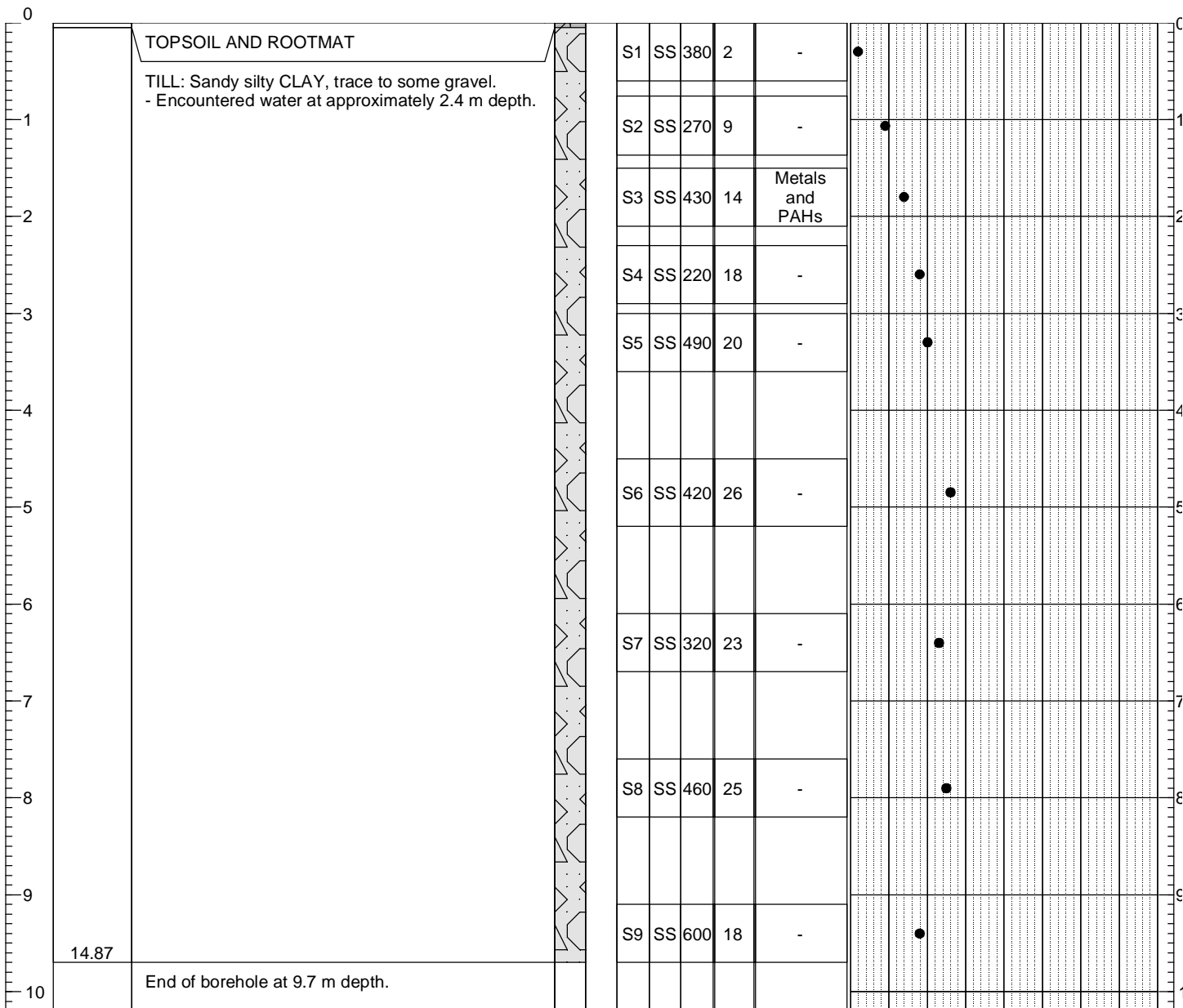
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**WATER LEVEL DATE:** -

**DRILLING METHOD:** Auger

**ELEVATION DATUM:** Geodetic

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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

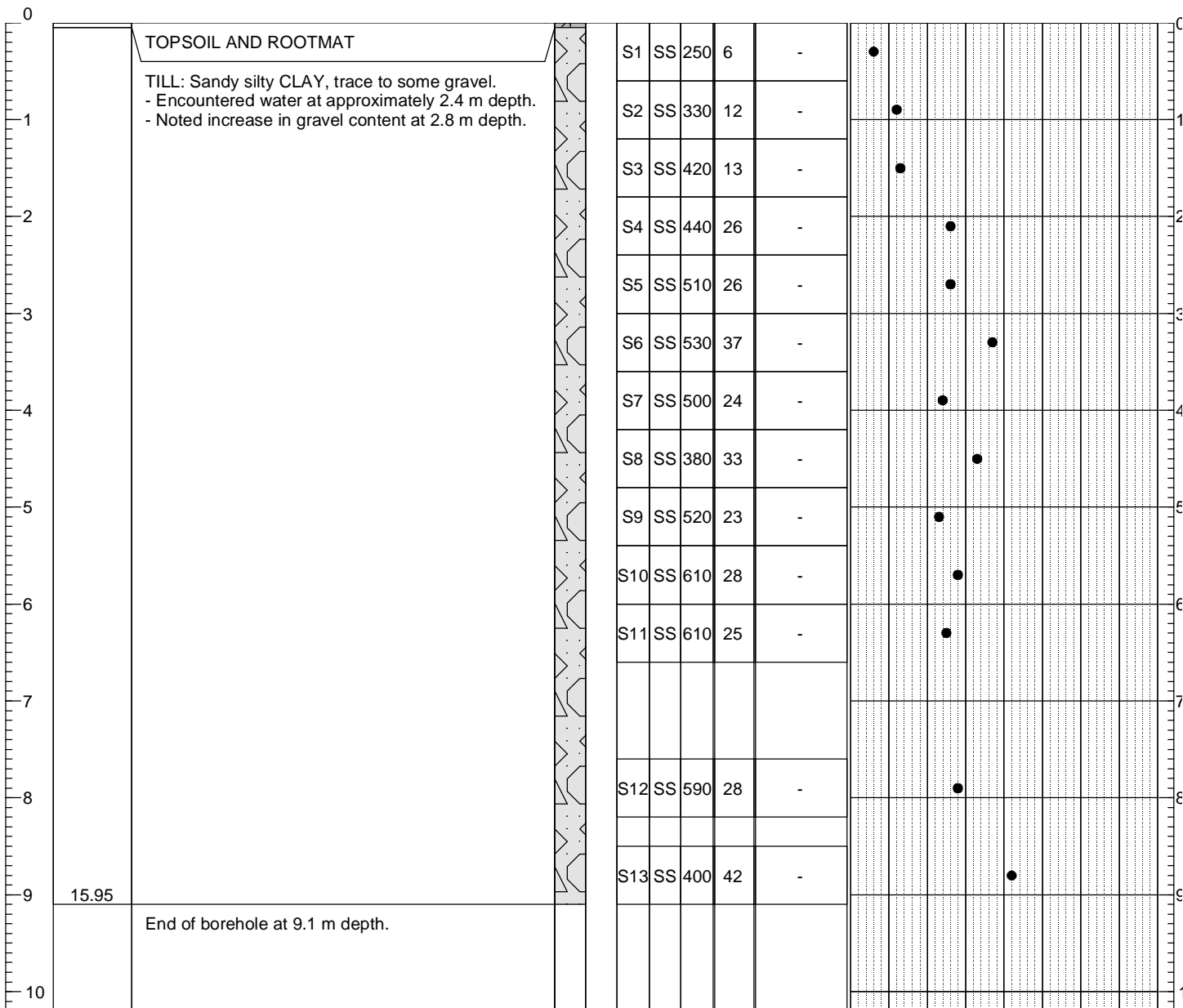
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**WATER LEVEL DATE:** -

**DRILLING METHOD:** Auger

**ELEVATION DATUM:** Geodetic

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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

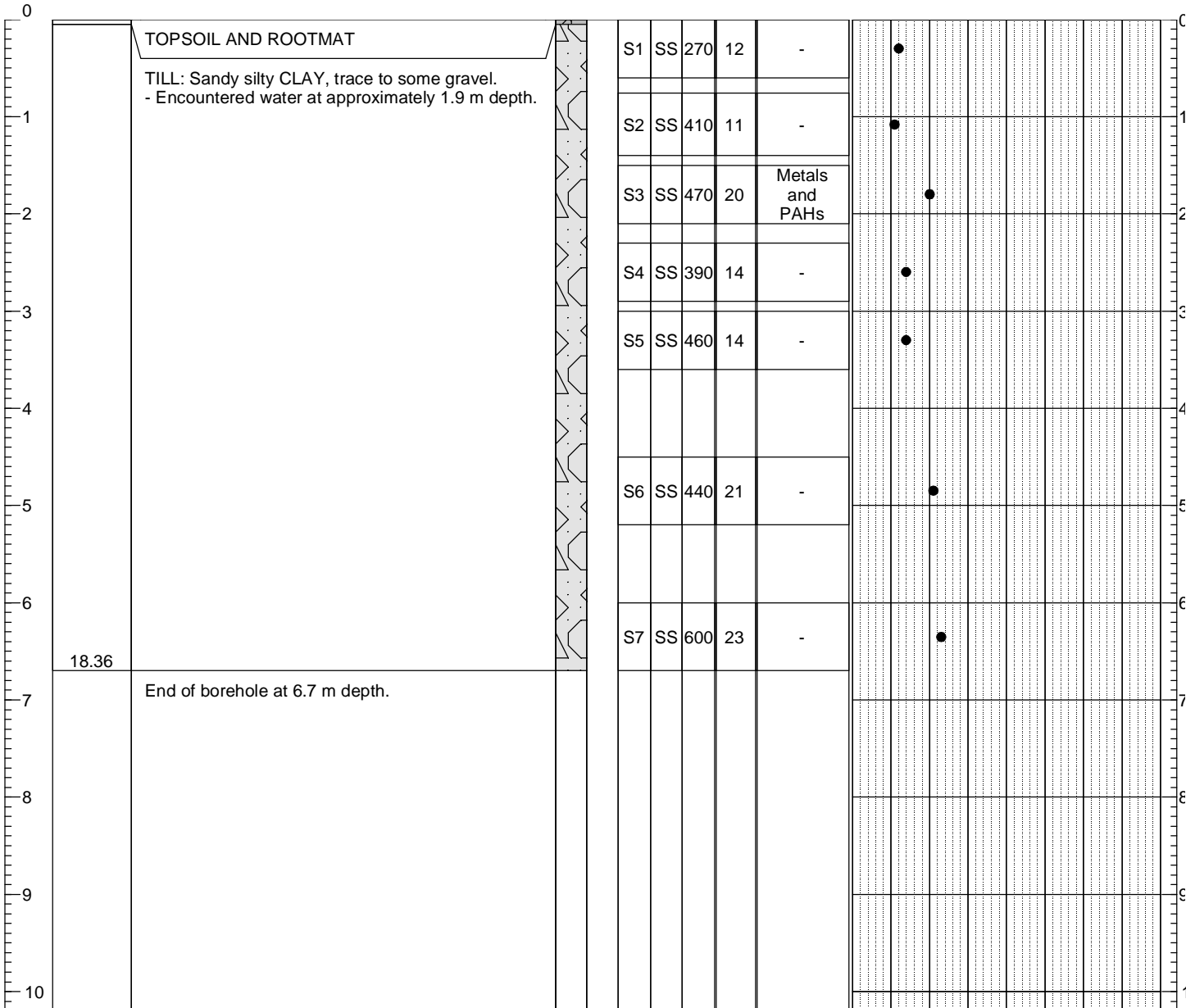
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801



**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

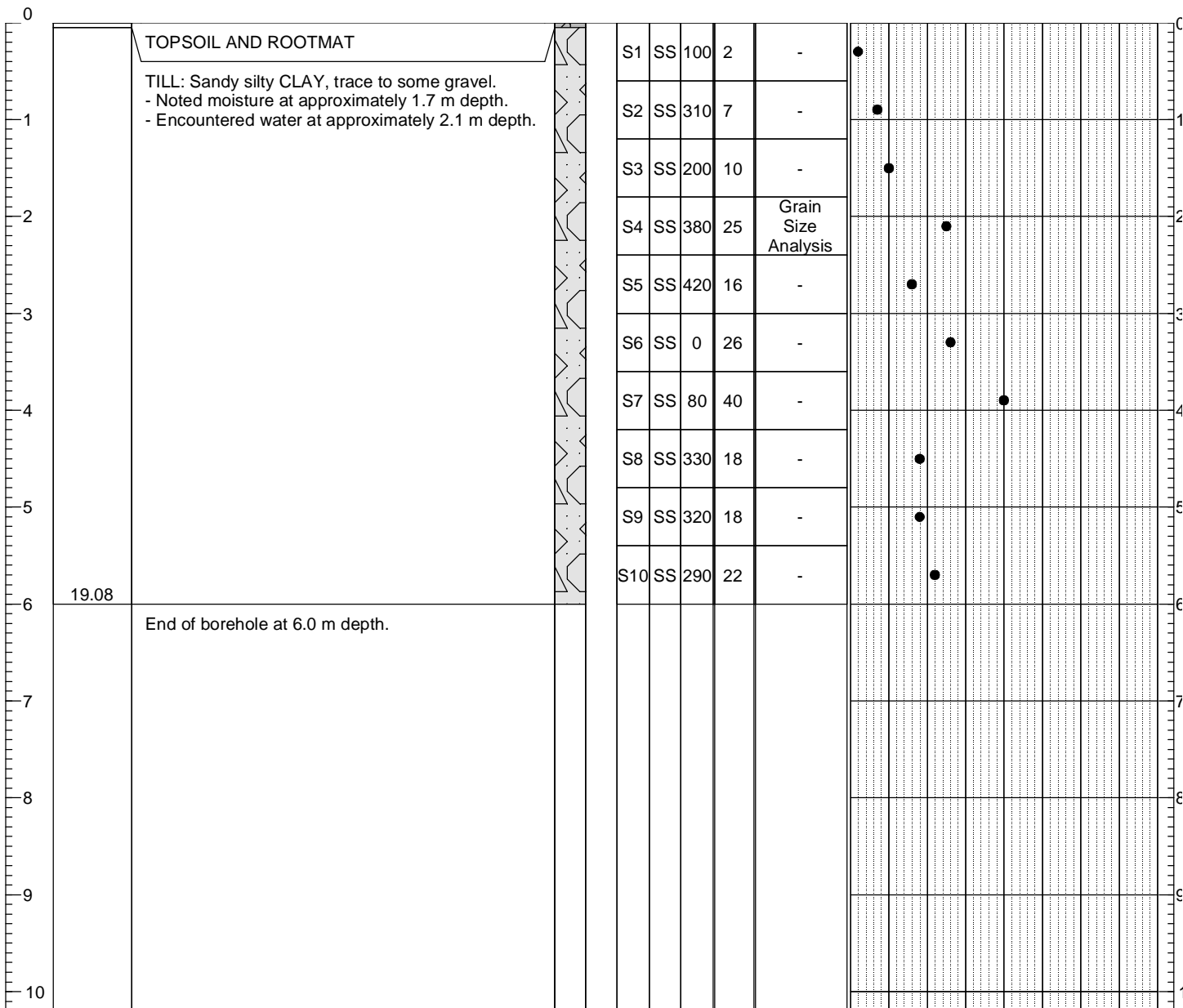
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

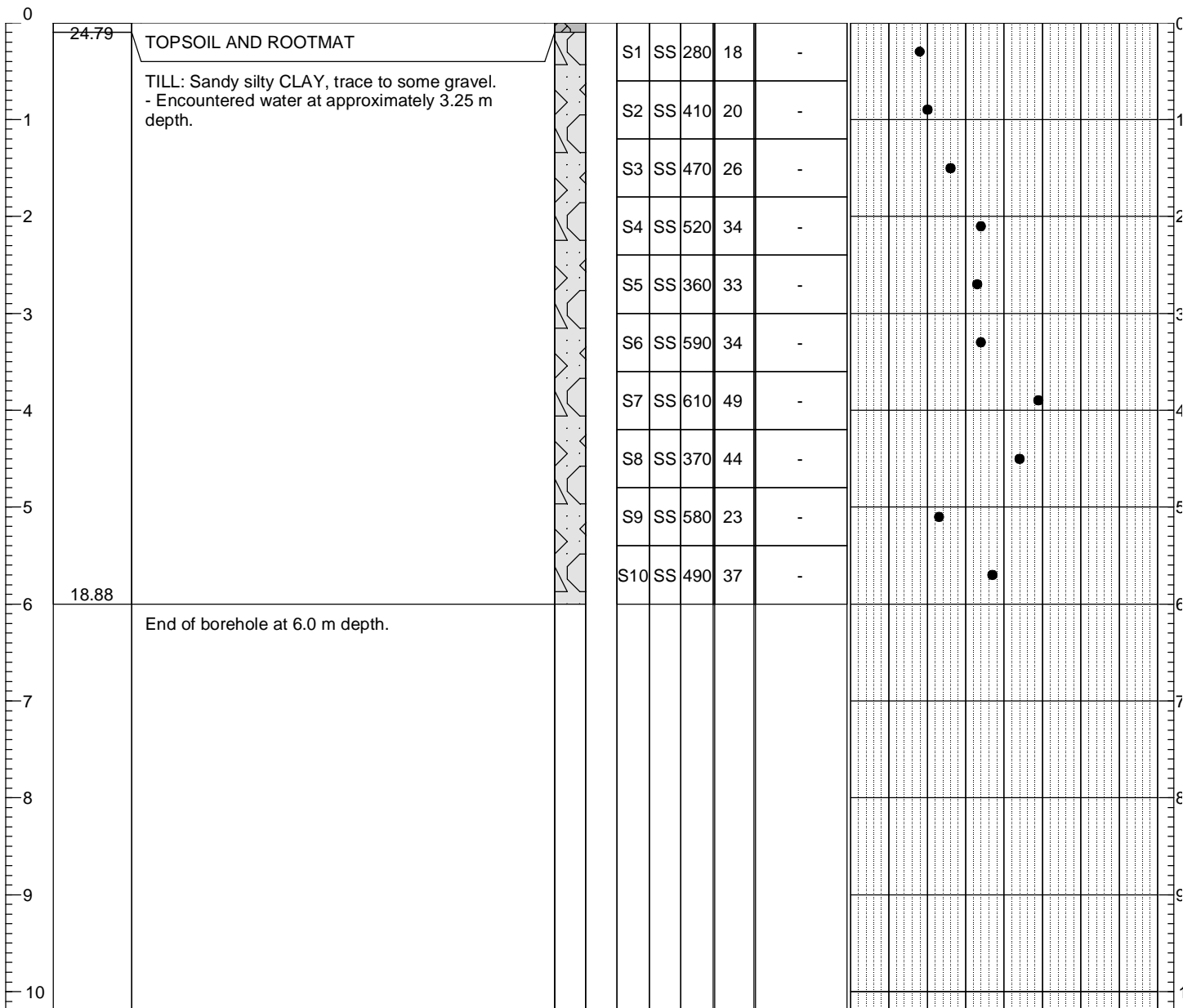
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**LOGGED BY:** Corey Strong

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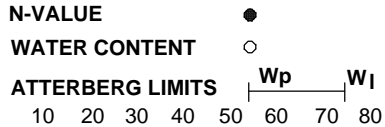
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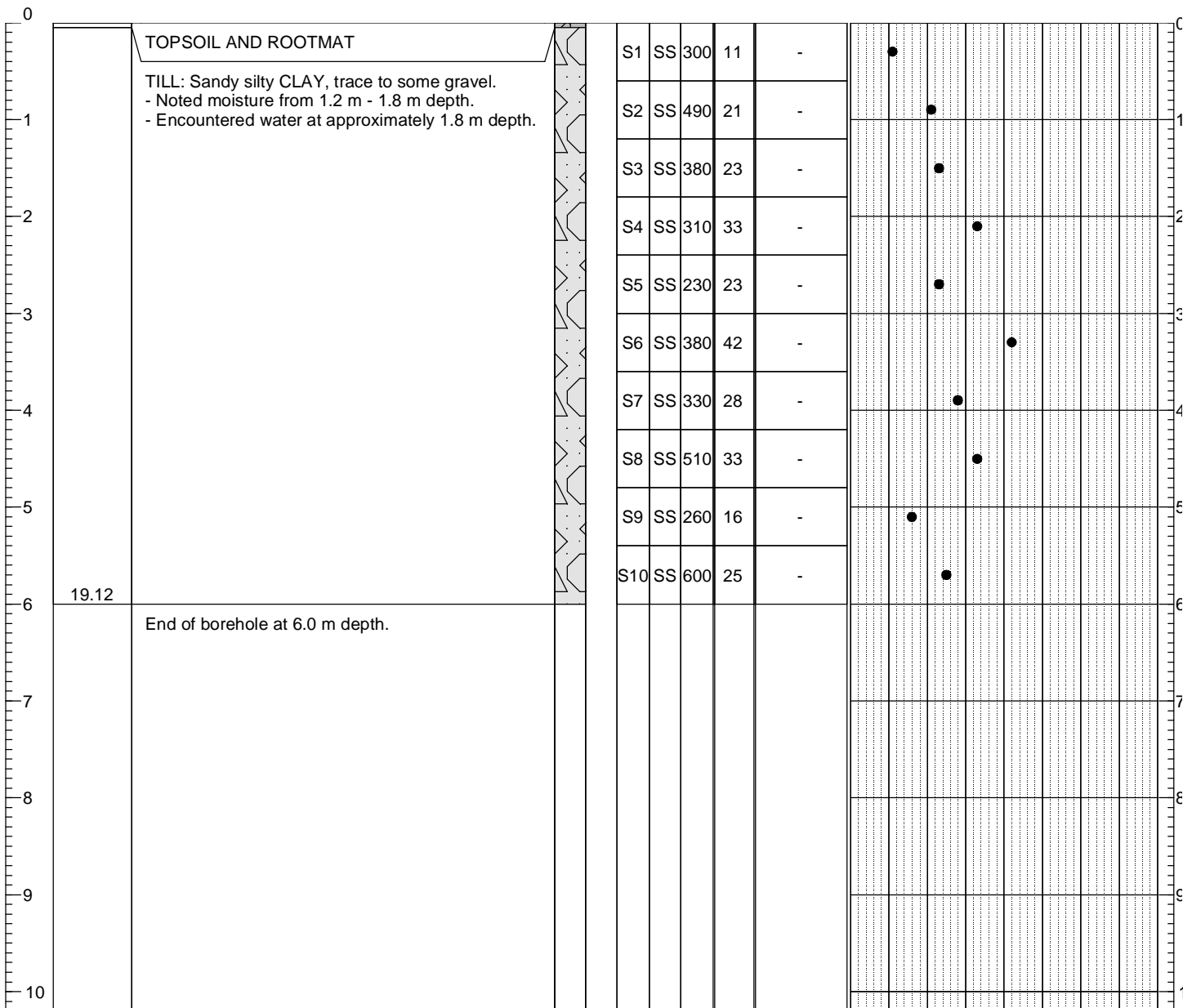
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**WATER LEVEL DATE:** -

**DRILLING METHOD:** Auger

**ELEVATION DATUM:** Geodetic

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**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

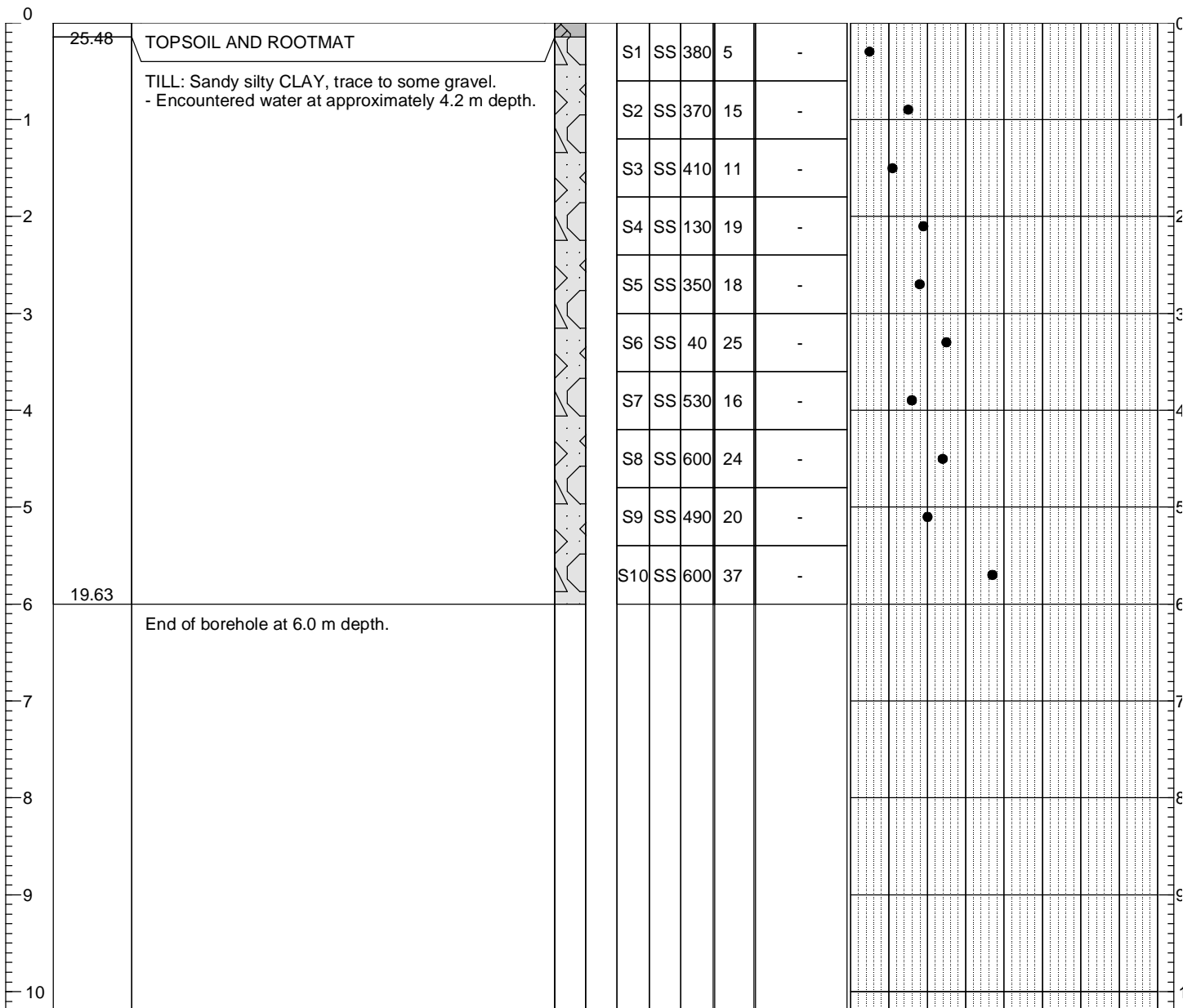
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**PROJECT NUMBER:** 13-4801

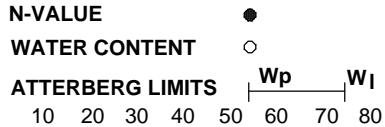
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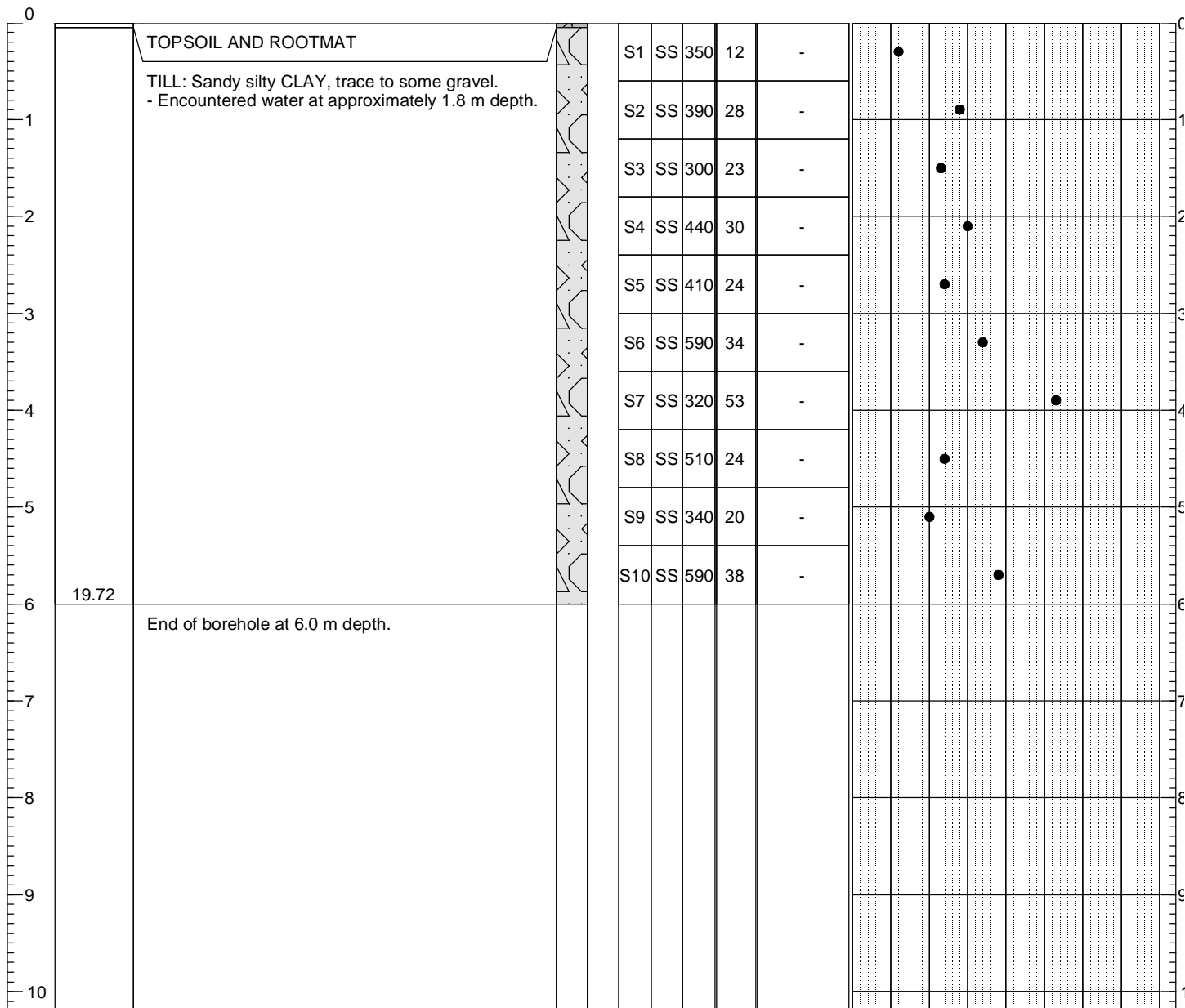
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

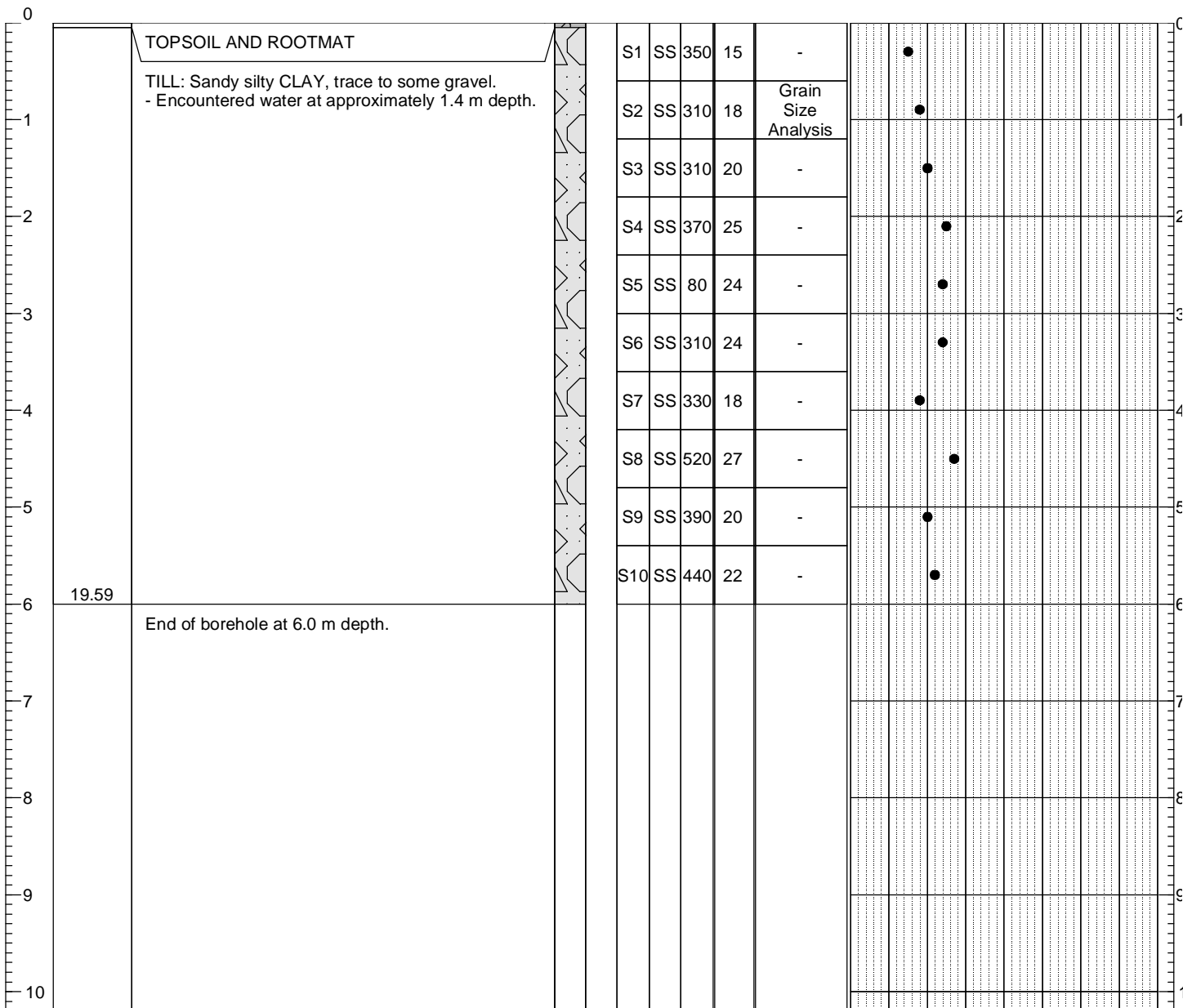
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

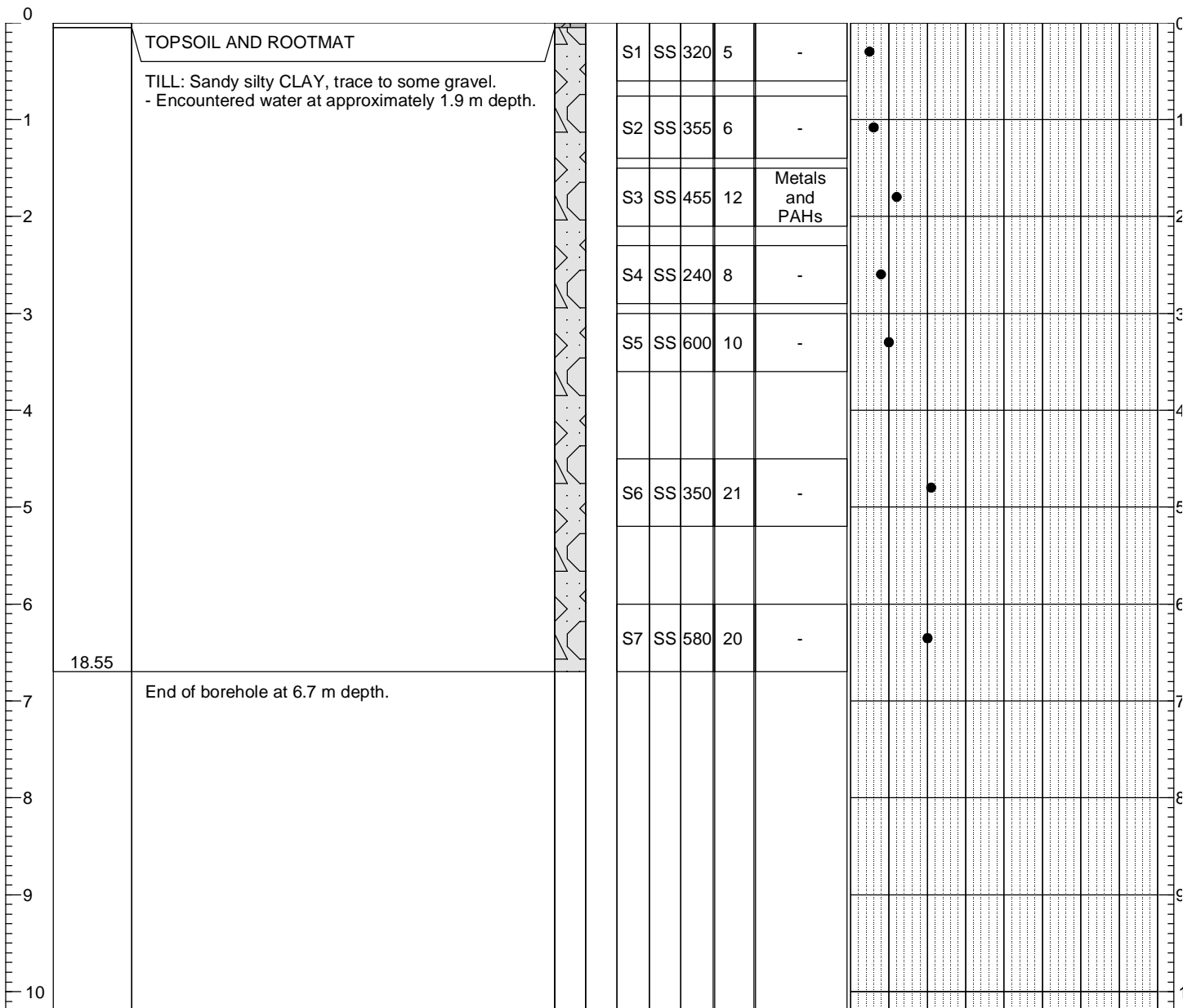
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801



**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

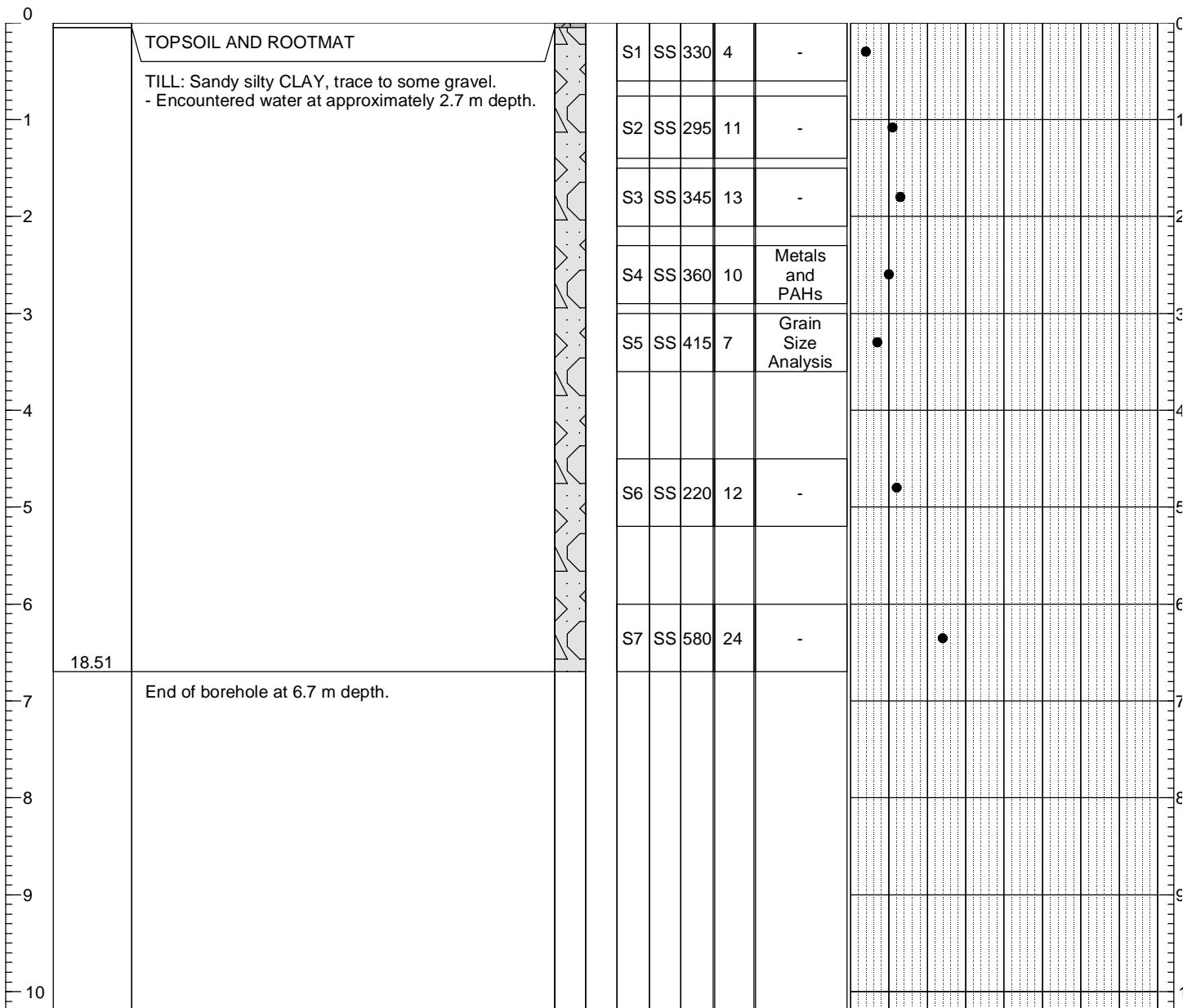
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

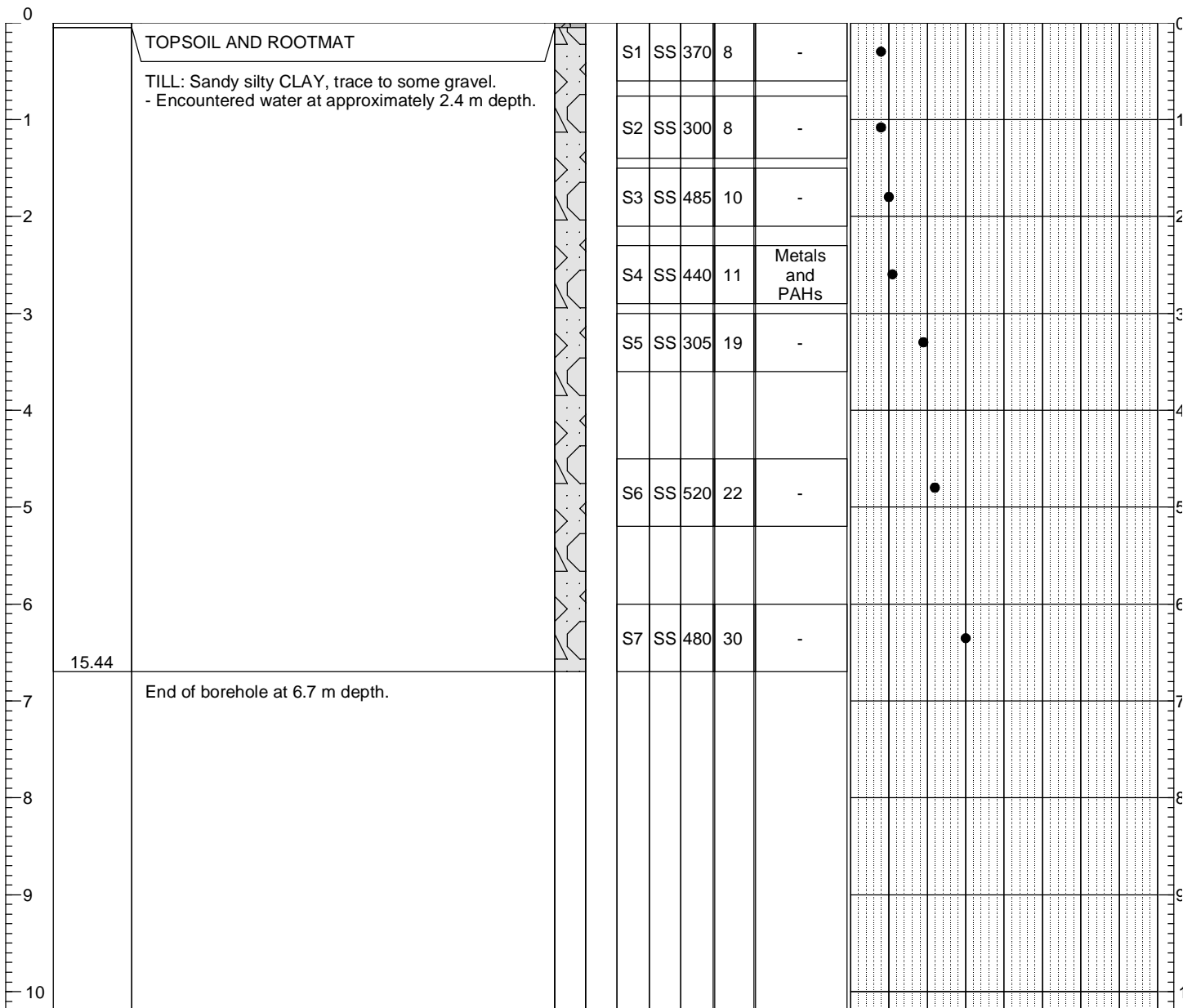
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**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

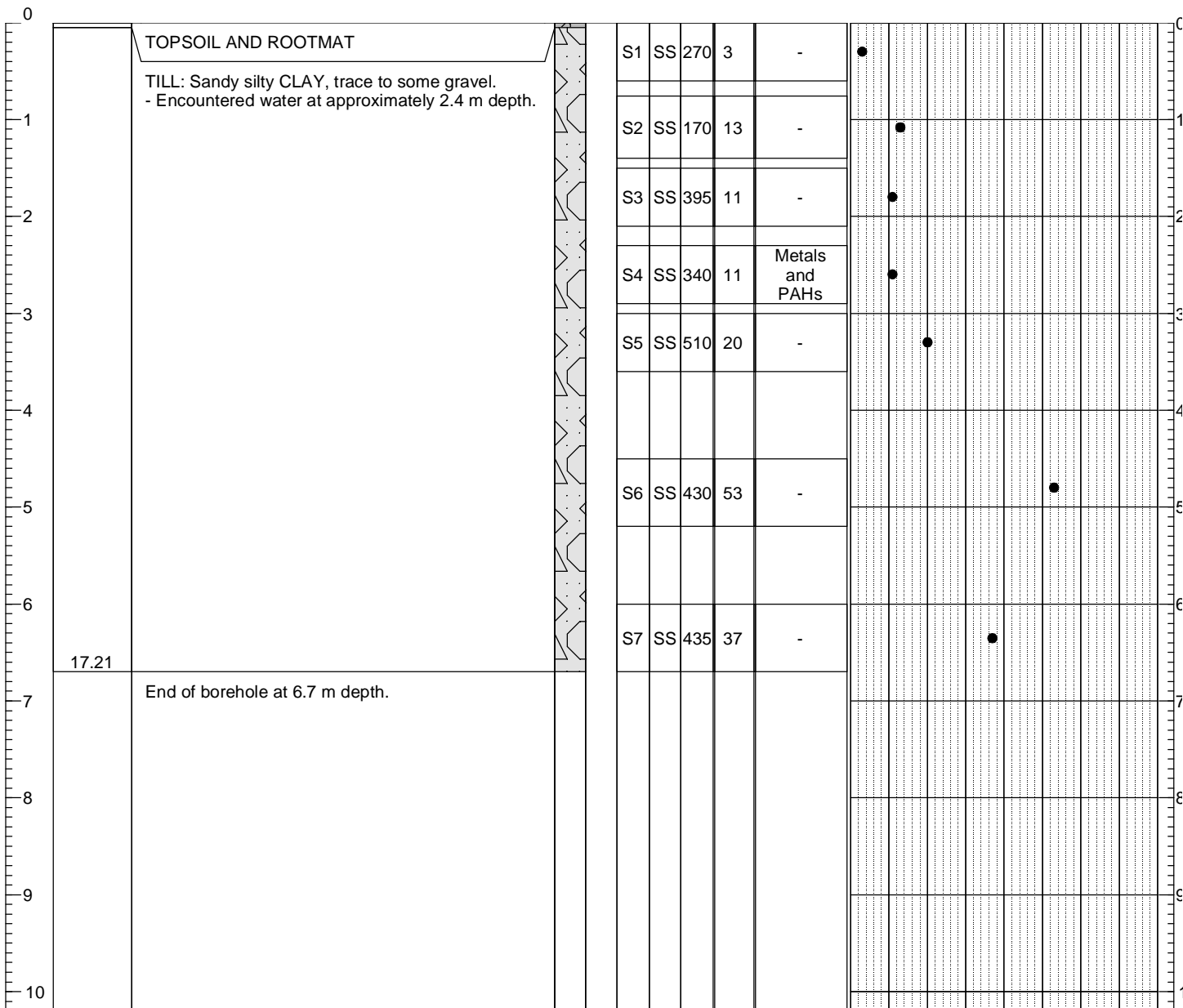
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**DRILLING METHOD:** Auger

**ELEVATION DATUM:** Geodetic

DEPTH (m)	ELEV. (m)	SOIL DESCRIPTION	STRATA	WATER LEVEL	SAMPLES				PLOT OF RESULTS			
					NUMBER	TYPE	RECOVERY (mm)	N-VALUE RQD	ANALYSIS	N-VALUE	WATER CONTENT	ATTERBERG LIMITS
	23.90											



**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

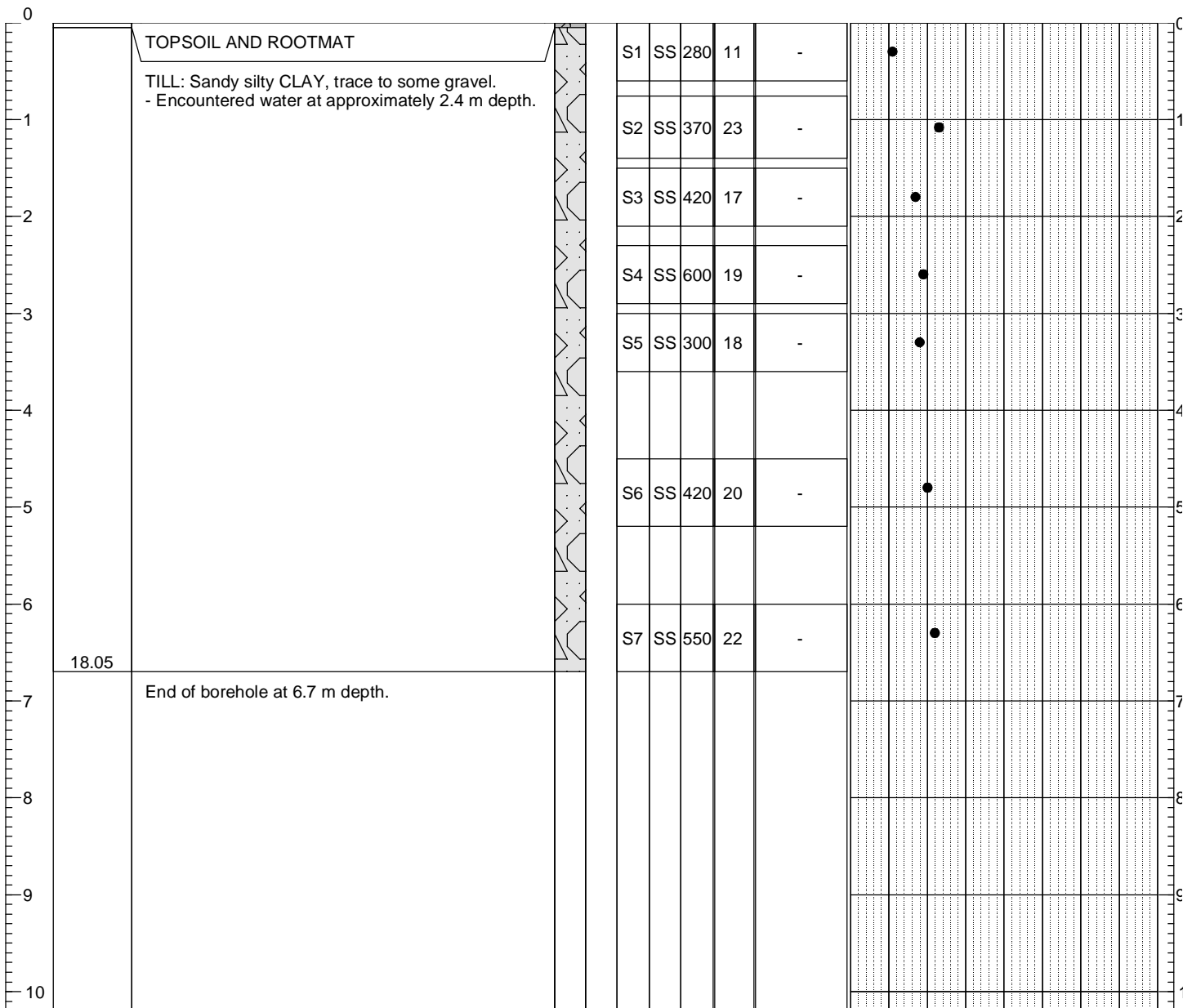
**DRILLING DATE:** February 2, 2016

**WATER LEVEL DATE:** -

**DRILLING METHOD:** Auger

**ELEVATION DATUM:** Geodetic

DEPTH (m)	ELEV. (m)	SOIL DESCRIPTION	STRATA	WATER LEVEL	SAMPLES				PLOT OF RESULTS			
					NUMBER	TYPE	RECOVERY (mm)	N-VALUE RQD	ANALYSIS	N-VALUE	WATER CONTENT	ATTERBERG LIMITS
	24.75											



**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

**PROJECT:** Atlantic Superstore, Elmsdale, NS (PIDs 45336690 & 45003050)

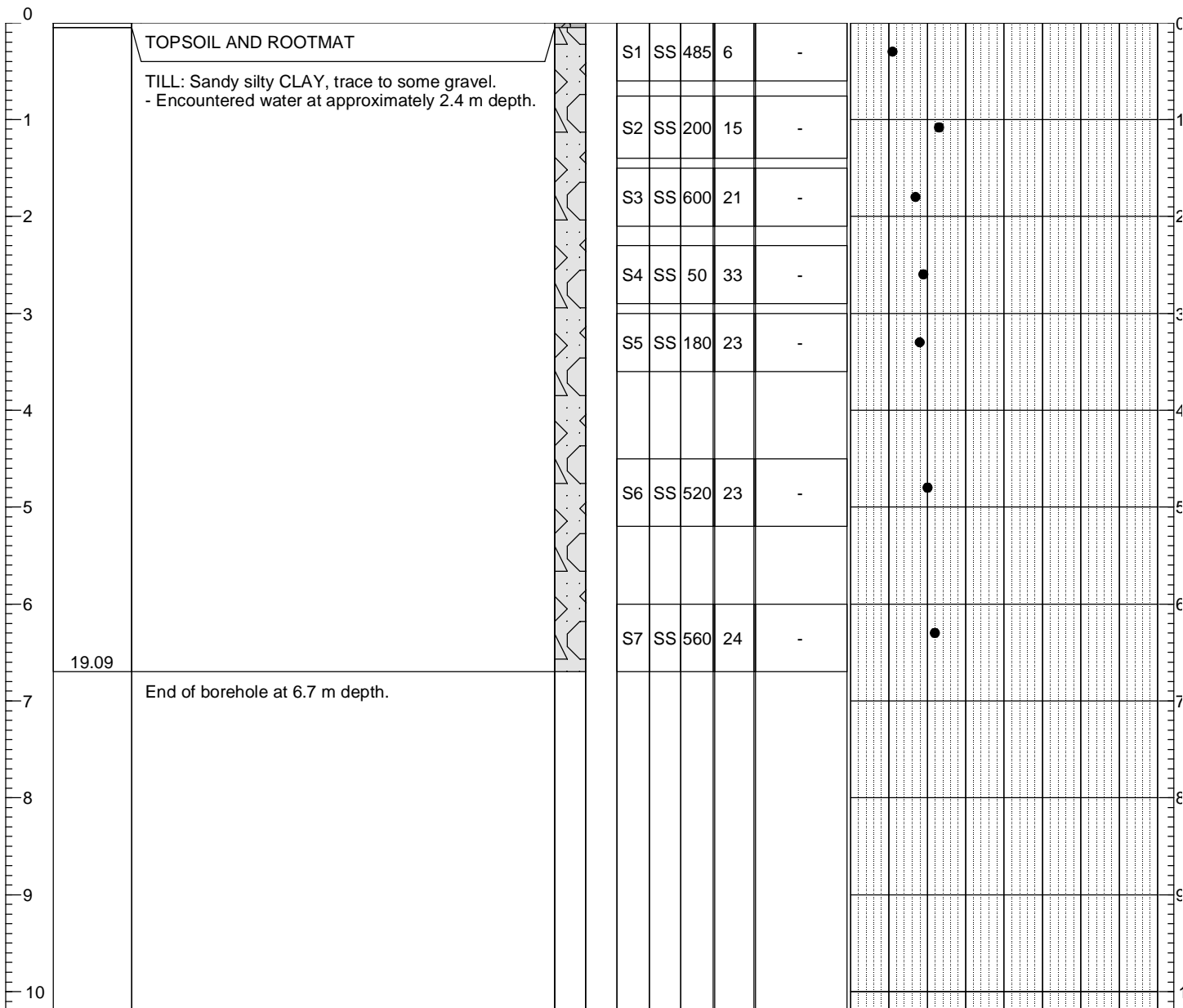
**DRILLING DATE:** February 2, 2016

**WATER LEVEL DATE:** -

**DRILLING METHOD:** Auger

**ELEVATION DATUM:** Geodetic

DEPTH (m)	ELEV. (m)	SOIL DESCRIPTION	STRATA	WATER LEVEL	SAMPLES				PLOT OF RESULTS			
					NUMBER	TYPE	RECOVERY (mm)	N-VALUE RQD	ANALYSIS	N-VALUE	WATER CONTENT	ATTERBERG LIMITS
	25.79											



**LOGGED BY:** Corey Strong

**PROJECT NUMBER:** 13-4801

## **Appendix C**

### **Lab Test Results**

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

**Client:**

Strum Consulting  
Raiside, 1355 Bedford Highway  
Bedford, Nova Scotia  
B4A 1C5

**Our Project No:** 21294

**Client Contract No.:** 15-5343

**Client PO.:**

**CC:**

**Attn:** Corey Strong

**PHONE** (902) 835-5560

**FAX:**

**Project:** General Lab Testing

**Source:** BH #4

**Sample No:** S4

**Location:**

**Date Sampled:**

**Sampled by:** Client

**Date Received:** 05-Feb-16

**Date Tested:** 11-Feb-16

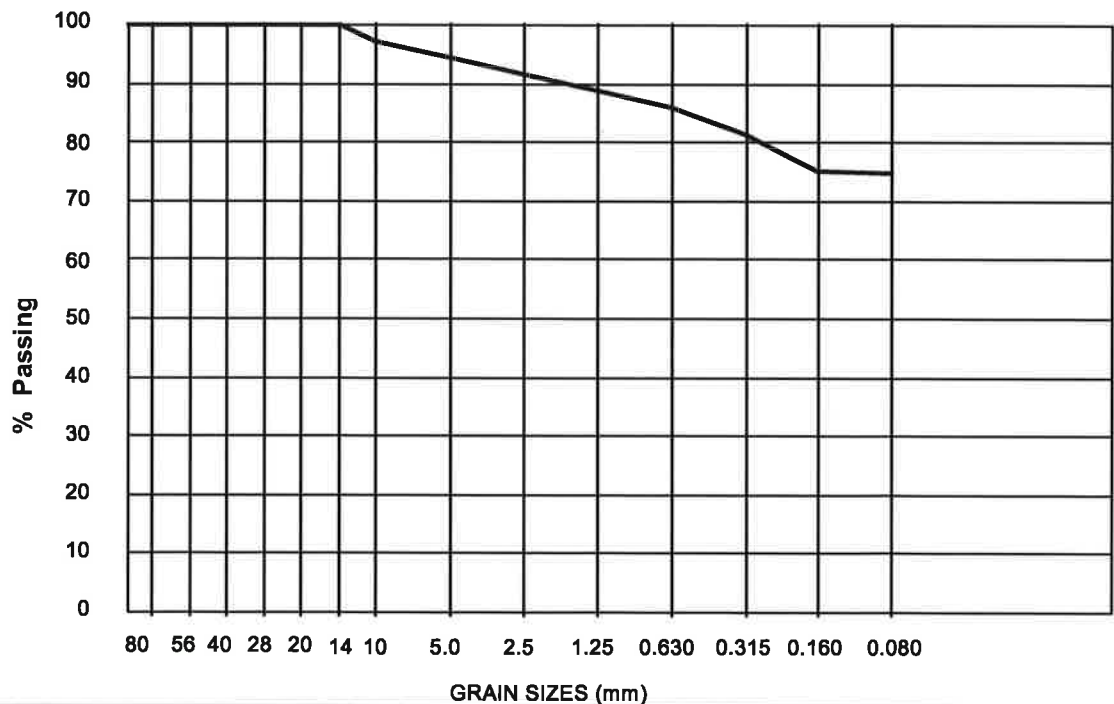
### PHYSICAL PROPERTY TESTS

Soil Type		Liquid Limit	24.9	Flat and Elongated Particles, %	
Gravel, %	5	Plastic Limit	15	Coarse Spec. Gravity	
Sand, %	20	Plasticity Index	9.9	Fractured Faces, %	
Silt and Clay, %	75	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	13.1	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28		
20		
14	100	
10	97	
5.0	95	
2.5	91	
1.25	89	
0.630	86	
0.315	81	
0.160	75	
0.080	74.8	

### GRAIN SIZE CURVE

**Spec Band**  
**NO SPEC**



**Comments:**

Record No: 9838

Englobe Tech: JA

PER



CERTIFIED LABORATORY  
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Richard Henry



97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

**Client:**

Strum Consulting  
Raiside, 1355 Bedford Highway  
Bedford, Nova Scotia  
B4A 1C5

**Our Project No:** 21294

**Client Contract No.:** 15-5343

**Client PO.:**

**CC:**

**Attn:** Corey Strong

**PHONE** (902) 835-5560

**FAX:**

**Project:** General Lab Testing

**Source:** BH #9

**Sample No:** S2

**Location:**

**Date Sampled:**

**Sampled by:** Client

**Date Received:** 05-Feb-16

**Date Tested:** 11-Feb-16

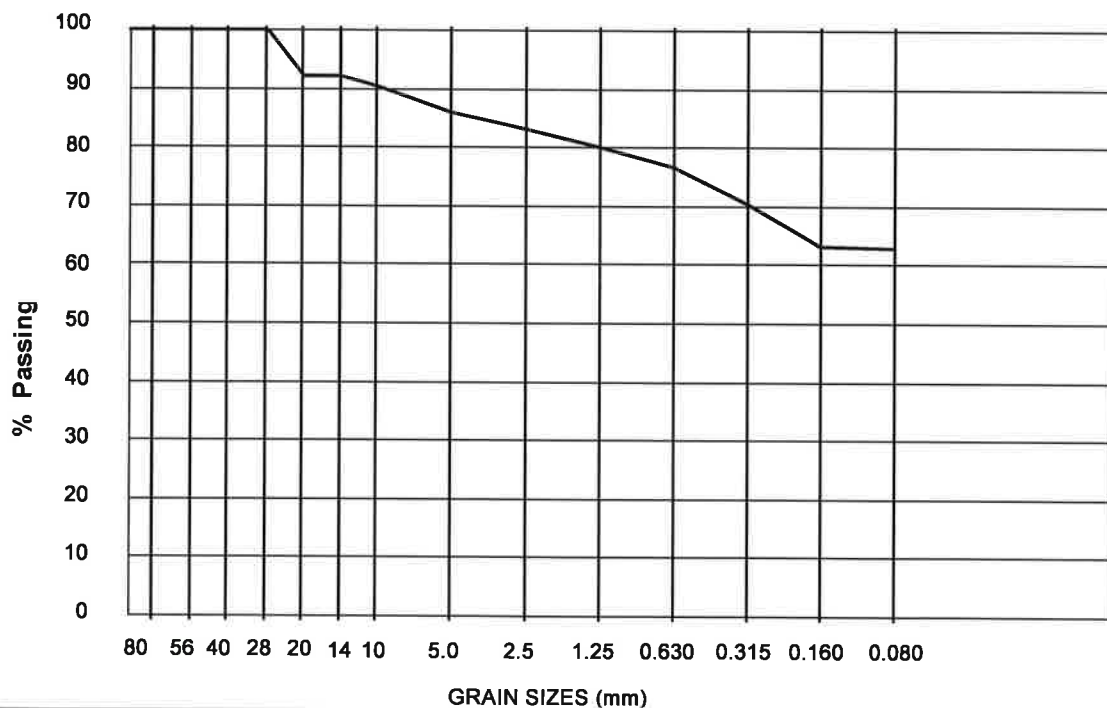
## PHYSICAL PROPERTY TESTS

Soil Type		Liquid Limit	22.4	Flat and Elongated Particles, %	
Gravel, %	14	Plastic Limit	13.5	Coarse Spec. Gravity	
Sand, %	23	Plasticity Index	8.9	Fractured Faces, %	
Silt and Clay, %	63	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	10	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28	100	
20	92	
14	92	
10	90	
5.0	86	
2.5	83	
1.25	80	
0.630	77	
0.315	71	
0.160	63	
0.080	63.0	

## GRAIN SIZE CURVE

**Spec Band**  
**NO SPEC**



**Comments:**

Record No: 9839

Englobe Tech: JA

PER



CERTIFIED LABORATORY  
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Richard Henry

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

**Client:**

Strum Consulting  
Railside, 1355 Bedford Highway  
Bedford, Nova Scotia  
B4A 1C5

**Our Project No:** 21294

**Client Contract No.:** 15-5343

**Client PO.:**

**CC:**

**Attn:** Corey Strong

**PHONE** (902) 835-5560

**FAX:**

**Project:** General Lab Testing

**Source:** BH 11

**Sample No:** S5

**Location:**

**Date Sampled:**

**Sampled by:** Client

**Date Received:** 05-Feb-16

**Date Tested:** 11-Feb-16

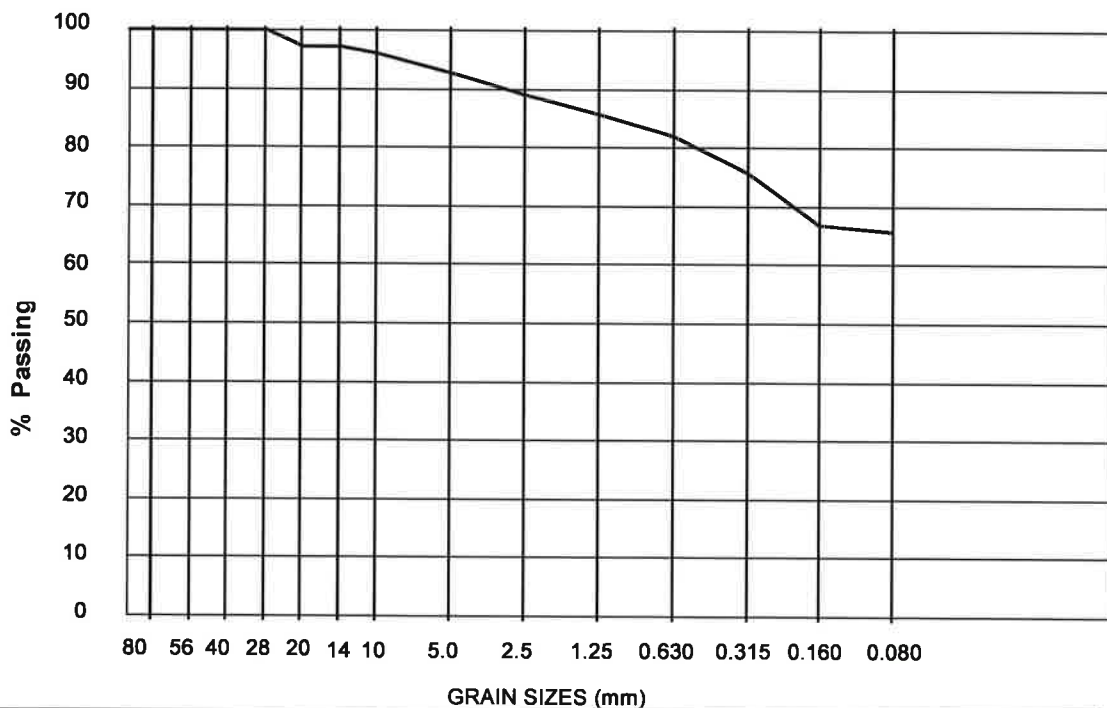
## PHYSICAL PROPERTY TESTS

Soil Type		Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	7	Plastic Limit		Coarse Spec. Gravity	
Sand, %	27	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	66	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	12.5	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28	100	
20	97	
14	97	
10	96	
5.0	93	
2.5	89	
1.25	86	
0.630	82	
0.315	76	
0.160	67	
0.080	65.7	

## GRAIN SIZE CURVE

**Spec Band**  
**NO SPEC**



**Comments:**

Record No: 9837

Englobe Tech: JA

PER



CERTIFIED LABORATORY  
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Richard Henry