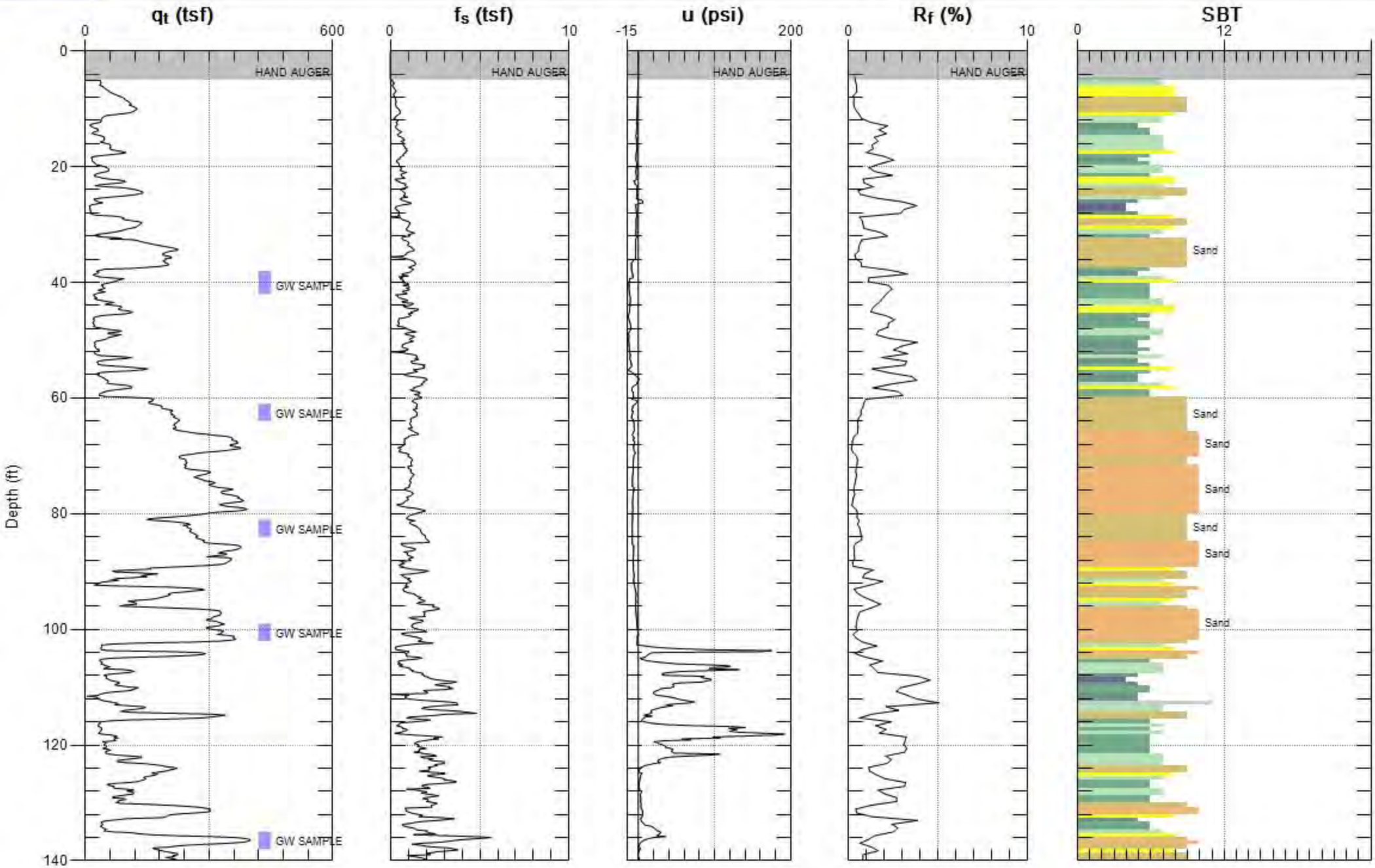
APPENDIX B

CPT, Boring, and Well Installation Logs

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-03

Engineer: D.GRUBER
Date: 3/13/2013 07:32



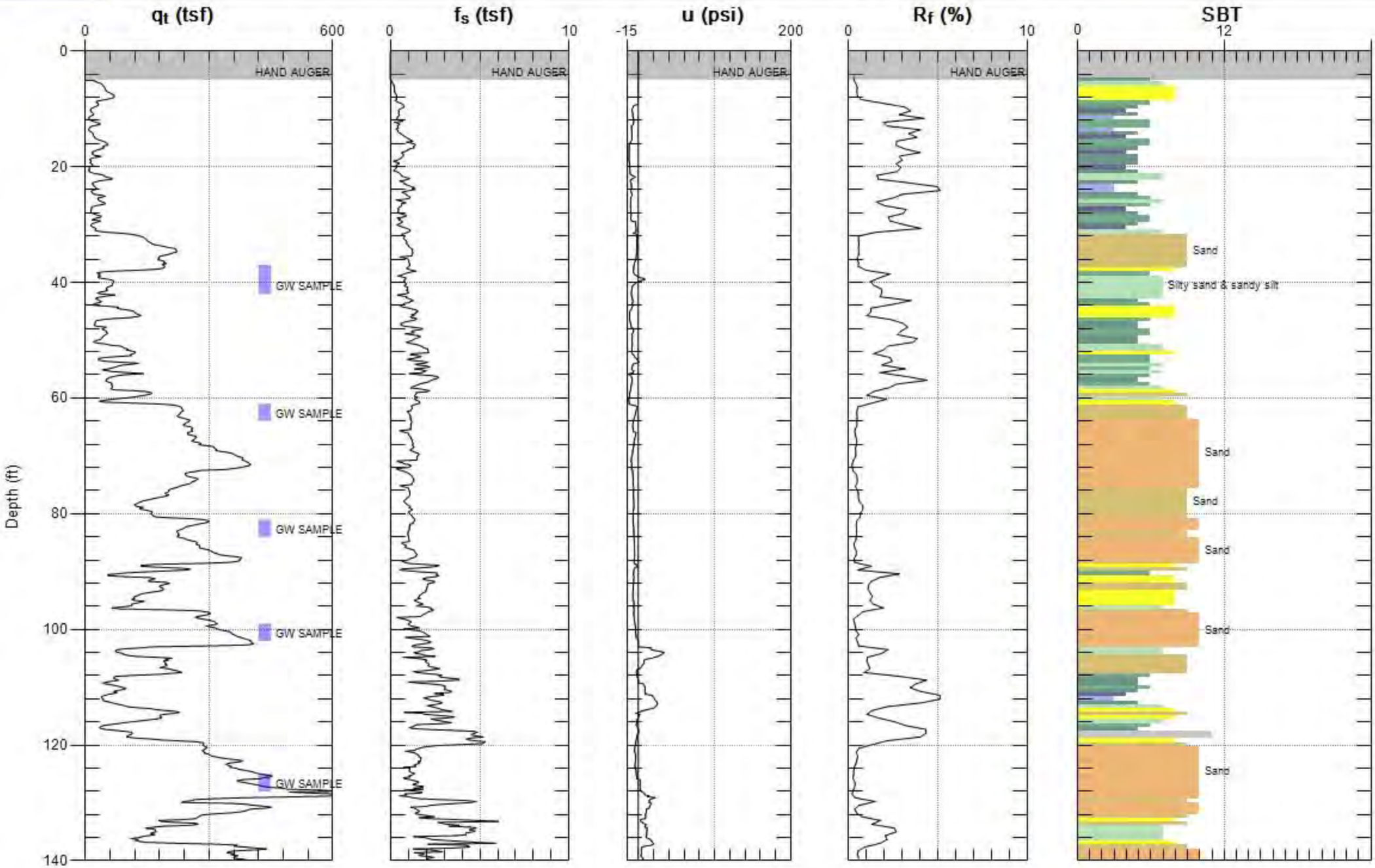
Max. Depth: 140.584 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-04

Engineer: D.GRUBER
Date: 3/14/2013 07:33



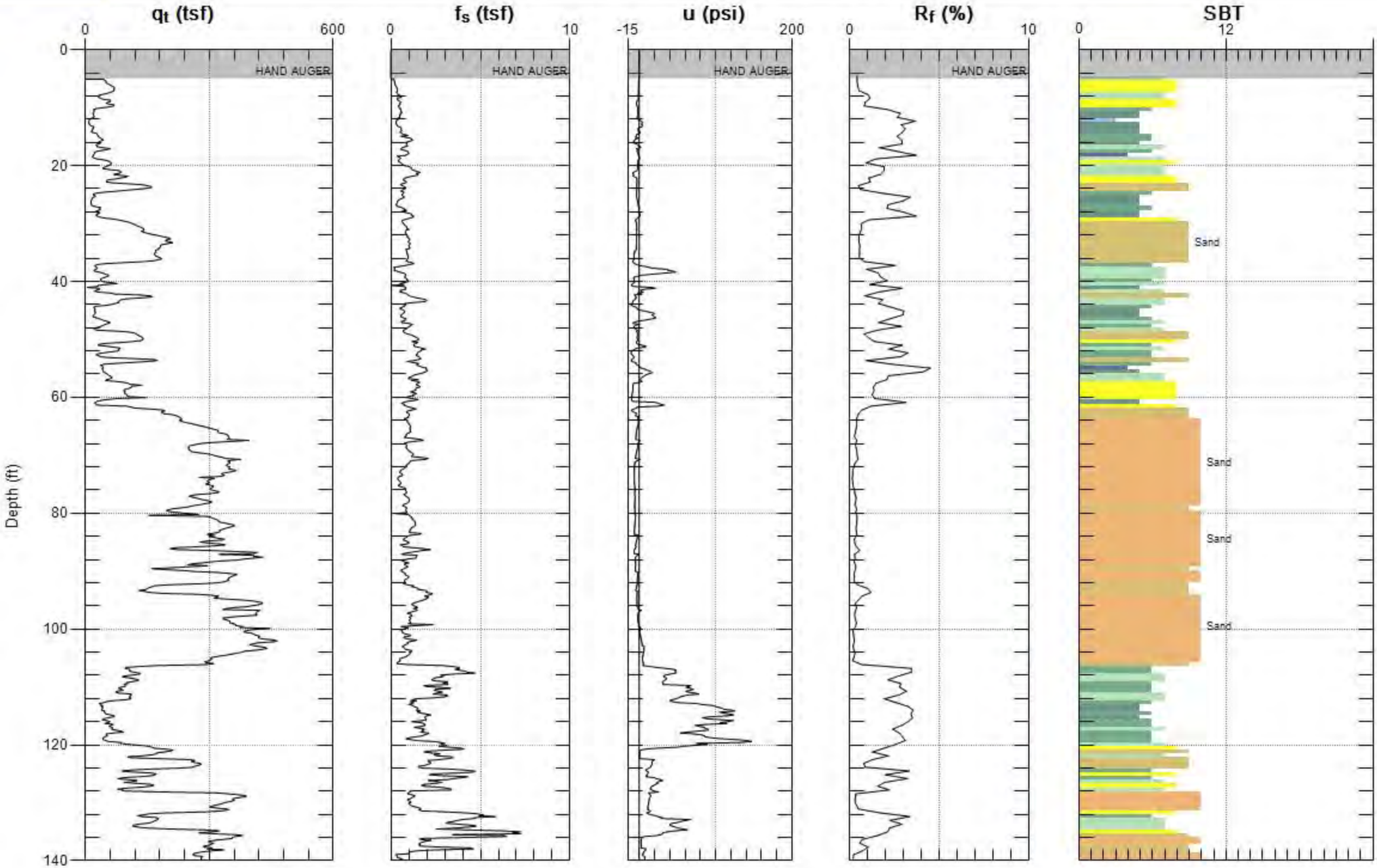
Max. Depth: 140.256 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-5

Engineer: D.GRUBER
Date: 3/4/2013 10:10



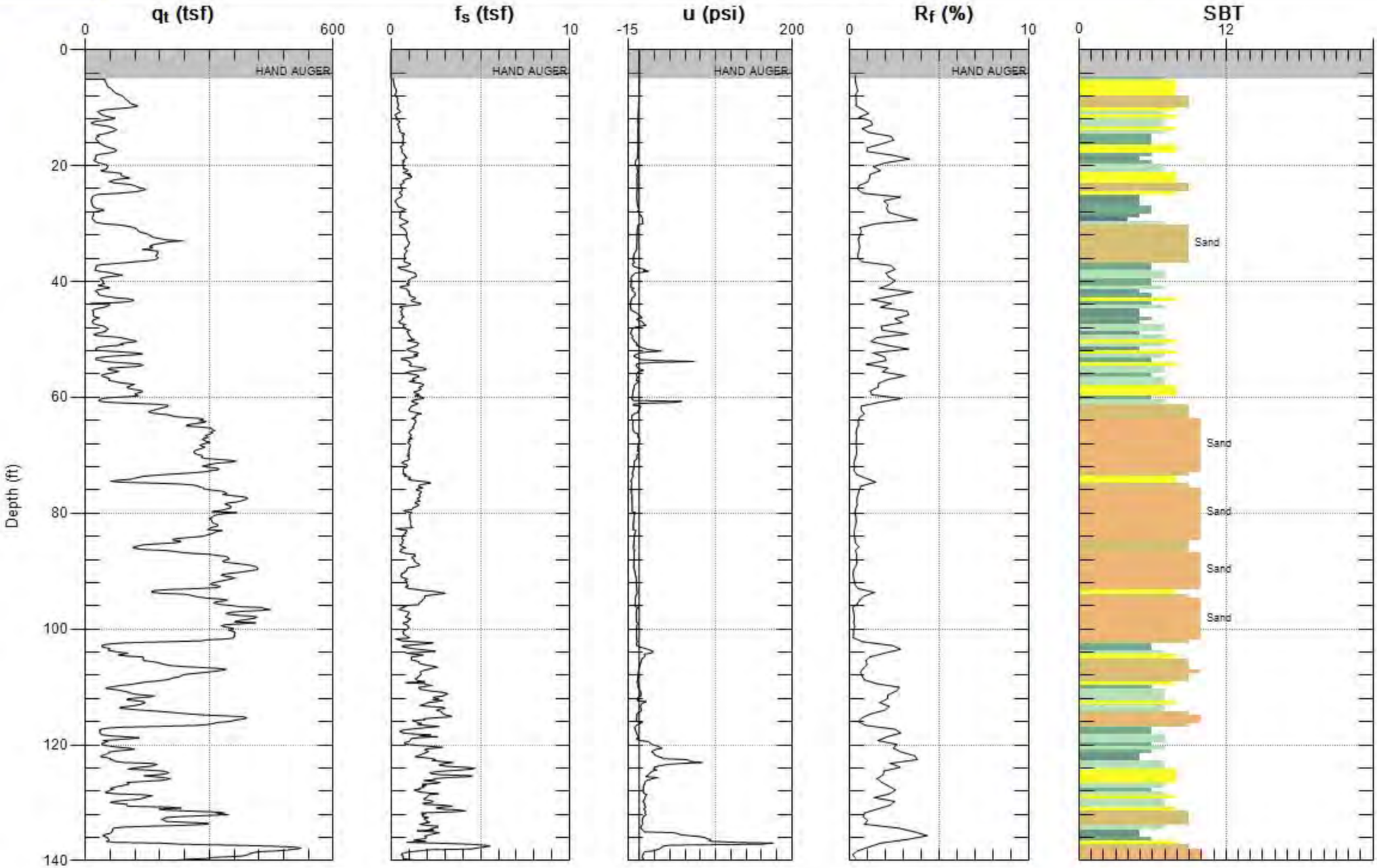
Max. Depth: 140.420 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-6

Engineer: D.GRUBER
Date: 3/7/2013 01:52



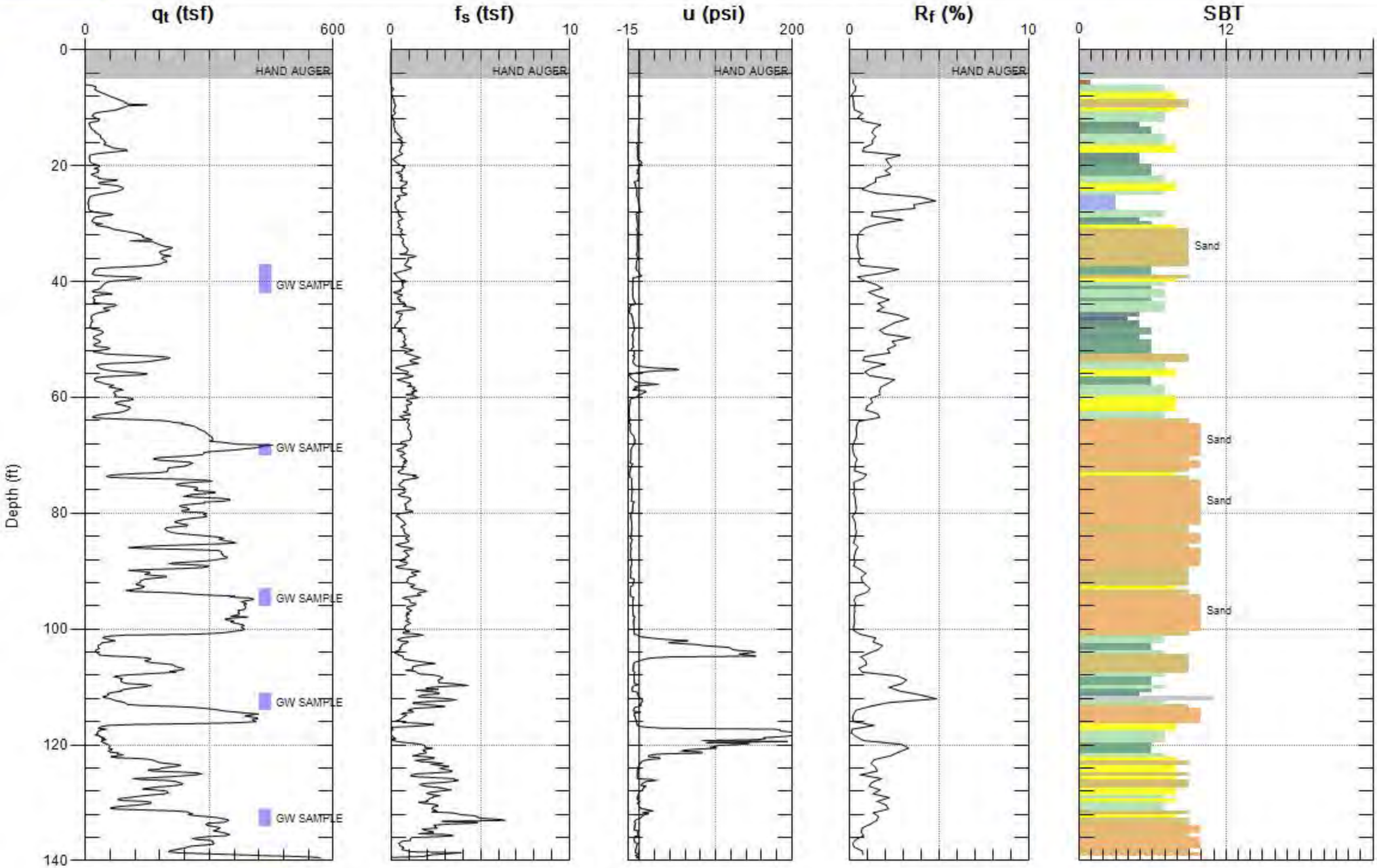
Max. Depth: 140.420 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-7

Engineer: D.GRUBER
Date: 2/25/2013 12:06



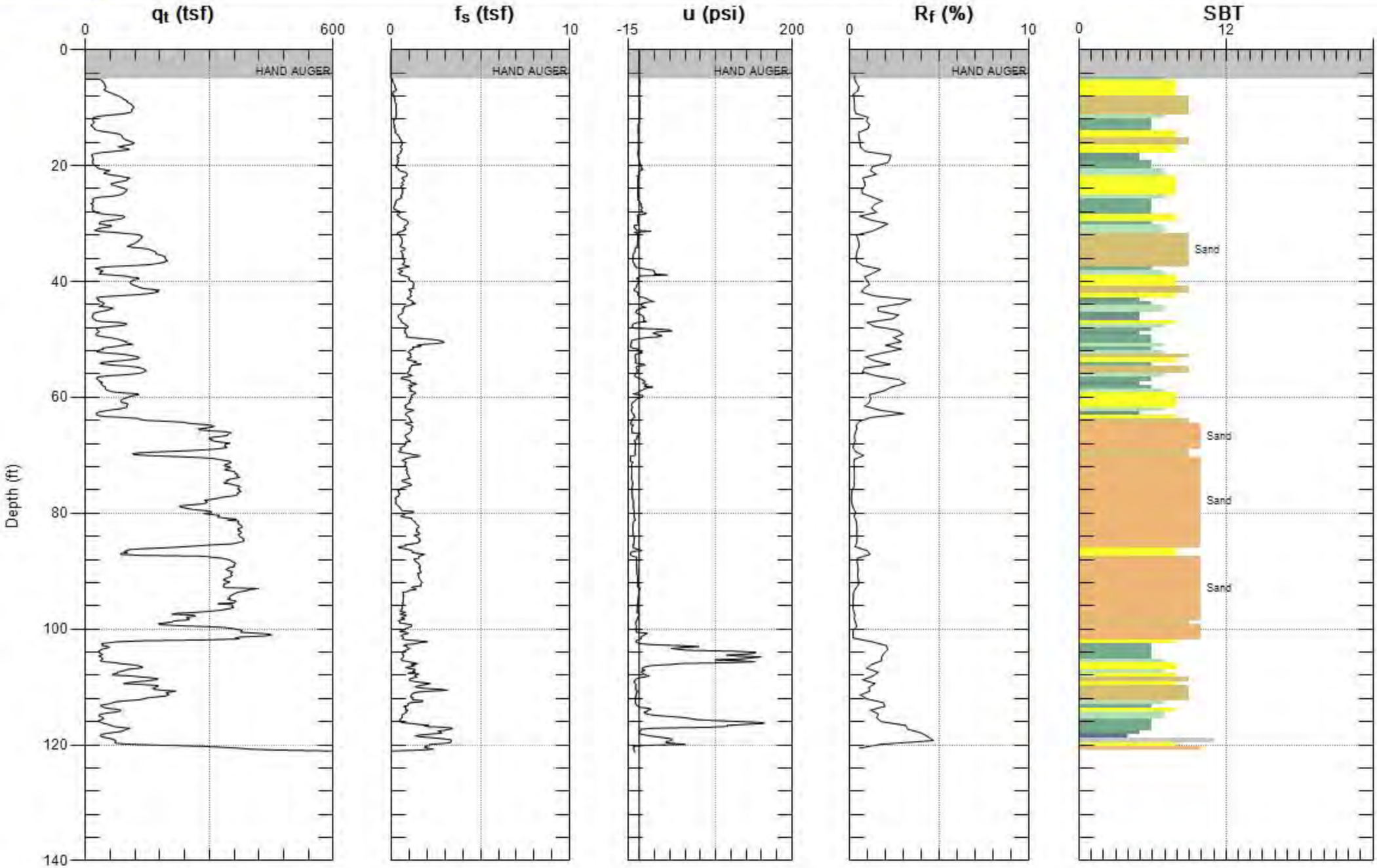
Max. Depth: 139.600 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-8

Engineer: D.GRUBER
Date: 3/6/2013 02:34



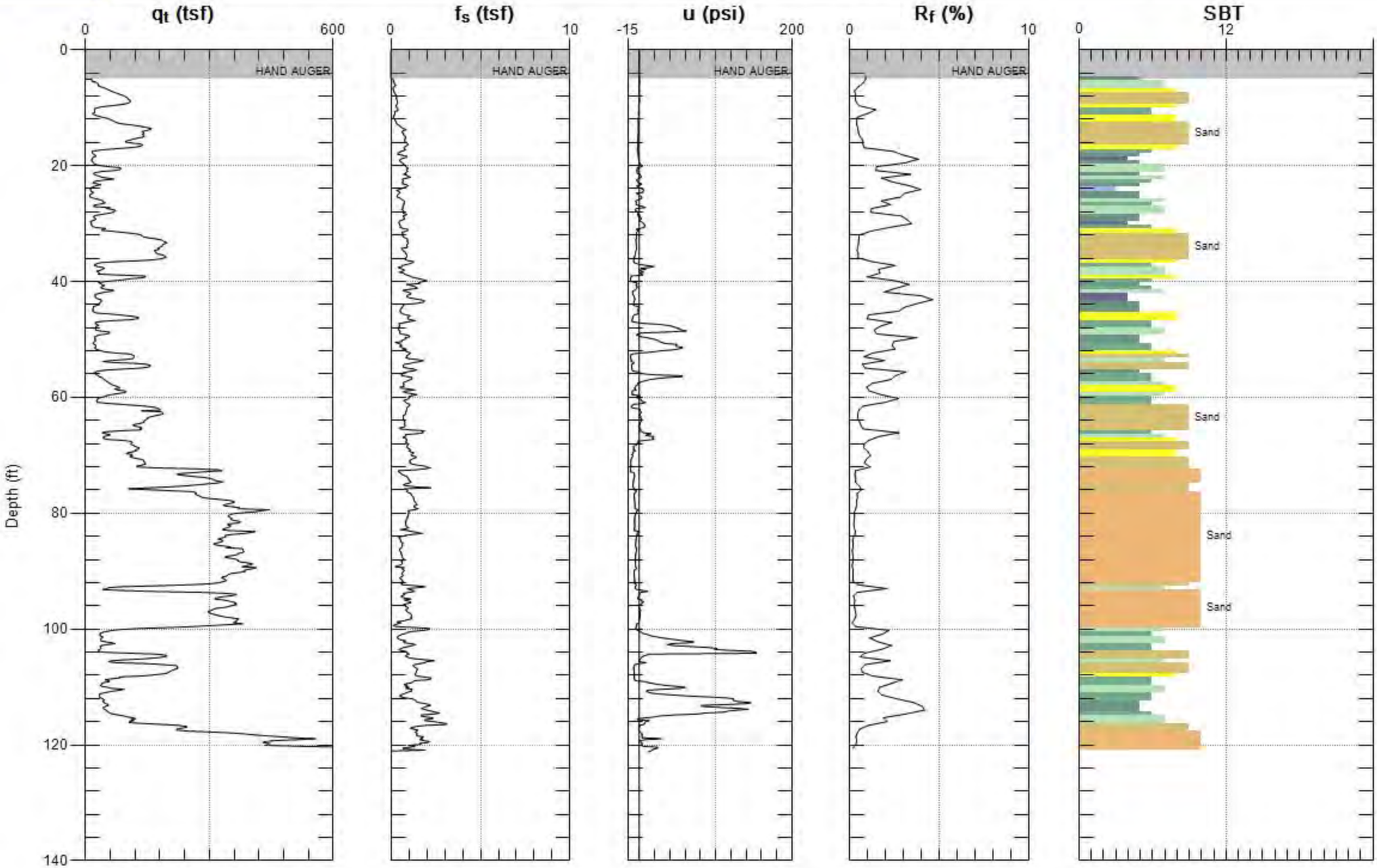
Max. Depth: 121.227 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-9

Engineer: D.GRUBER
Date: 3/5/2013 01:52



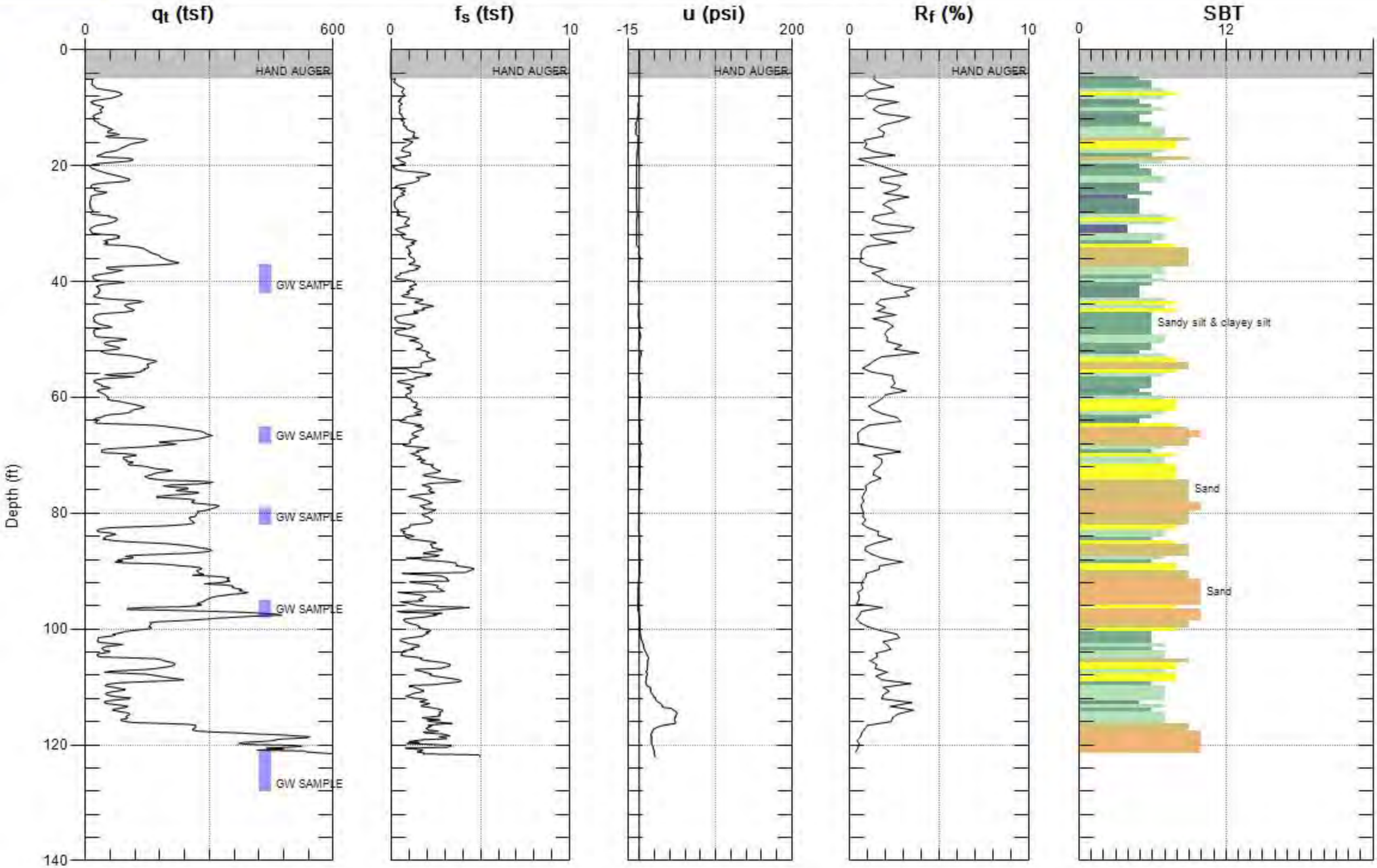
Max. Depth: 121.227 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-13

Engineer: D.GRUBER
Date: 3/15/2013 07:56



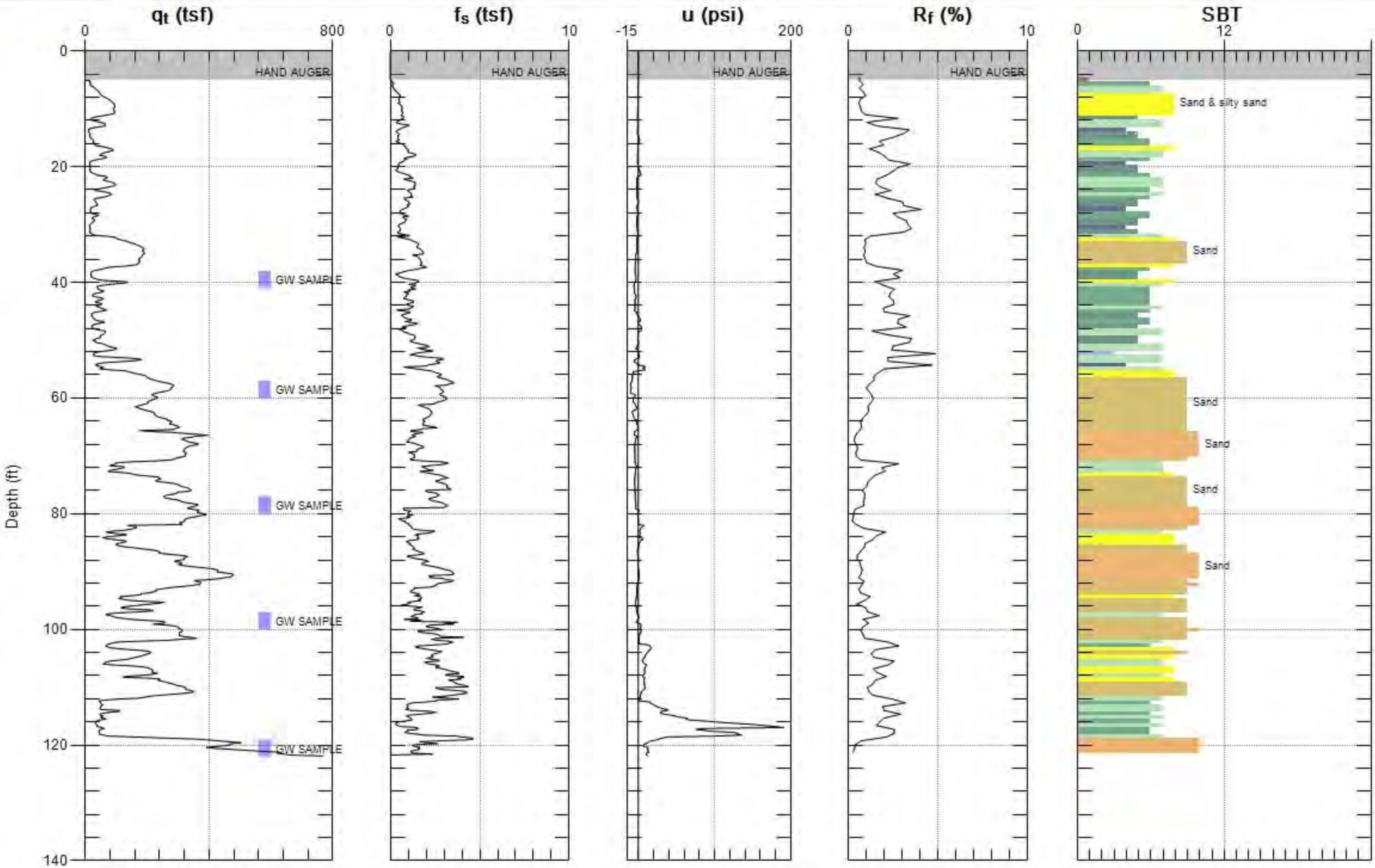
Max. Depth: 122.047 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-10

Engineer: D.GRUBER
Date: 3/21/2013 07:43



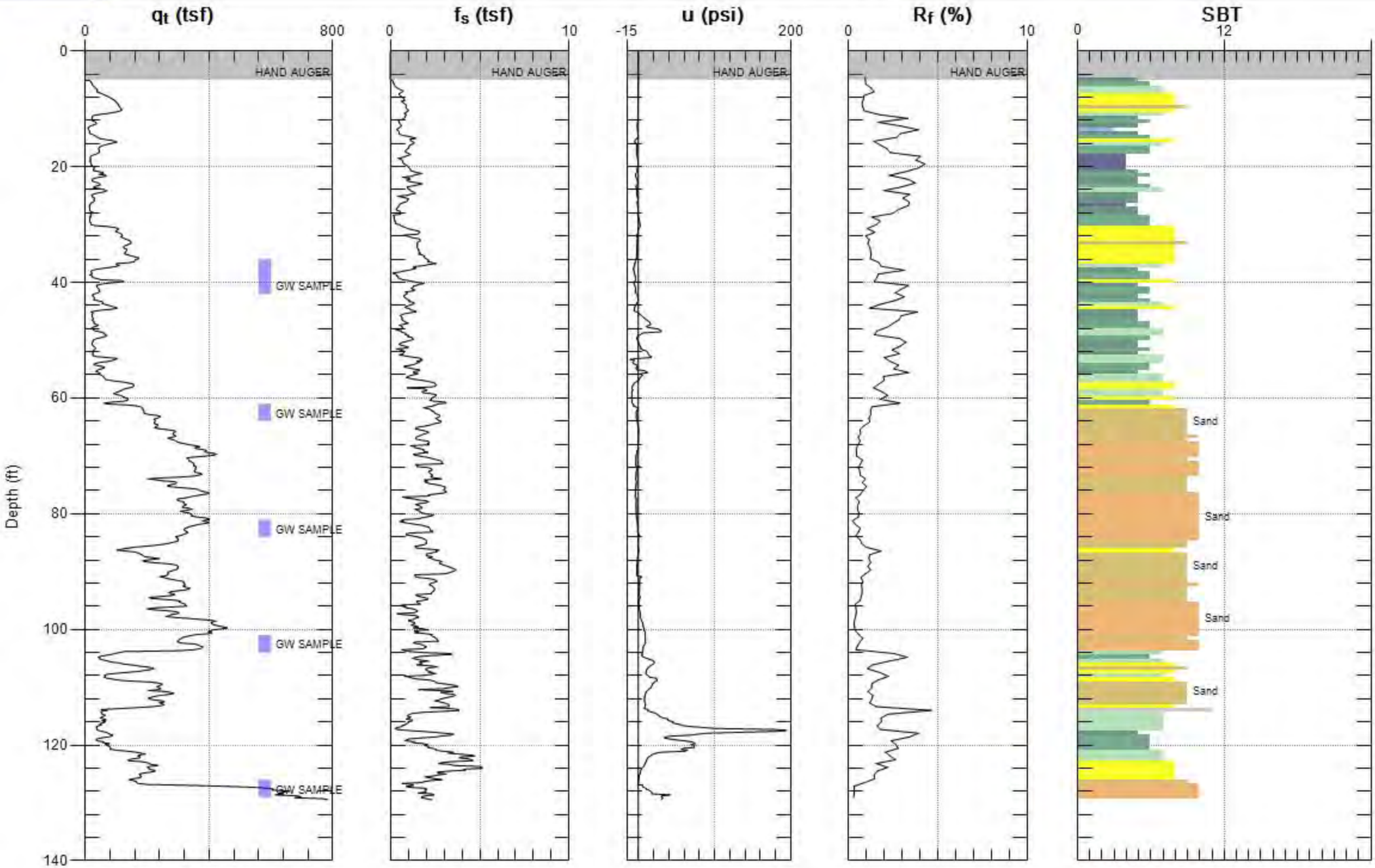
Max. Depth: 121.883 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-11

Engineer: D.GRUBER
Date: 3/20/2013 08:21



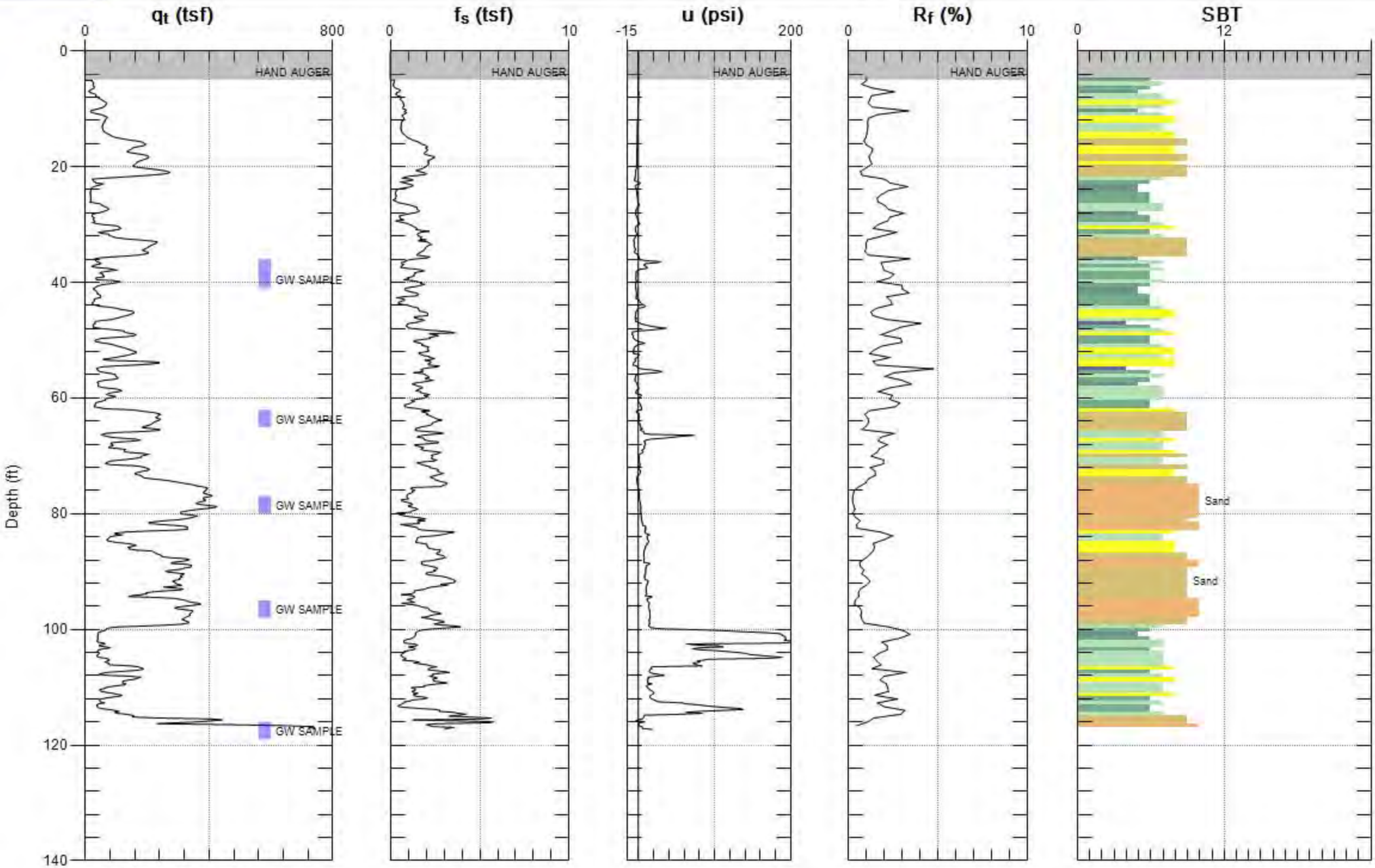
Max. Depth: 129.429 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-12

Engineer: D.GRUBER
Date: 3/19/2013 07:49



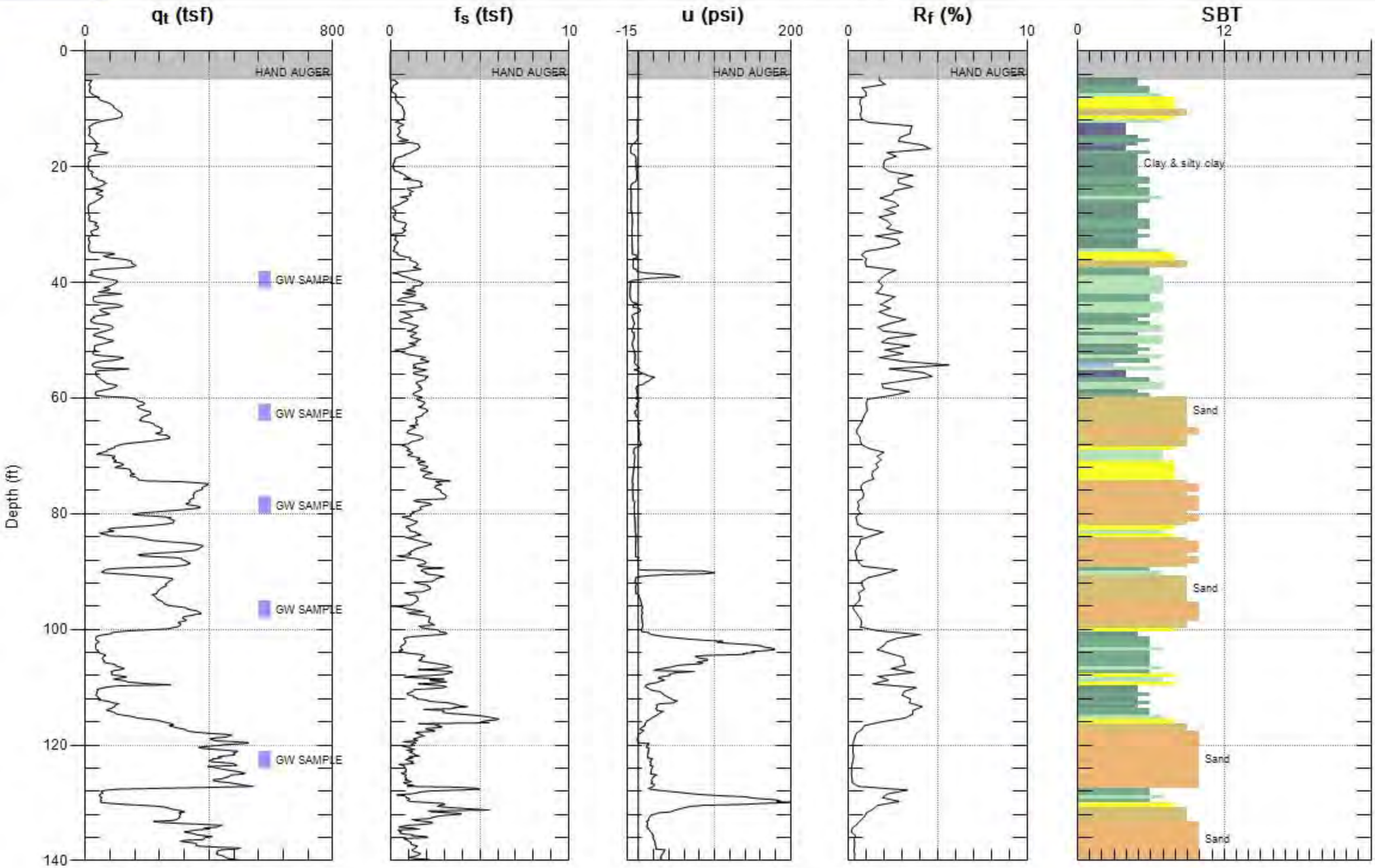
Max. Depth: 117.290 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG ITSI

Site: SOUTHERN AVE.
Sounding: CPT-2

Engineer: D.GRUBER
Date: 3/22/2013 08:22



Max. Depth: 140.584 (ft)
Avg. Interval: 0.656 (ft)

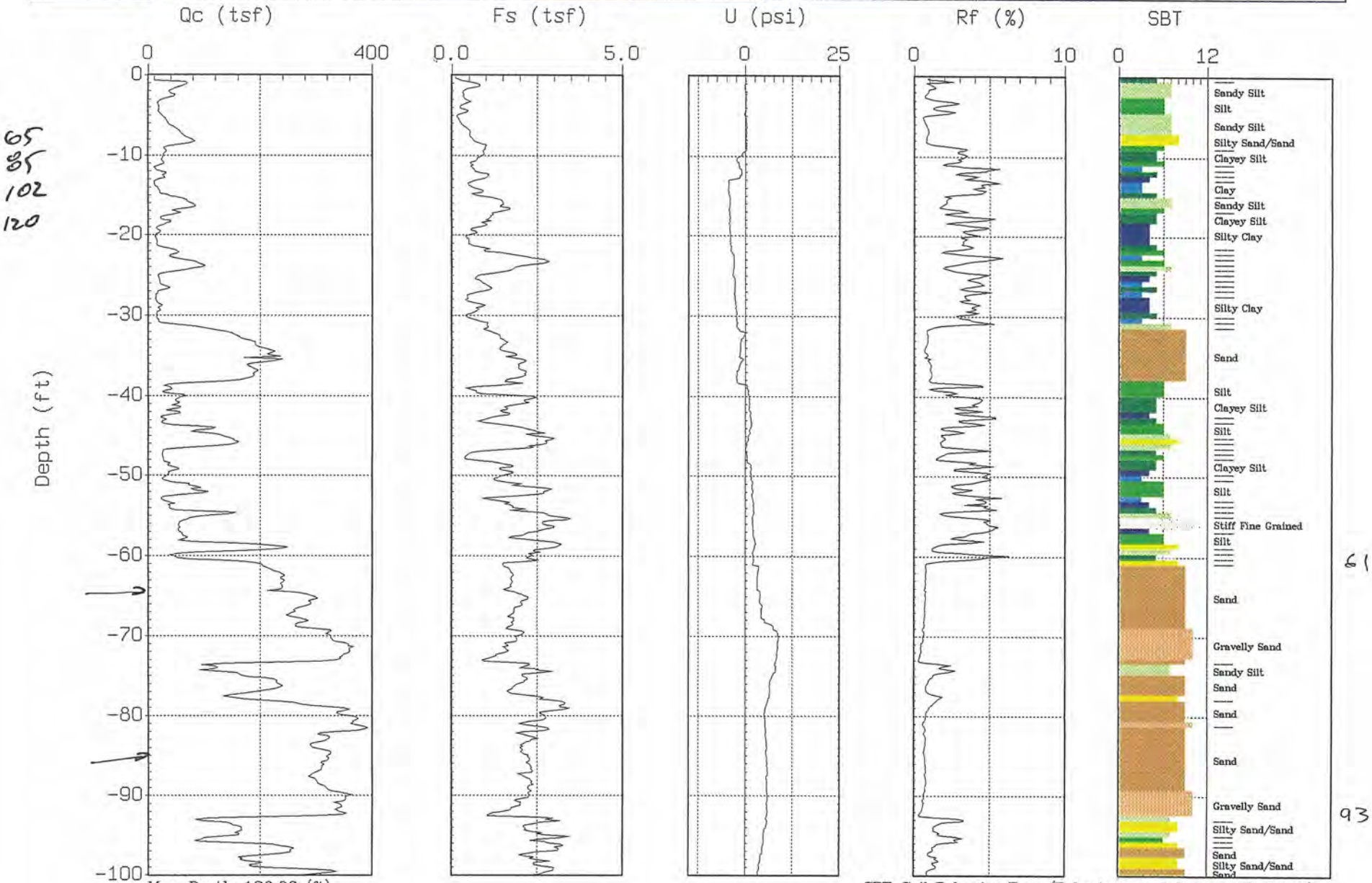
SBT: Soil Behavior Type (Robertson 1990)

GREGG

URS WOODWARD CLYDE

Site : COOPER DRUM
Location : CPT-10

Geologist: DON GRUBER
Date : 03:25:99 15:17



Max. Depth: 120.08 (ft)

Depth Inc.: 0.164 (ft)

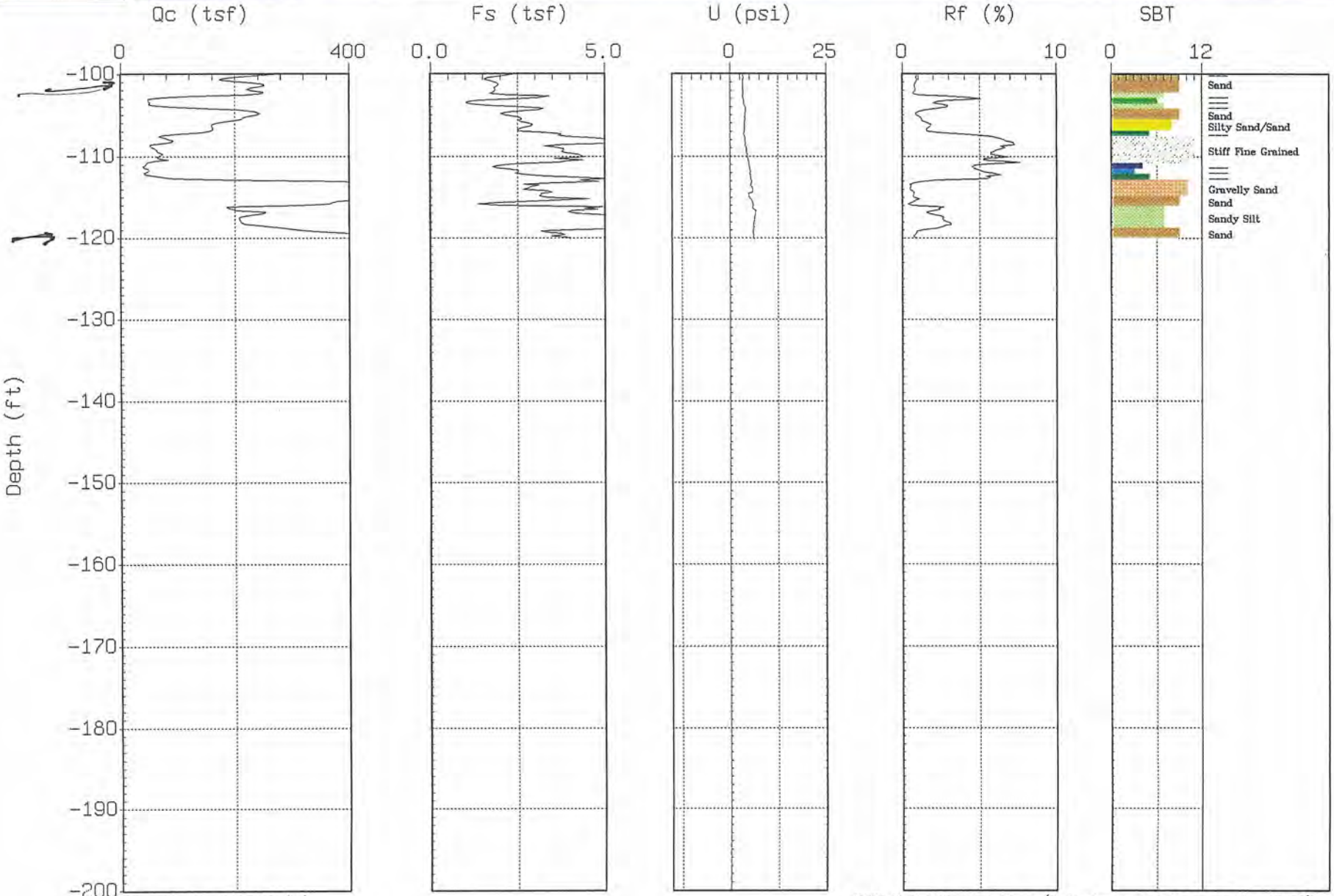
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

URS WOODWARD CLYDE

Site : COOPER DRUM
Location : CPT-10

Geologist: DON GRUBER
Date : 03:25:99 15:17



Max. Depth: 120.08 (ft)

Depth Inc.: 0.164 (ft)

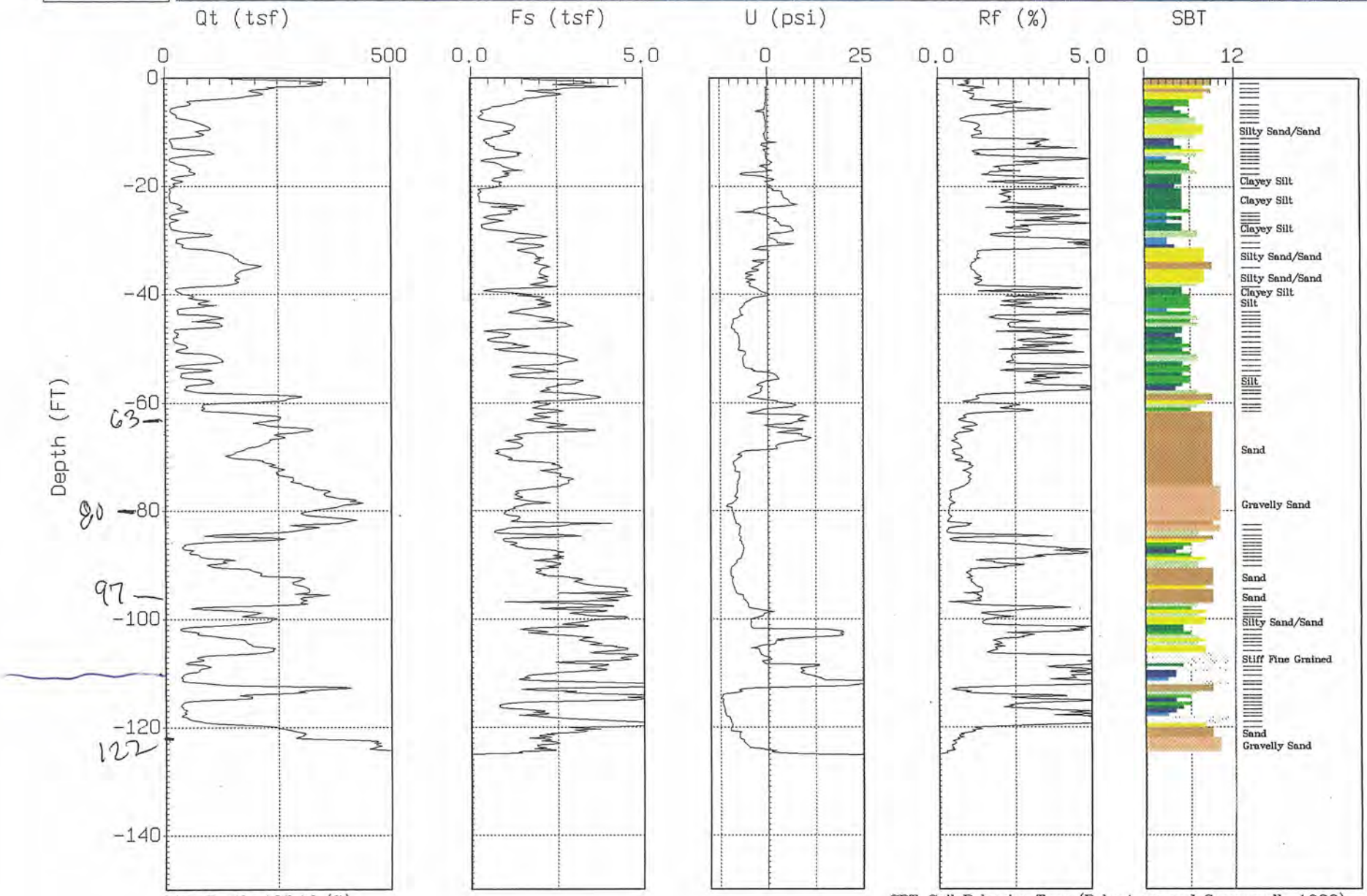
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

URS GREINER

Site : COOPER DRUM
Location : CPT-17

Geologist DON GRUBER
Date : 10:05:100 08:58



Max. Depth: 125.16 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

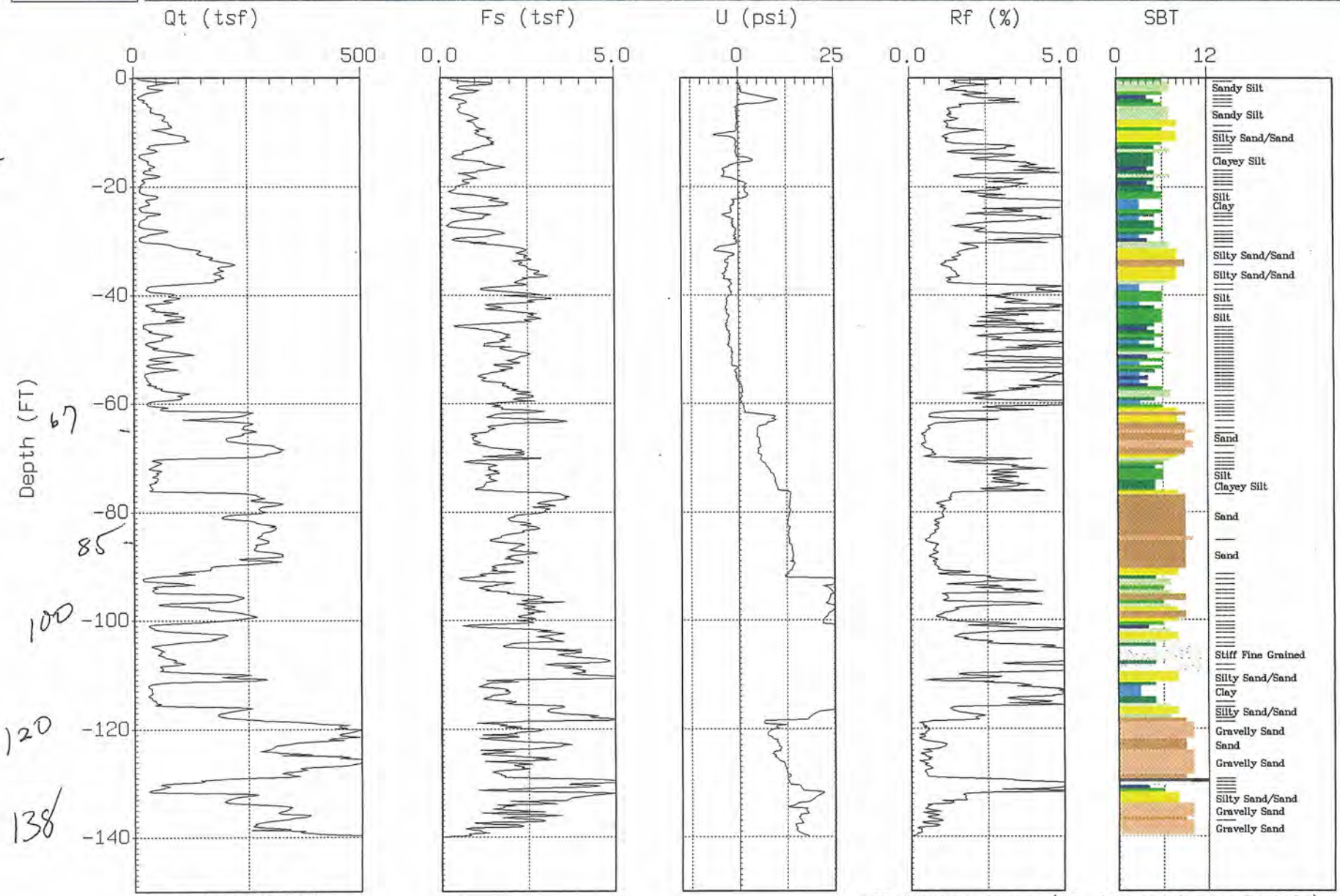
DRAFT

GREGG

URS GREINER

Site : COOPER DRUM
Location : CPT-18

Geologist DON GRUBER
Date : 10:05:100 14:15



Max. Depth: 140.09 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

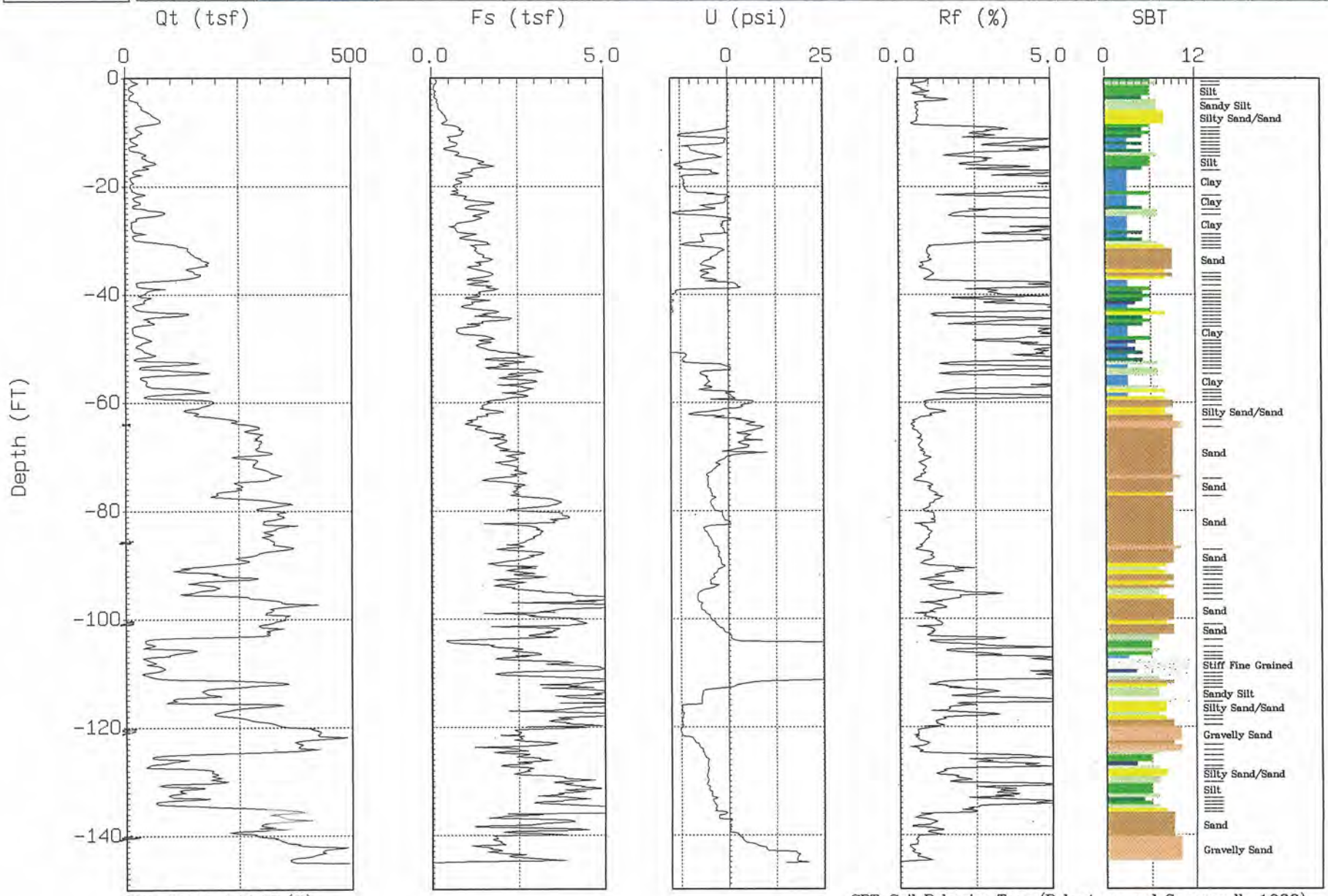
DRAFT

GREGG

URS GREINER

Site : COOPER DRUM
Location : CPT-21

Geologist DON GRUBER
Date : 10:06:100 09:48



Max. Depth: 145.18 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

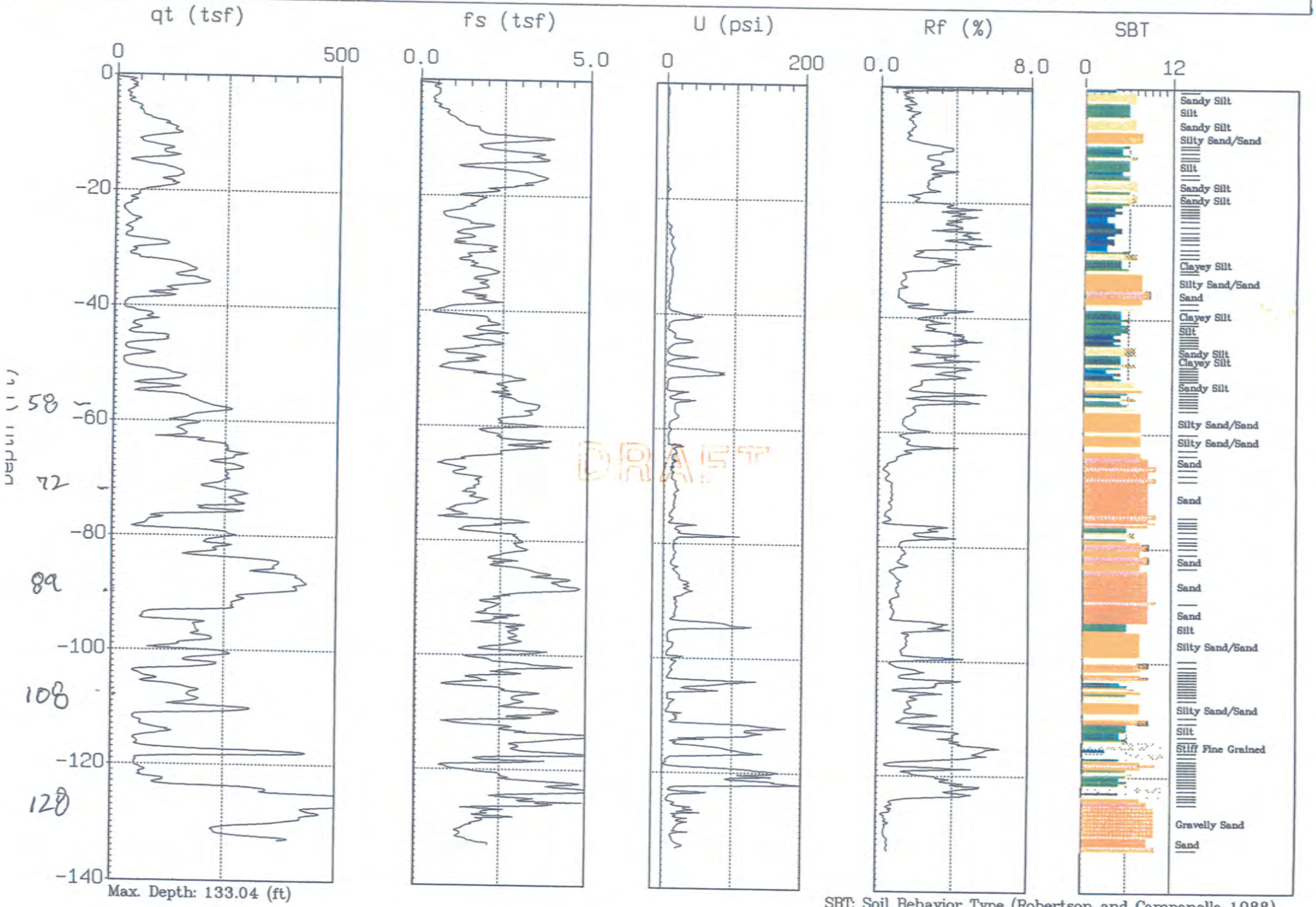
DRAFT

GREGG

URS

Site : COOPER DRUM
Location : CPT-36

Geologist : DON GRUBER
Date : 05:06:03 11:11



Max. Depth: 133.04 (ft)

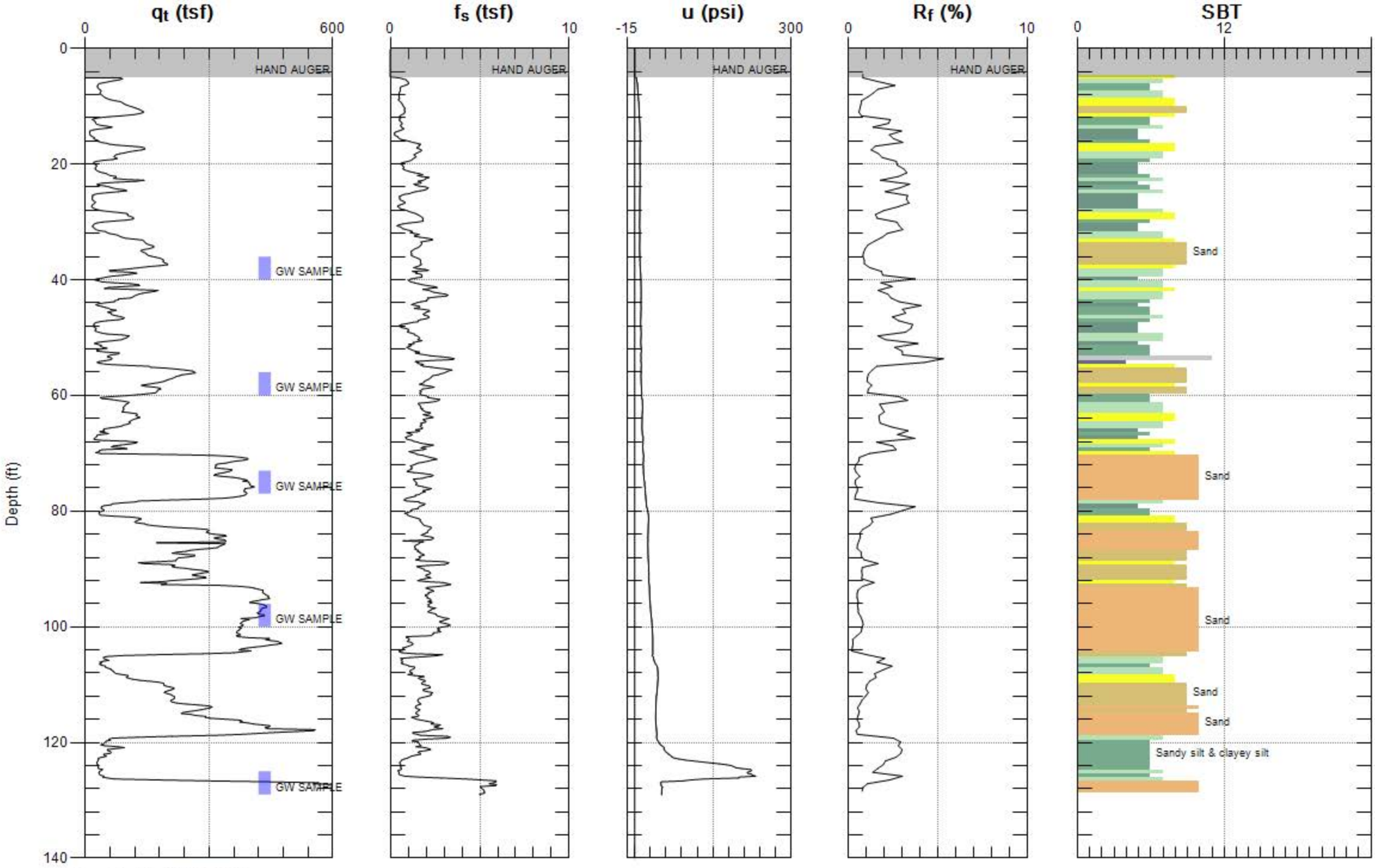
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-14

Engineer: P.PHILLIPS
Date: 7/23/2015 08:24



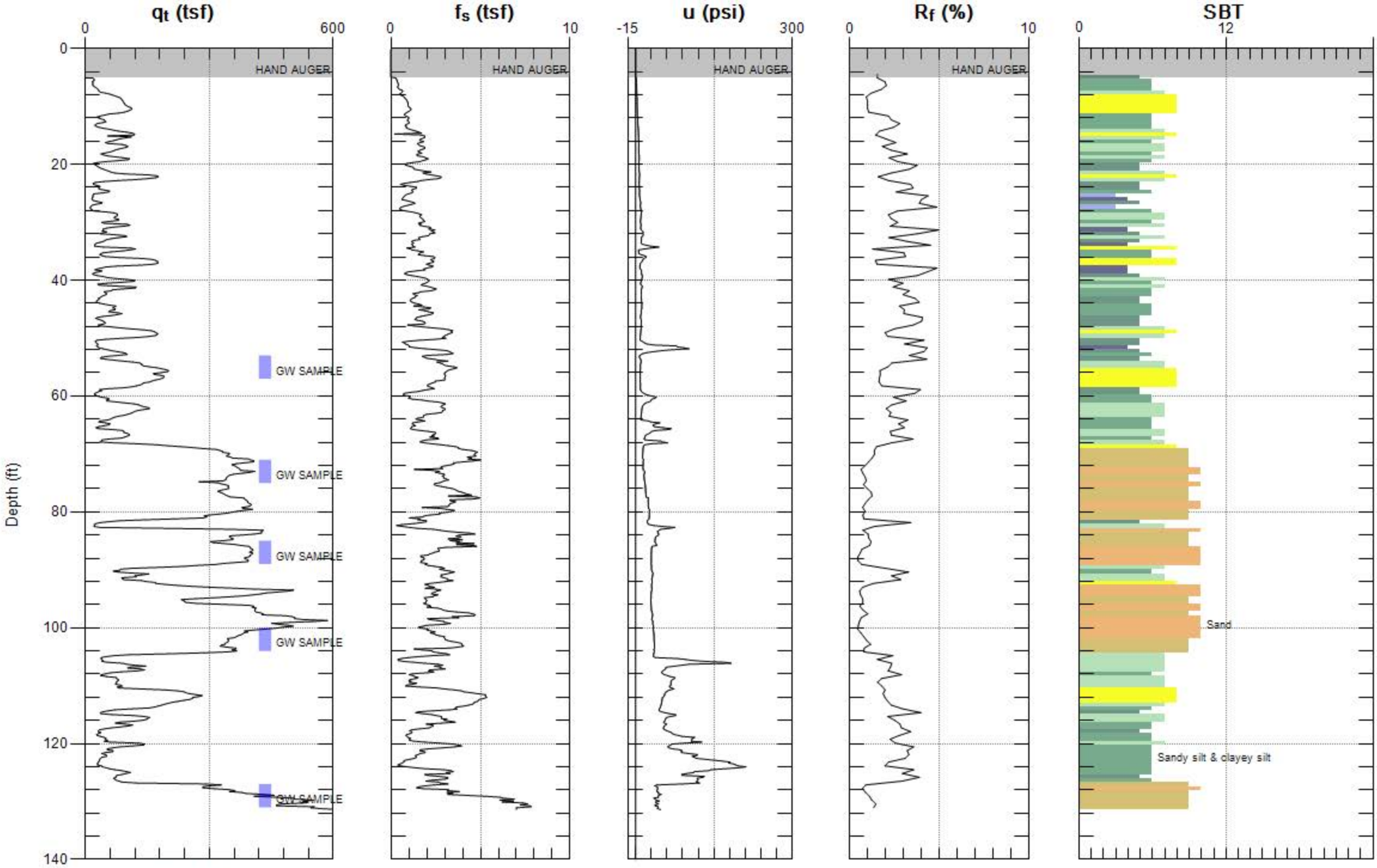
Max. Depth: 129.101 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-15

Engineer: P.PHILLIPS
Date: 7/28/2015 07:04



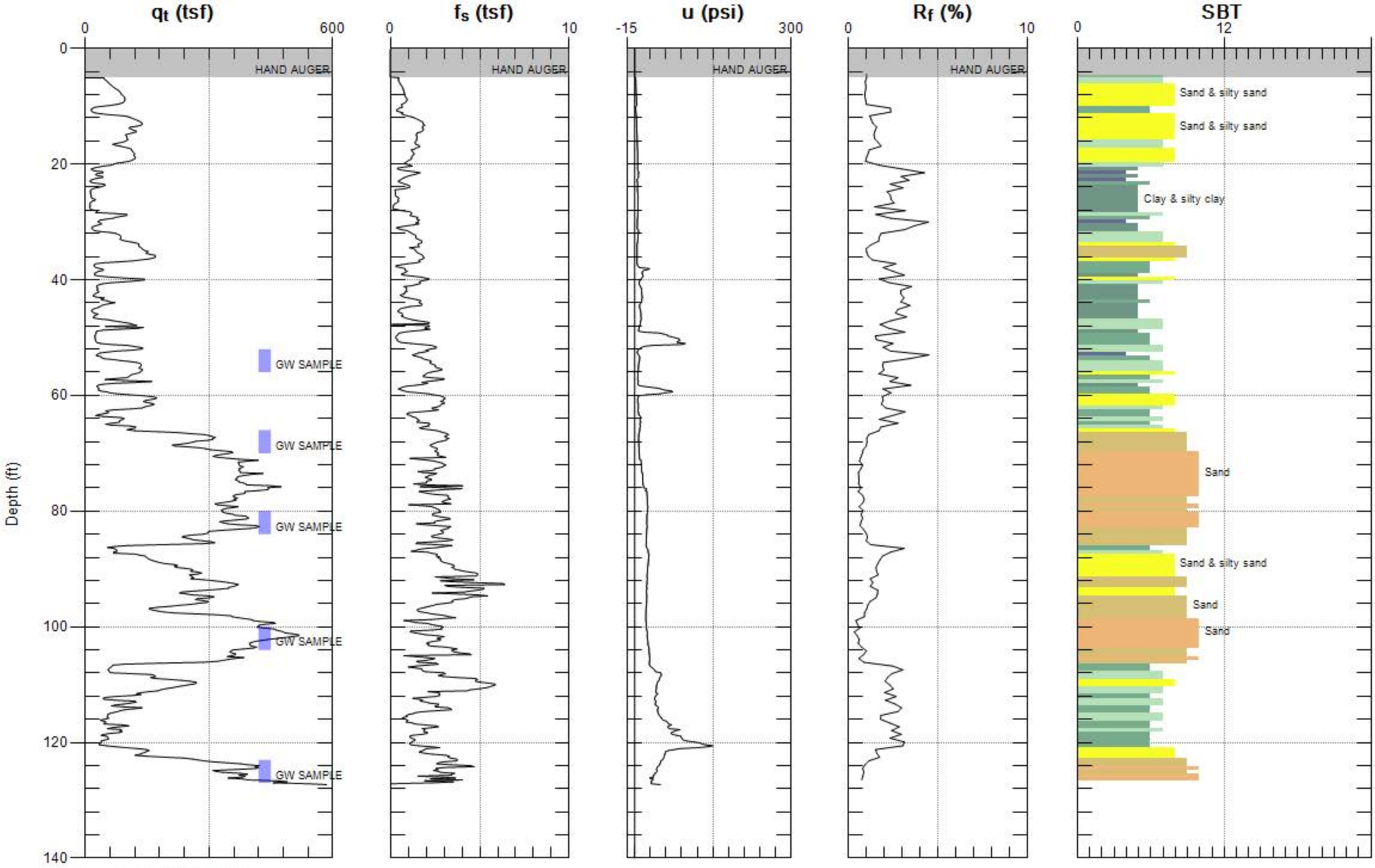
Max. Depth: 131.398 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-16

Engineer: P.PHILLIPS
Date: 7/29/2015 06:55



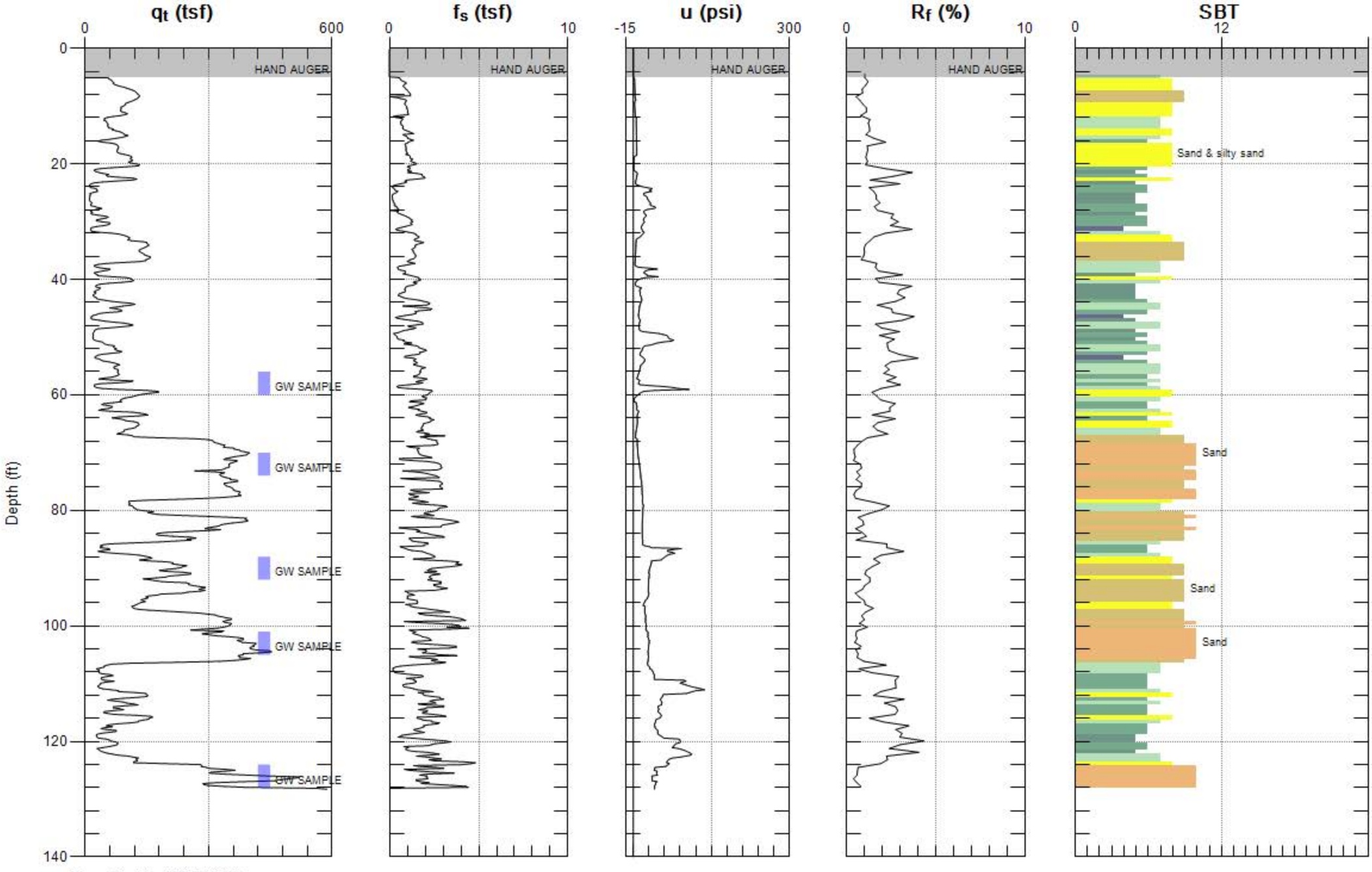
Max. Depth: 127.297 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-17

Engineer: P.PHILLIPS
Date: 7/30/2015 07:11



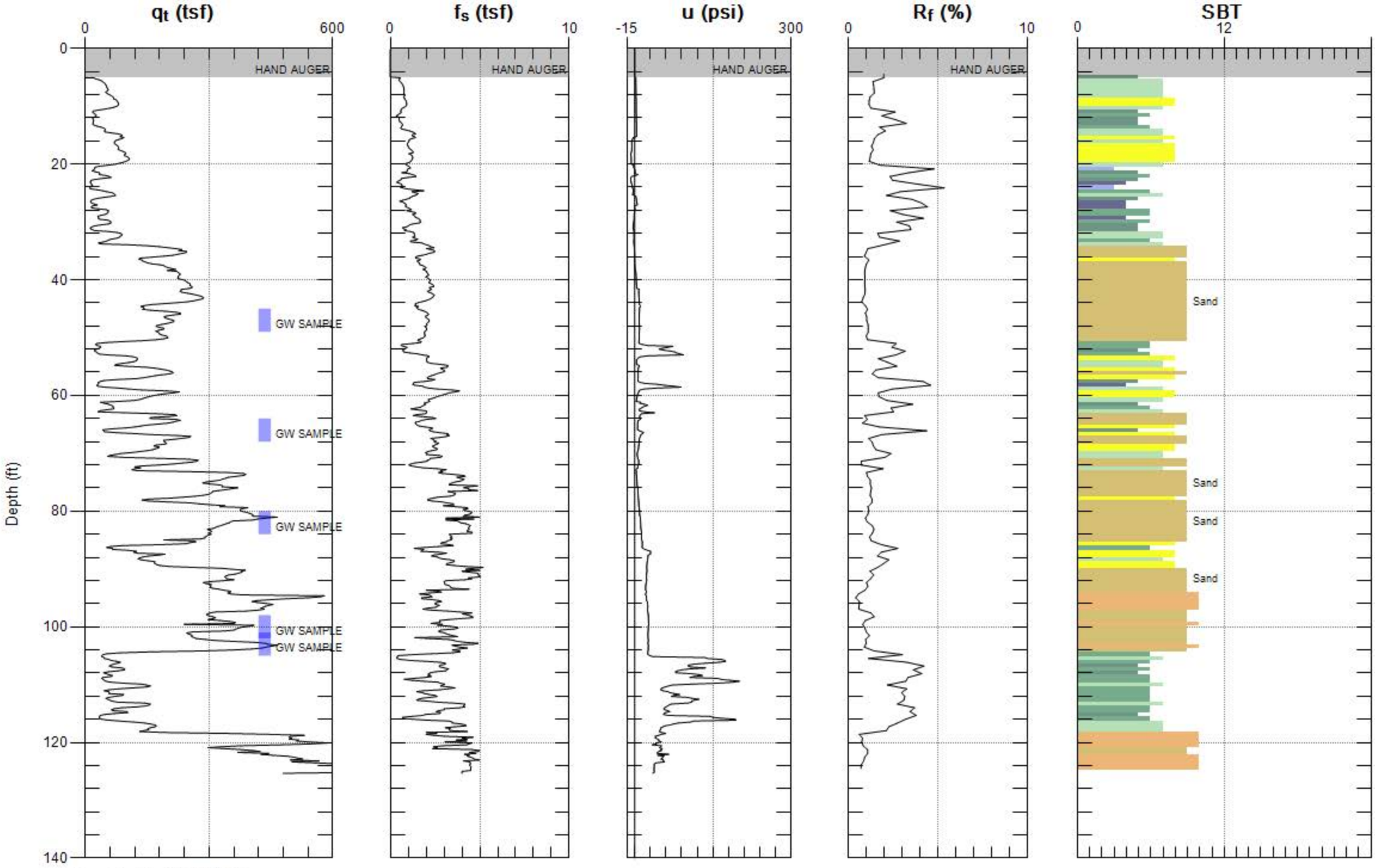
Max. Depth: 128.281 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-18

Engineer: P.PHILLIPS
Date: 7/31/2015 06:30



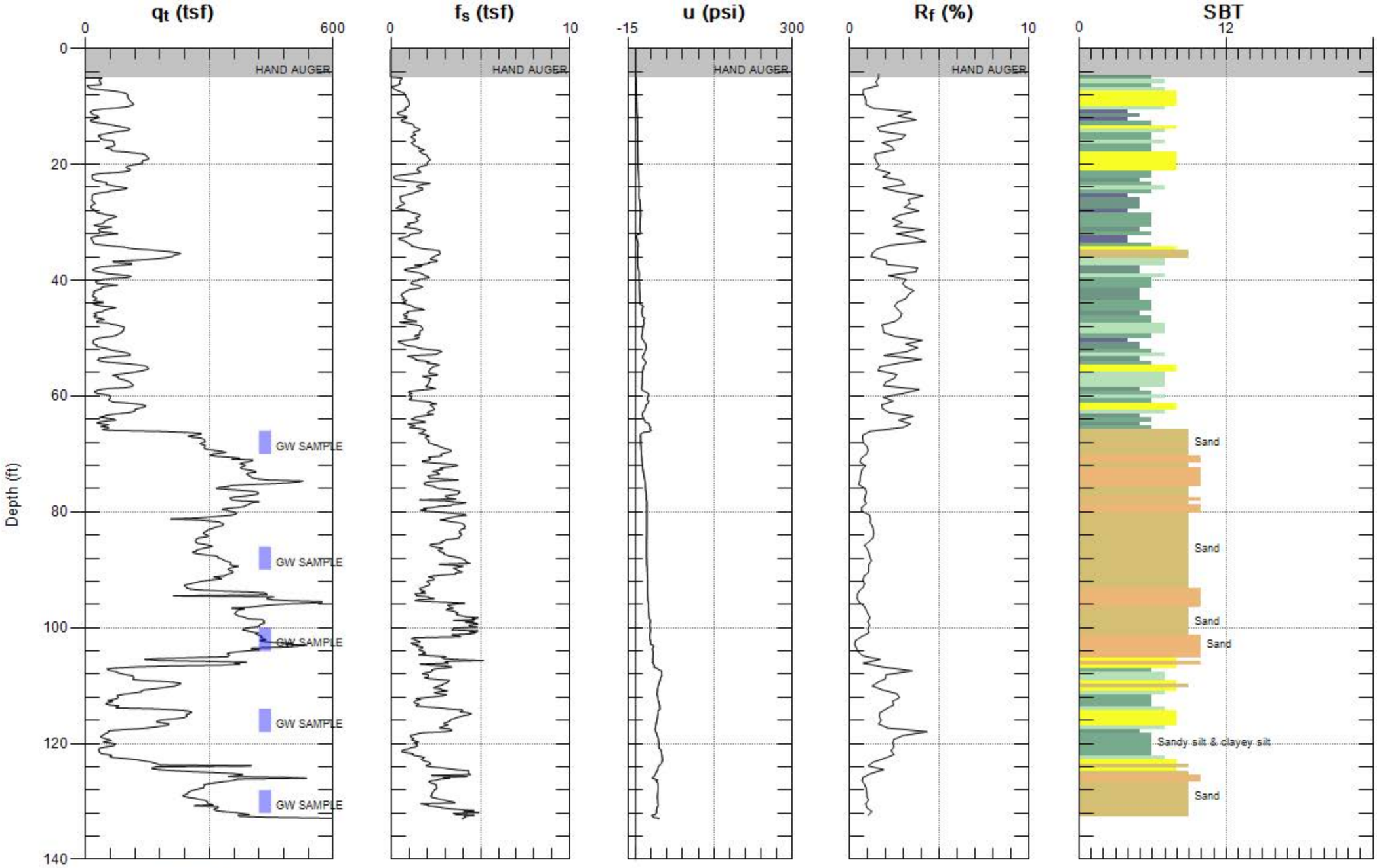
Max. Depth: 125.328 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-19

Engineer: P.PHILLIPS
Date: 7/24/2015 07:26



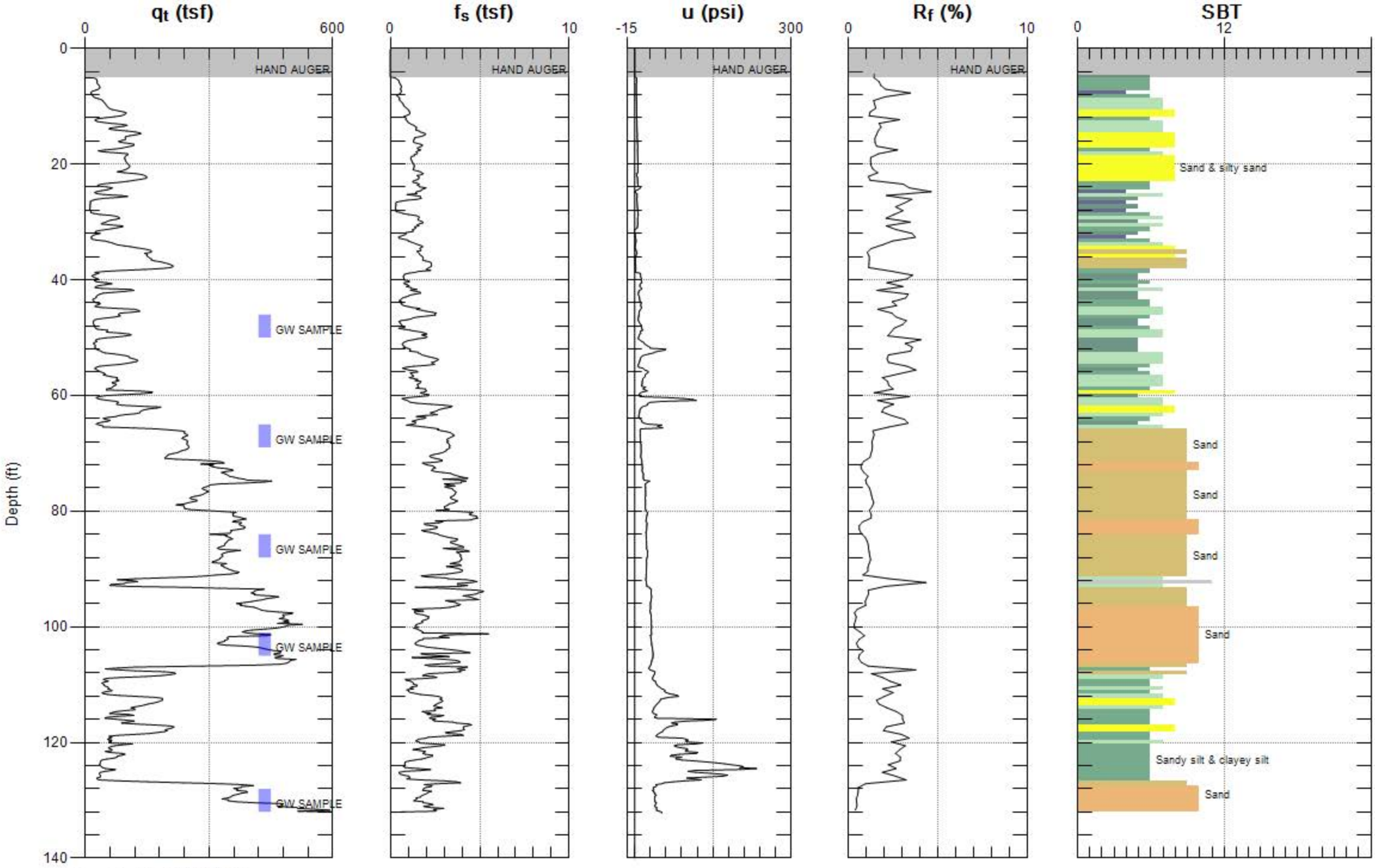
Max. Depth: 133.038 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: CPT-20

Engineer: P.PHILLIPS
Date: 7/27/2015 07:28



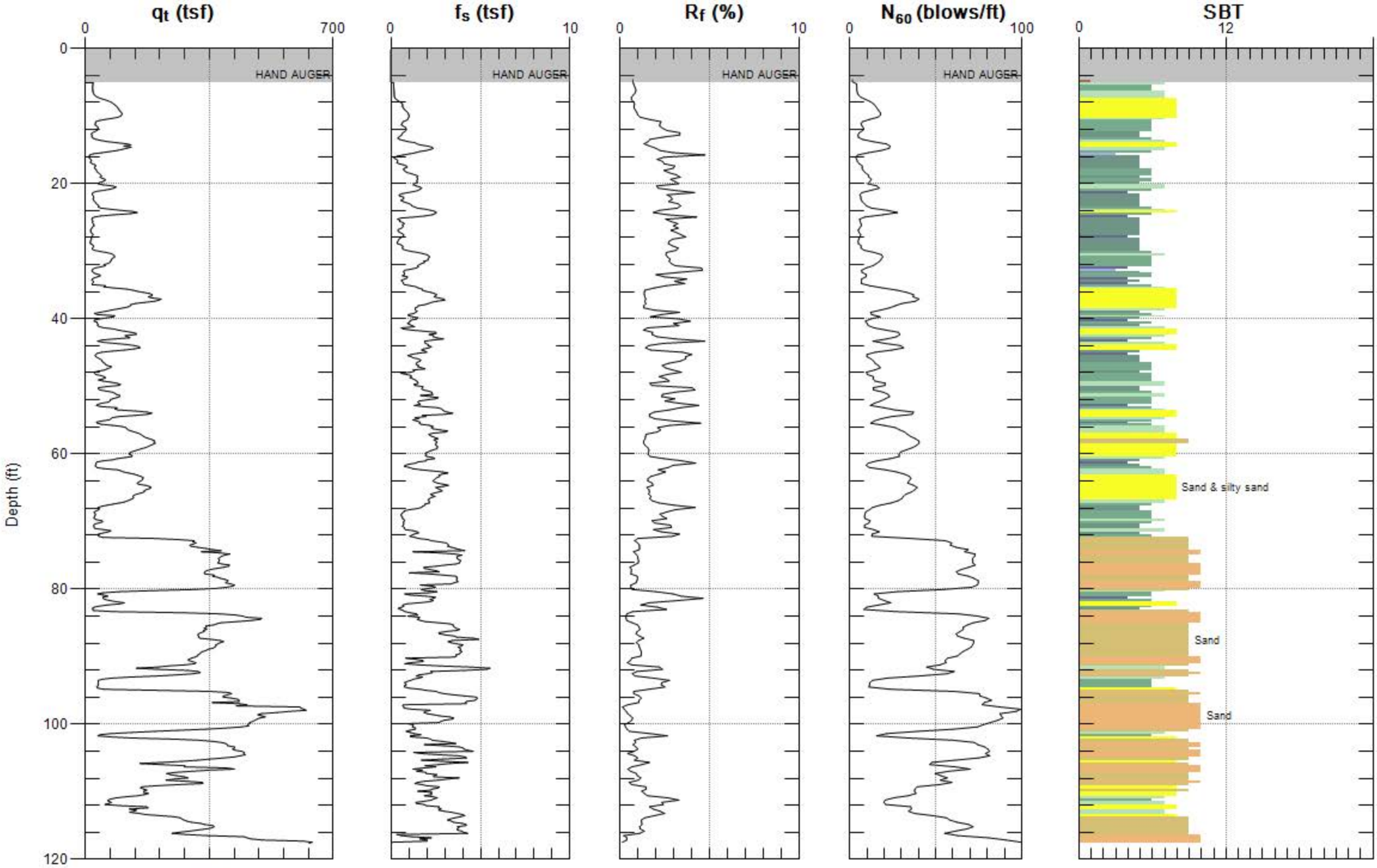
Max. Depth: 132.218 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: SAIA-CPT-21

Engineer: R.LEONG
Date: 6/14/2016 07:45



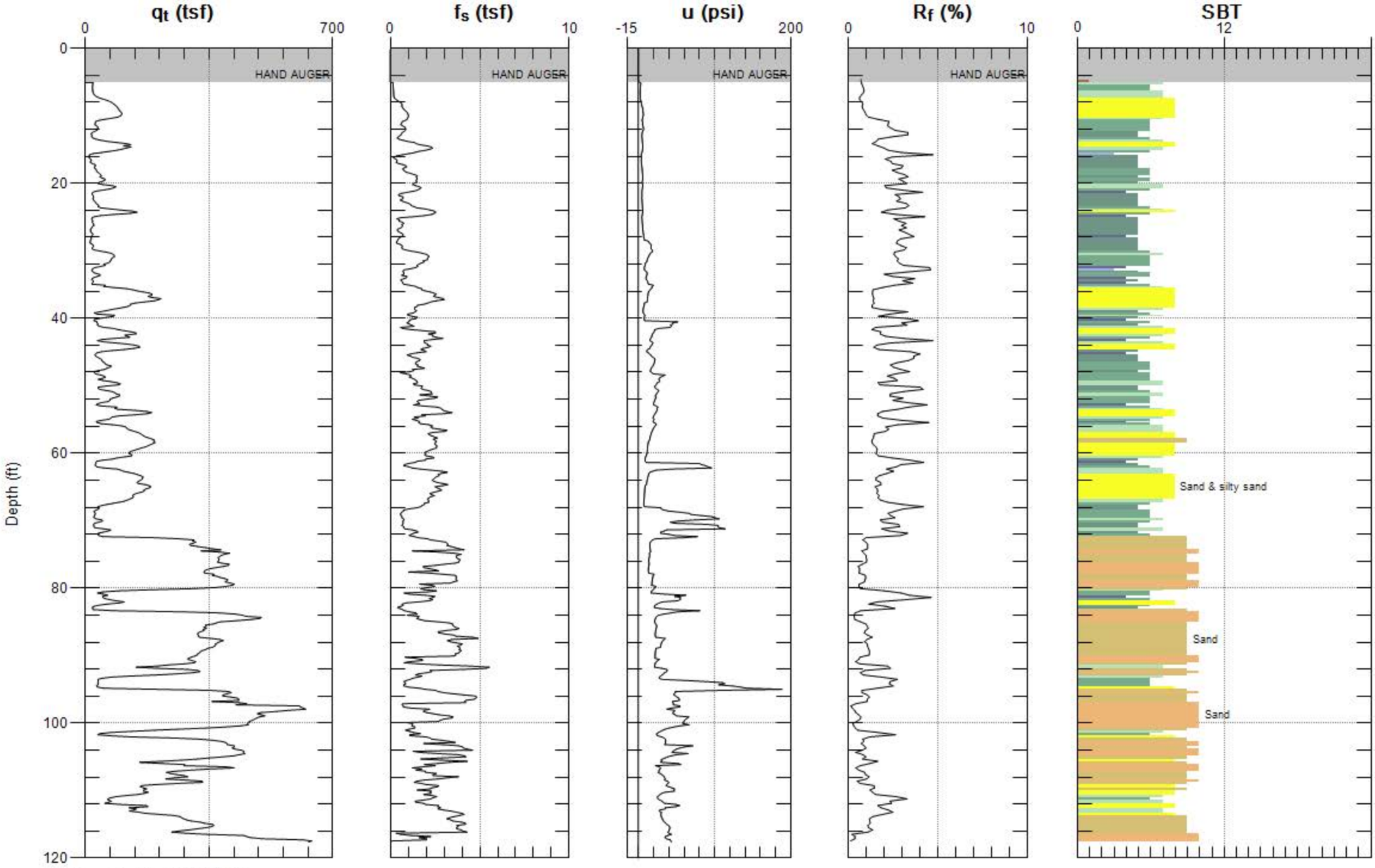
Max. Depth: 117.618 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: SAIA-CPT-21

Engineer: R.LEONG
Date: 6/14/2016 07:45



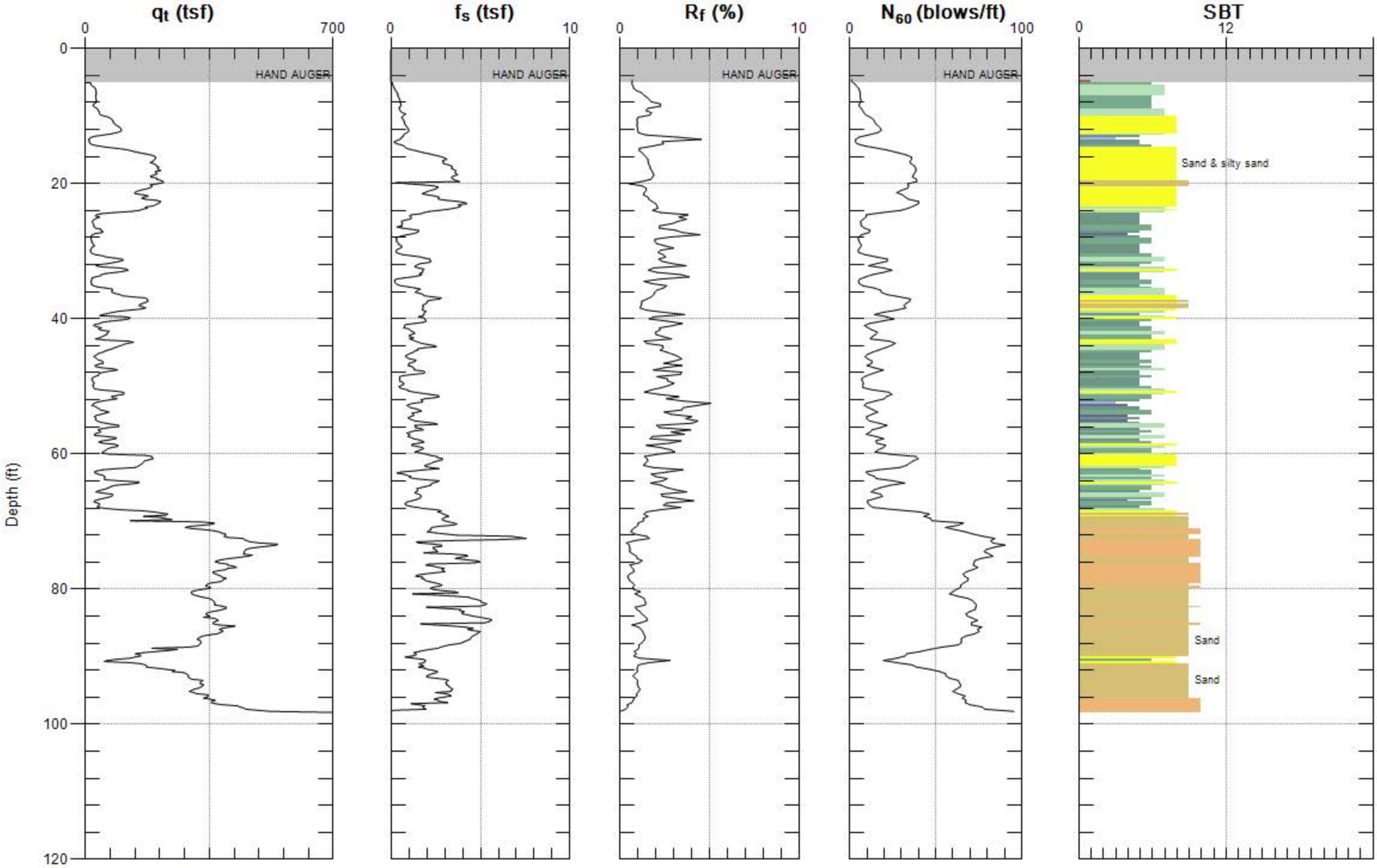
Max. Depth: 117.618 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: SAIA-CPT-22

Engineer: R.LEONG
Date: 12/31/2002 11:13



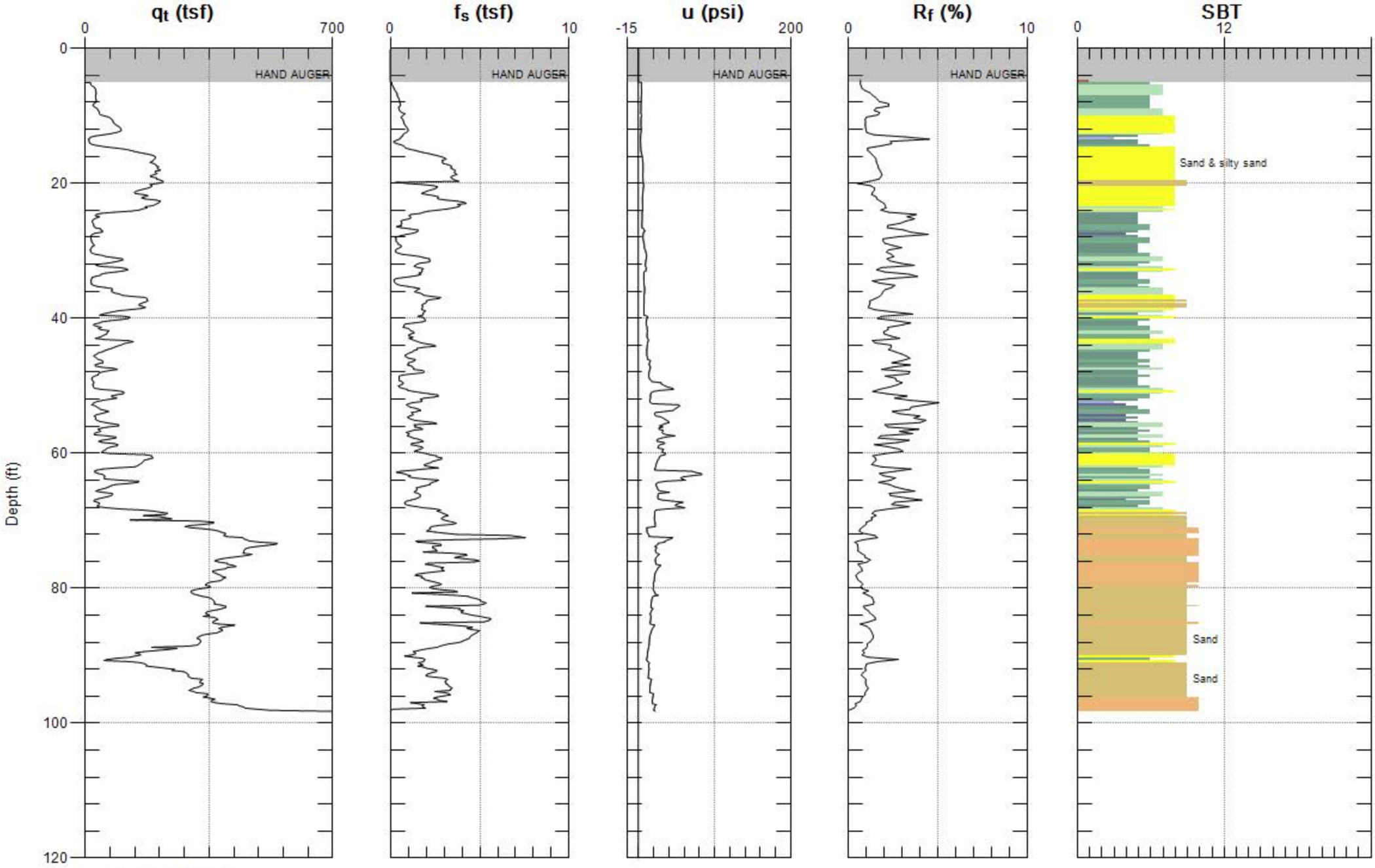
Max. Depth: 98.261 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GILBANE FEDERAL

Site: SAIA
Sounding: SAIA-CPT-22

Engineer: R.LEONG
Date: 12/31/2002 11:13



Max. Depth: 98.261 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

June 15, 2016

Gilbane Federal
Attn: Rogerio Leong

Subject: CPT Site Investigation
SAIA
South Gate, California
GREGG Project Number: 16-583SH

Dear Mr. Leong:

The following report presents the results of GREGG Drilling & Testing's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☒
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	UVOST Laser Induced Fluorescence	(UVOST)	☐
5	Groundwater Sampling	(GWS)	☐
6	Soil Sampling	(SS)	☐
7	Vapor Sampling	(VS)	☐
8	Pressuremeter Testing	(PMT)	☐
9	Vane Shear Testing	(VST)	☐
10	Dilatometer Testing	(DMT)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG Drilling & Testing, Inc.

Peter Robertson
Technical Director, Gregg Drilling & Testing, Inc.

Cone Penetration Testing Procedure (CPT)

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*.

The cone takes measurements of tip resistance (q_c), sleeve resistance (f_s), and penetration pore water pressure (u_2). Measurements are taken at either 2.5 or 5 cm intervals during penetration to provide a nearly continuous profile. CPT data reduction and basic interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored electronically for further analysis and reference. All CPT soundings are performed in accordance with revised ASTM standards (D 5778-12).

The 5mm thick porous plastic filter element is located directly behind the cone tip in the u_2 location. A new saturated filter element is used on each sounding to measure both penetration pore pressures as well as measurements during a dissipation test (*PPDT*). Prior to each test, the filter element is fully saturated with oil under vacuum pressure to improve accuracy.

When the sounding is completed, the test hole is backfilled according to client specifications. If grouting is used, the procedure generally consists of pushing a hollow tremie pipe with a "knock out" plug to the termination depth of the CPT hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

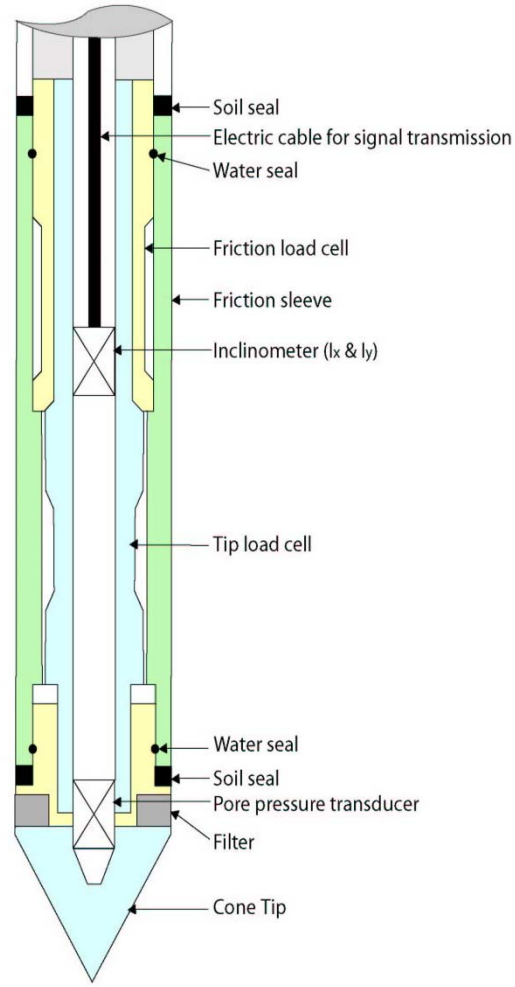


Figure CPT

Gregg 15cm^2 Standard Cone Specifications

Dimensions	
Cone base area	15 cm^2
Sleeve surface area	225 cm^2
Cone net area ratio	0.80
Specifications	
Cone load cell	
Full scale range	180 kN (20 tons)
Overload capacity	150%
Full scale tip stress	120 MPa (1,200 tsf)
Repeatability	120 kPa (1.2 tsf)
Sleeve load cell	
Full scale range	31 kN (3.5 tons)
Overload capacity	150%
Full scale sleeve stress	1,400 kPa (15 tsf)
Repeatability	1.4 kPa (0.015 tsf)
Pore pressure transducer	
Full scale range	7,000 kPa (1,000 psi)
Overload capacity	150%
Repeatability	7 kPa (1 psi)

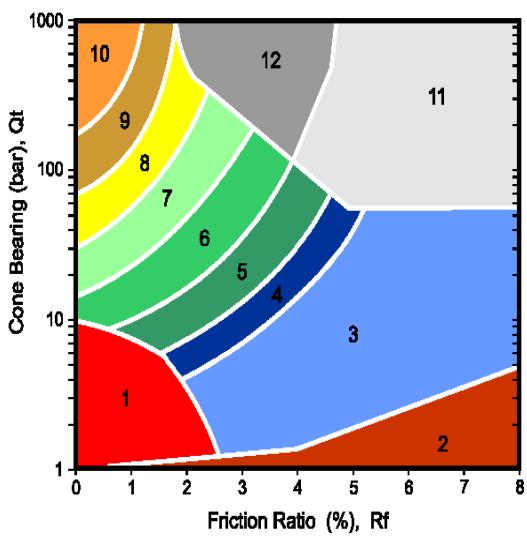
Note: The repeatability during field use will depend somewhat on ground conditions, abrasion, maintenance and zero load stability.

Cone Penetration Test Data & Interpretation

The Cone Penetration Test (CPT) data collected are presented in graphical and electronic form in the report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (1990). Typical plots display SBT based on the non-normalized charts of Robertson et al (1986). For CPT soundings deeper than 30m, we recommend the use of the normalized charts of Robertson (1990) which can be displayed as SBTn, upon request. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Professor Robertson (Guide to Cone Penetration Testing, 2015). The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling & Testing Inc. does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software. Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on q_t, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.



ZONE		SBT
1		Sensitive, fine grained
2		Organic materials
3		Clay
4		Silty clay to clay
5		Clayey silt to silty clay
6		Sandy silt to clayey silt
7		Silty sand to sandy silt
8		Sand to silty sand
9		Sand
10		Gravely sand to sand
11		Very stiff fine grained*
12		Sand to clayey sand*

*over consolidated or cemented

Figure SBT (After Robertson et al., 1986) – Note: Colors may vary slightly compared to plots

Cone Penetration Test (CPT) Interpretation

Gregg uses a proprietary CPT interpretation and plotting software. The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997). The interpretation is presented in tabular format using MS Excel. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameters.

Input:

1. Units for display (Imperial or metric) (atm. pressure, p_a = 0.96 tsf or 0.1 MPa)
2. Depth interval to average results (ft or m). Data are collected at either 0.02 or 0.05m and can be averaged every 1, 3 or 5 intervals.
3. Elevation of ground surface (ft or m)
4. Depth to water table, z_w (ft or m) – input required
5. Net area ratio for cone, a (default to 0.80)
6. Relative Density constant, C_{Dr} (default to 350)
7. Young's modulus number for sands, α (default to 5)
8. Small strain shear modulus number
   a. for sands, S_G (default to 180 for SBT_n 5, 6, 7)
   b. for clays, C_G (default to 50 for SBT_n 1, 2, 3 & 4)
9. Undrained shear strength cone factor for clays, N_{kt} (default to 15)
10. Over Consolidation ratio number, k_{ocr} (default to 0.3)
11. Unit weight of water, (default to γ_w = 62.4 lb/ft^3 or 9.81 kN/m^3)

Column

1. Depth, z, (m) – CPT data is collected in meters
2. Depth (ft)
3. Cone resistance, q_c (tsf or MPa)
4. Sleeve resistance, f_s (tsf or MPa)
5. Penetration pore pressure, u (psi or MPa), measured behind the cone (i.e. u_2)
6. Other – any additional data
7. Total cone resistance, q_t (tsf or MPa) $q_t = q_c + u\,(1-a)$

8	Friction Ratio, R_f (%)	$R_f = (f_s/q_t) \times 100\%$
9	Soil Behavior Type (non-normalized), SBT	see note
10	Unit weight, γ (pcf or kN/m^3)	based on SBT, see note
11	Total overburden stress, σ_v (tsf)	$\sigma_{vo} = \sigma z$
12	In-situ pore pressure, u_o (tsf)	$u_o = \gamma_w (z - z_w)$
13	Effective overburden stress, σ'_{vo} (tsf)	$\sigma'_{vo} = \sigma_{vo} - u_o$
14	Normalized cone resistance, Q_{t1}	$Q_{t1} = (q_t - \sigma_{vo}) / \sigma'_{vo}$
15	Normalized friction ratio, F_r (%)	$F_r = f_s / (q_t - \sigma_{vo}) \times 100\%$
16	Normalized Pore Pressure ratio, B_q	$B_q = u - u_o / (q_t - \sigma_{vo})$
17	Soil Behavior Type (normalized), SBT_n	see note
18	SBT_n Index, I_c	see note
19	Normalized Cone resistance, Q_{tn} (n varies with I_c)	see note
20	Estimated permeability, k_{SBT} (cm/sec or ft/sec)	see note
21	Equivalent SPT N_{60}, blows/ft	see note
22	Equivalent SPT $(N_1)_{60}$ blows/ft	see note
23	Estimated Relative Density, D_r, (%)	see note
24	Estimated Friction Angle, ϕ', (degrees)	see note
25	Estimated Young's modulus, E_s (tsf)	see note
26	Estimated small strain Shear modulus, Go (tsf)	see note
27	Estimated Undrained shear strength, s_u (tsf)	see note
28	Estimated Undrained strength ratio	s_u/σ_v'
29	Estimated Over Consolidation ratio, OCR	see note

Notes:

1 Soil Behavior Type (non-normalized), SBT (Lunne et al., 1997 and table below)

2 Unit weight, γ either constant at 119 pcf or based on Non-normalized SBT (Lunne et al., 1997 and table below)

3 Soil Behavior Type (Normalized), SBT_n Lunne et al. (1997)

4 SBT_n Index, I_c $I_c = ((3.47 - \log Q_{t1})^2 + (\log F_r + 1.22)^2)^{0.5}$

5 Normalized Cone resistance, Q_{tn} (n varies with Ic)

$Q_{tn} = ((q_t - \sigma_{vo})/pa)\ (pa/(\sigma'_{vo})^n$ and recalculate I_c, then iterate:

When $I_c < 1.64$, n = 0.5 (clean sand)
When $I_c > 3.30$, n = 1.0 (clays)
When $1.64 < I_c < 3.30$, $n = (I_c - 1.64)0.3 + 0.5$
Iterate until the change in n, $\Delta n < 0.01$

6 Estimated permeability, k_{SBT} based on Normalized SBT_n (Lunne et al., 1997 and table below)

7 Equivalent SPT N_{60}, blows/ft Lunne et al. (1997)

$$\frac{(q_t/p_a)}{N_{60}} = 8.5\left(1 - \frac{I_c}{4.6}\right)$$

8 Equivalent SPT $(N_1)_{60}$ blows/ft $(N_1)_{60} = N_{60}\, C_N$,
where $C_N = (pa/\sigma'_{vo})^{0.5}$

9 Relative Density, D_r, (%) $D_r^2 = Q_{tn} / C_{Dr}$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

10 Friction Angle, ϕ', (degrees) $\tan \phi' = \frac{1}{2.68}\left[\log\left(\frac{q_c}{\sigma'_{vo}}\right) + 0.29\right]$
Only SBT_n 5, 6, 7 & 8 *Show'N/A' in zones 1, 2, 3, 4 & 9*

11 Young's modulus, E_s $E_s = \alpha\, q_t$
Only SBT_n 5, 6, 7 & 8 *Show 'N/A' in zones 1, 2, 3, 4 & 9*

12 Small strain shear modulus, Go
a. $G_o = S_G\,(q_t\ \sigma'_{vo}\ pa)^{1/3}$ *For SBT_n 5, 6, 7*
b. $G_o = C_G\, q_t$ *For SBT_n 1, 2, 3& 4*
Show 'N/A' in zones 8 & 9

13 Undrained shear strength, s_u $s_u = (q_t - \sigma_{vo}) / N_{kt}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

14 Over Consolidation ratio, OCR $OCR = k_{ocr}\, Q_{t1}$
Only SBT_n 1, 2, 3, 4 & 9 *Show 'N/A' in zones 5, 6, 7 & 8*

The following updated and simplified SBT descriptions have been used in the software:

SBT Zones		**SBT_n Zones**	
1	sensitive fine grained	1	sensitive fine grained
2	organic soil	2	organic soil
3	clay	3	clay
4	clay & silty clay	4	clay & silty clay
5	clay & silty clay		
6	sandy silt & clayey silt		

7	silty sand & sandy silt	5	silty sand & sandy silt
8	sand & silty sand	6	sand & silty sand
9	sand		
10	sand	7	sand
11	very dense/stiff soil*	8	very dense/stiff soil*
12	very dense/stiff soil*	9	very dense/stiff soil*

*heavily overconsolidated and/or cemented

Track when soils fall with zones of same description and print that description (i.e. if soils fall only within SBT zones 4 & 5, print 'clays & silty clays')

Estimated Permeability (see Lunne et al., 1997)

SBT_n	Permeability (ft/sec)	(m/sec)
1	$3x\ 10^{-8}$	$1x\ 10^{-8}$
2	$3x\ 10^{-7}$	$1x\ 10^{-7}$
3	$1x\ 10^{-9}$	$3x\ 10^{-10}$
4	$3x\ 10^{-8}$	$1x\ 10^{-8}$
5	$3x\ 10^{-6}$	$1x\ 10^{-6}$
6	$3x\ 10^{-4}$	$1x\ 10^{-4}$
7	$3x\ 10^{-2}$	$1x\ 10^{-2}$
8	$3x\ 10^{-6}$	$1x\ 10^{-6}$
9	$1x\ 10^{-8}$	$3x\ 10^{-9}$

Estimated Unit Weight (see Lunne et al., 1997)

SBT	Approximate Unit Weight (lb/ft^3)	(kN/m^3)
1	111.4	17.5
2	79.6	12.5
3	111.4	17.5
4	114.6	18.0
5	114.6	18.0
6	114.6	18.0
7	117.8	18.5
8	120.9	19.0
9	124.1	19.5
10	127.3	20.0
11	130.5	20.5
12	120.9	19.0

Pore Pressure Dissipation Tests (PPDT)

Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals can be used to measure equilibrium water pressure (at the time of the CPT). If conditions are hydrostatic, the equilibrium water pressure can be used to determine the approximate depth of the ground water table. A PPDT is conducted when penetration is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure (*u)* with time is measured behind the tip of the cone and recorded.

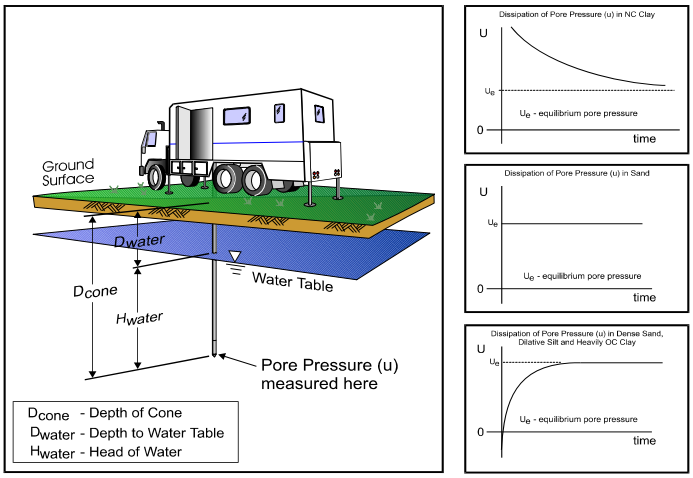
Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In situ horizontal coefficient of consolidation (c_h)
- In situ horizontal coefficient of permeability (k_h)

In order to correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until it reaches equilibrium, *Figure PPDT*. This time is commonly referred to as t_{100}, the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992 and Lunne et al. 1997.

A summary of the pore pressure dissipation tests are summarized in Table 1.



Water Table Calculation

$$D_{water} = D_{cone} - H_{water}$$

where $H_{water} = U_e$ (depth units)

Useful Conversion Factors: 1psi = 0.704m = 2.31 feet (water)
1tsf = 0.958 bar = 13.9 psi
1m = 3.28 feet

Figure PPDT

Seismic Cone Penetration Testing (SCPT)

Seismic Cone Penetration Testing (SCPT) can be conducted at various intervals during the Cone Penetration Test. Shear wave velocity (Vs) can then be calculated over a specified interval with depth. A small interval for seismic testing, such as 1-1.5m (3-5ft) allows for a detailed look at the shear wave profile with depth. Conversely, a larger interval such as 3-6m (10-20ft) allows for a more average shear wave velocity to be calculated. Gregg's cones have a horizontally active geophone located 0.2m (0.66ft) behind the tip.

To conduct the seismic shear wave test, the penetration of the cone is stopped and the rods are decoupled from the rig. An automatic hammer is triggered to send a shear wave into the soil. The distance from the source to the cone is calculated knowing the total depth of the cone and the horizontal offset distance between the source and the cone. To calculate an interval velocity, a minimum of two tests must be performed at two different depths. The arrival times between the two wave traces are compared to obtain the difference in time (Δt). The difference in depth is calculated (Δd) and velocity can be determined using the simple equation: $v = \Delta d/\Delta t$

Multiple wave traces can be recorded at the same depth to improve quality of the data.

A complete reference on seismic cone penetration tests is presented by Robertson et al. 1986 and Lunne et al. 1997.

A summary the shear wave velocities, arrival times and wave traces are provided with the report.

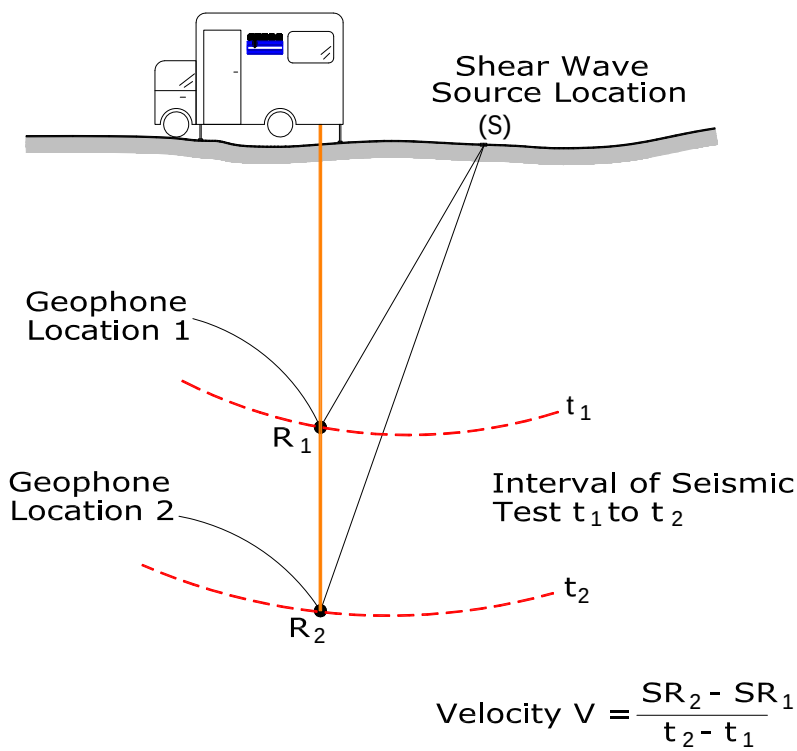


Figure SCPT

Groundwater Sampling

Gregg Drilling & Testing, Inc. conducts groundwater sampling using a sampler as shown in *Figure GWS*. The groundwater sampler has a retrievable stainless steel or disposable PVC screen with steel drop off tip. This allows for samples to be taken at multiple depth intervals within the same sounding location. In areas of slower water recharge, provisions may be made to set temporary PVC well screens during sampling to allow the pushing equipment to advance to the next sample location while the groundwater is allowed to infiltrate.

The groundwater sampler operates by advancing 44.5mm (1¾ inch) hollow push rods with the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired sample depth, the push rods are retracted; exposing the encased filter screen and allowing groundwater to infiltrate hydrostatically from the formation into the inlet screen. A small diameter bailer (approximately ½ or ¾ inch) is lowered through the push rods into the screen section for sample collection. The number of downhole trips with the bailer and time necessary to complete the sample collection at each depth interval is a function of sampling protocols, volume requirements, and the yield characteristics and storage capacity of the formation. Upon completion of sample collection, the push rods and sampler, with the exception of the PVC screen and steel drop off tip are retrieved to the ground surface, decontaminated and prepared for the next sampling event.

For a detailed reference on direct push groundwater sampling, refer to Zemo et. al., 1992.

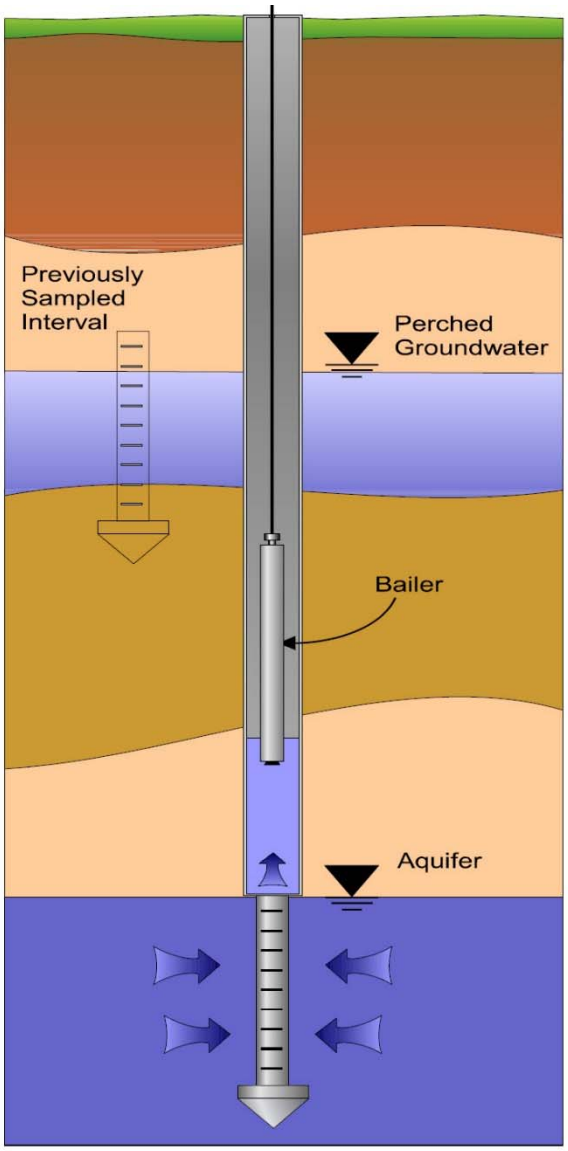


Figure GWS

Soil Sampling

Gregg Drilling & Testing, Inc. uses a piston-type push-in sampler to obtain small soil samples without generating any soil cuttings, *Figure SS*. Two different types of samplers (12 and 18 inch) are used depending on the soil type and density. The soil sampler is initially pushed in a "closed" position to the desired sampling interval using the CPT pushing equipment. Keeping the sampler closed minimizes the potential of cross contamination. The inner tip of the sampler is then retracted leaving a hollow soil sampler with inner 1¼" diameter sample tubes. The hollow sampler is then pushed in a locked "open" position to collect a soil sample. The filled sampler and push rods are then retrieved to the ground surface. Because the soil enters the sampler at a constant rate, the opportunity for 100% recovery is increased. For environmental analysis, the soil sample tube ends are sealed with Teflon and plastic caps. Often, a longer "split tube" can be used for geotechnical sampling.

For a detailed reference on direct push soil sampling, refer to Robertson et al, 1998.

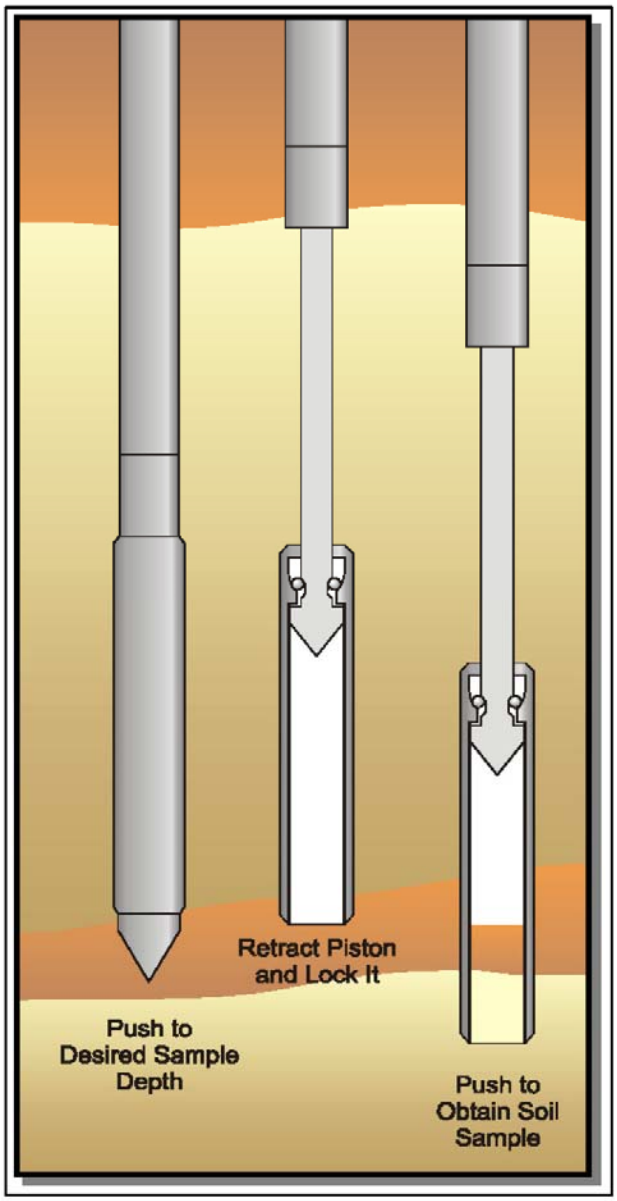


Figure SS

Ultra-Violet Induced Fluorescence (UVOST)

Gregg Drilling conducts Laser Induced Fluorescence (LIF) Cone Penetration Tests using a UVOST module that is located behind the standard piezocone, *Figure UVOST*. The laser induced fluorescence cone works on the principle that polycyclic aromatic hydrocarbons (PAH's), mixed with soil and/or groundwater, fluoresce when irradiated by ultra violet light. Therefore, by measuring the intensity of fluorescence, the lateral and vertical extent of hydrocarbon contamination in the ground can be estimated.

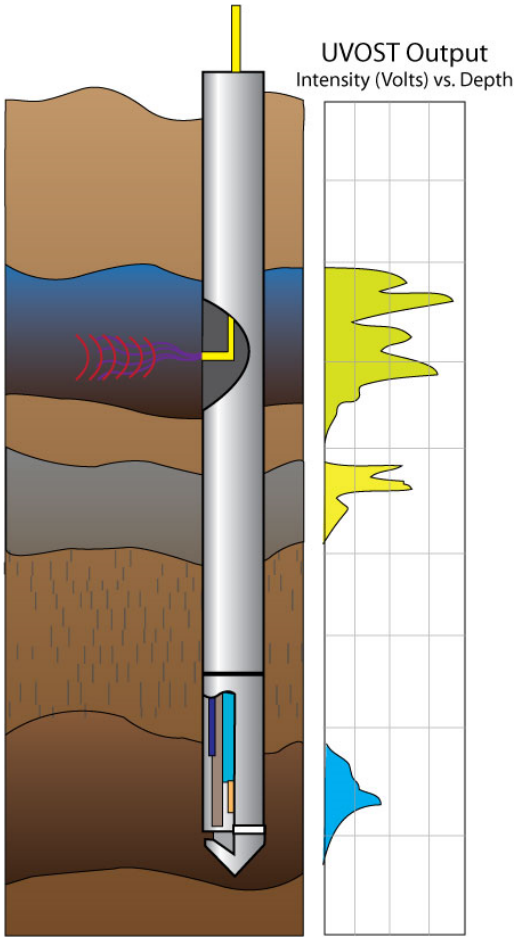


Figure UVOST

The UVOST module uses principles of fluorescence spectrometry by irradiating the soil with ultra violet light produced by a laser and transmitted to the cone through fiber optic cables. The UV light passes through a small window in the side of the cone into the soil. Any hydrocarbon molecules present in the soil absorb the light energy during radiation and immediately re-emit the light at a longer wavelength. This re-emission is termed fluorescence. The UVOST system also measures the emission decay with time at four different wavelengths (350nm, 400nm, 450nm, and 500nm). This allows the software to determine a product "signature" at each data point. This process provides a method to evaluate the type of contaminant. A sample output from the UVOST system is shown in *Figure Output*. In general, the typical detection limit for the UVOST system is <100 ppm and it will operate effectively above and below the saturated zone.

With the capability to push up to 200m (600ft) per day, laser induced fluorescence offers a fast and efficient means for delineating PAH contaminant plumes. Color coded logs offer qualitative information in a quick glance and can be produced in the field for real-time decision making. Coupled with the data provided by the CPT, a complete site assessment can be completed with no samples or cuttings, saving laboratory costs as well as site and environmental impact.

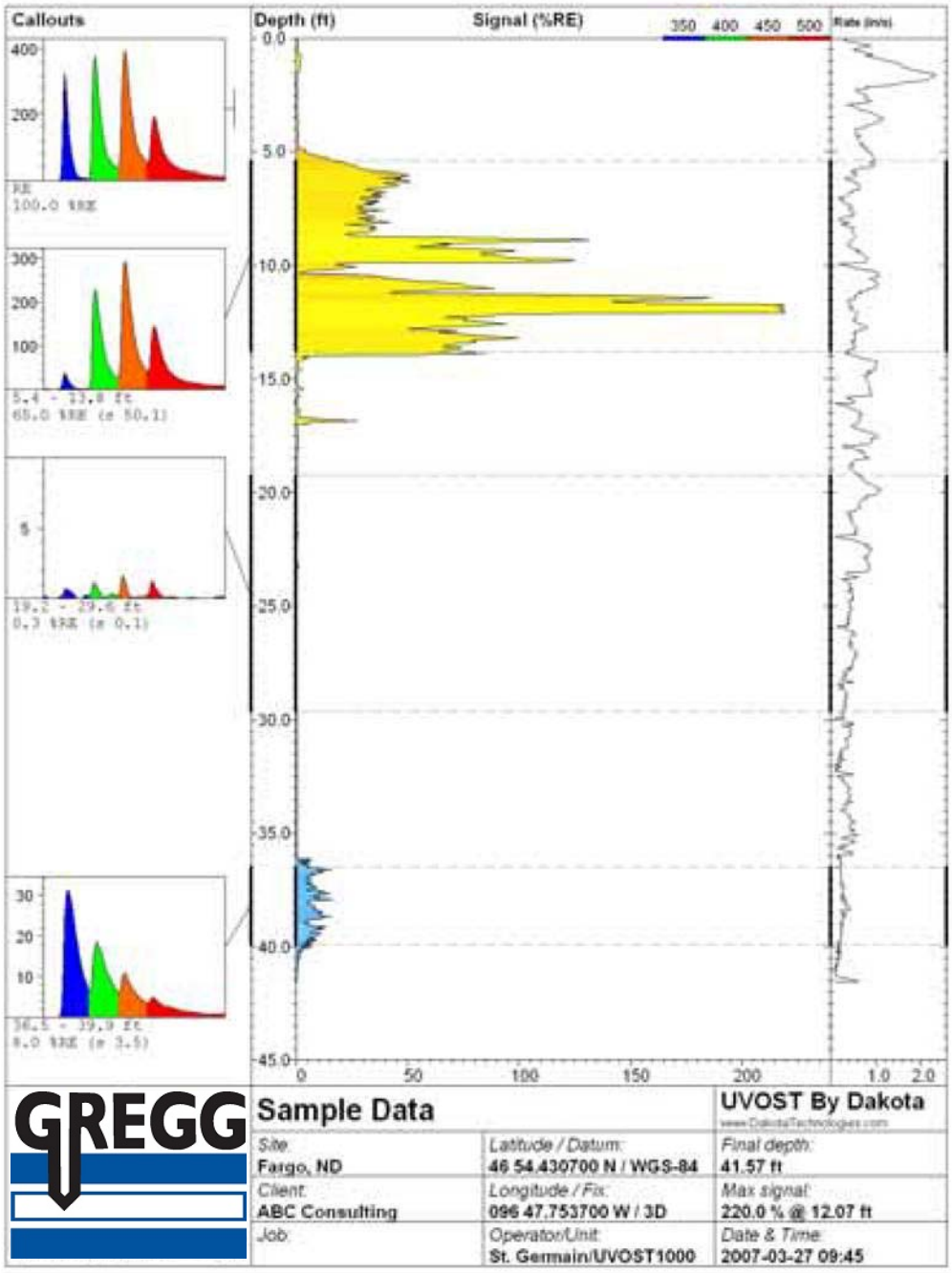


Figure Output

Hydrocarbons detected with UVOST

- Gasoline
- Diesel
- Jet (Kerasene)
- Motor Oil
- Cutting fluids
- Hydraulic fluids
- Crude Oil

Hydrocarbons rarely detected using UVOST

- Extremely weathered gasoline
- Coal tar
- Creosote
- Bunker Oil
- Polychlorinated bi-phenols (PCB's)
- Chlorinated solvent DNAPL
- Dissolved phase (aqueous) PAH's

Potential False Positives (fluorescence observed)

- Sea-shells (weak-medium)
- Paper (medium-strong depending on color)
- Peat/meadow mat (weak)
- Calcite/calcareous sands (weak)
- Tree roots (weak-medium)
- Sewer lines (medium-strong)

Potential False Negatives (do not fluoresce)

- Extremely weathered fuels (especially gasoline)
- Aviation gasoline (weak)
- "Dry" PAHs such as aqueous phase, lamp black, purifier chips
- Creosotes (most)
- Coal tars (most) gasoline (weak)
- Most chlorinated solvents
- Benzene, toluene, zylenes (relatively pure)

Dakota Technologies
UVOST Log Reference

2008-12-12

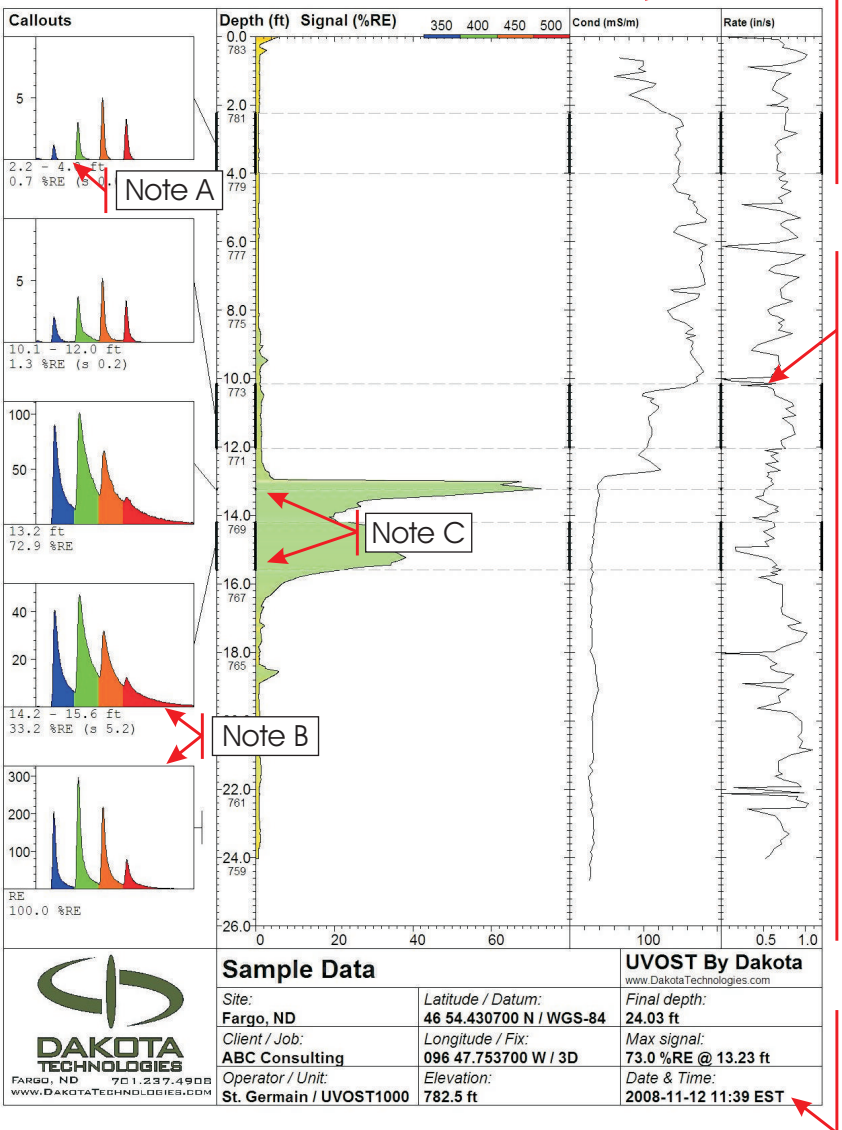
Main Plot :
Signal (total fluorescence) versus depth where signal is relative to the Reference Emitter (RE). The total area of the waveform is divided by the total area of the Reference Emitter yielding the %RE. This %RE scales with the NAPL fluorescence. The fill color is based on relative contribution of each channel's area to the total waveform area (see callout waveform). The channel-to-color relationship and corresponding wavelengths are given in the upper right corner of the main plot.

Callouts :
Waveforms from selected depths or depth ranges showing the multi-wavelength waveform for that depth.

The four peaks are due to fluorescence at four wavelengths and referred to as "channels". Each channel is assigned a color.

Various NAPLs will have a unique waveform "fingerprint" due to the relative amplitude of the four channels and/or broadening of one or more channels.

Basic waveform statistics and any operator notes are given below the callout.



Conductivity Plot :
The Electrical Conductivity (EC) of the soil can be logged simultaneously with the UVOST data. EC often provides insight into the stratigraphy.
Note the drop in EC from 10 - 13 ft, indicating a shift from consolidated to unconsolidated stratigraphy. This correlates with the observed NAPL distribution.

Rate Plot :
The rate of probe advancement. ~ 0.8in (2cm) per second is preferred.

A noticeable decrease in the rate of advancement may be indicative of difficult probing conditions (gravel, angular sands, etc.) such as that seen here at ~5 ft.

Notice that this log was terminated arbitrarily, not due to "refusal", which would have been indicated by a sudden rate drop at final depth.

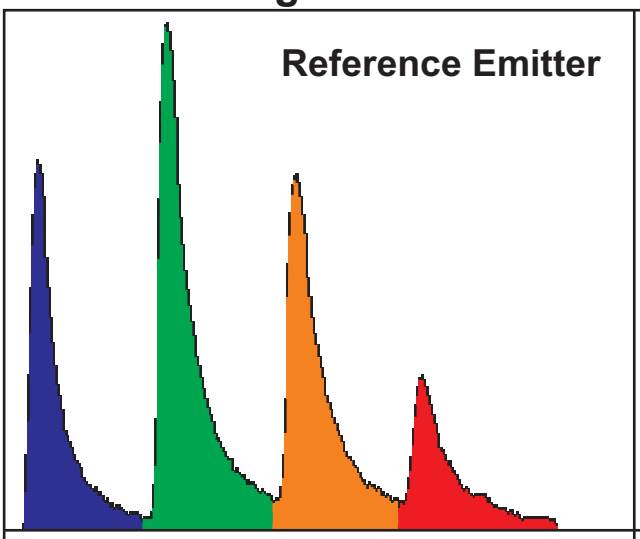
Info Box :
Contains pertinent log info including name and location.

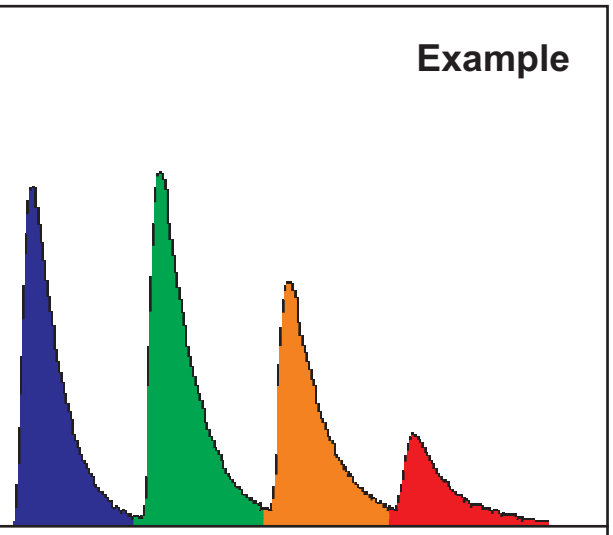
Note A :
Time is along the x axis. No scale is given, but it is a consistent 320ns wide.
The y axis is in mV and directly corresponds to the amount of light striking the photodetector.

Note B :
These two waveforms are clearly different. The first is weathered diesel from the log itself while the second is the Reference Emitter (a blend of NAPLs) always taken before each log for calibration.

Note C :
Callouts can be a single depth (see 3rd callout) or a range (see 4th callout). The range is noted on the depth axis by a bold line. When the callout is a range, the average and standard deviation in %RE is given below the callout.

Waveform Signal Calculation



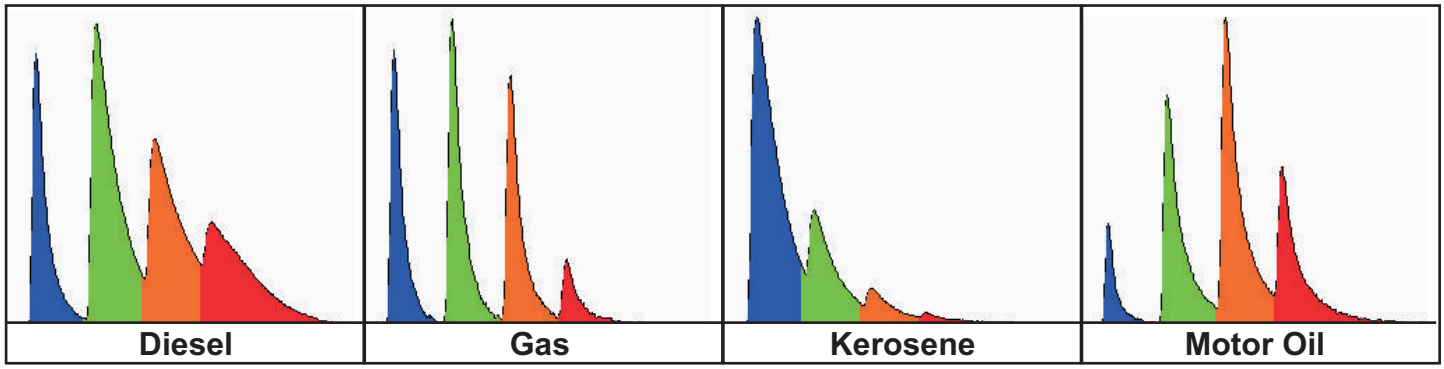


CH1		CH2		CH3		CH4		Total		CH1		CH2		CH3		CH4		Total
4820	+	8108	+	6249	+	2984	=	**22161**	***Channel Area (pVs)***	4923	+	5743	+	4166	+	1735	=	**16587**
21.7		36.6		28.2		13.5		**100%**	***Percent RE***	22.3		25.9		18.8		7.8		**75%**

Data Files

***.lif.raw.bin**	Raw data file. Header is ASCII format and contains information stored when the file was initially written (e.g. date, total depth, max signal, gps, etc., and any information entered by the operator). All raw waveforms are appended to the bottom of the file in a binary format.
***.lif.plt**	Stores the plot scheme history (e.g. callout depths) for associated Raw file. Transfer along with the Raw file in order to recall previous plots.
***.lif.jpg**	A jpg image of the OST log including the main signal vs. depth plot, callouts, information, etc.
***.lif.dat.txt**	Data export of a single Raw file. ASCII tab delimited format. No string header is provided for the columns (to make importing into other programs easier). Each row is a unique depth reading. The columns are: Depth, Total Signal (%RE), Ch1%, Ch2%, Ch3%, Ch4%, Rate, Conductivity Depth, Conductivity Signal, Hammer Rate. Summing channels 1 to 4 yields the Total Signal.
***.lif.sum.txt**	A summary file for a number of Raw files. ASCII tab delimited format. The file contains a string header. The summary includes one row for each Raw file and contains information for each file including: the file name, gps coordinates, max depth, max signal, and depth at which the max signal occured.
***.lif.log.txt**	An activity log generated automatically located in the OST application directory in the 'log' subfolder. Each OST unit the computer operates will generate a separate log file per month. A log file contains much of the header information contained within each separate Raw file, including: date, total depth, max signal, etc.

Common Waveforms (highly dependent on soil, weathering, etc.)



Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (feet)	Depth of Groundwater Samples (feet)	Depth of Soil Samples (feet)	Depth of Pore Pressure Dissipation Tests (feet)
SAIA-CPT-21	6/14/16	117	-	-	-
SAIA-CPT-22	6/14/16	98	-	-	70.9

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Copies of ASTM Standards are available through www.astm.org

Project SAIA

Project Number 07163.0004

Location Seam Masters

Surface Elevation n/a

Logged By E. Gilleva

Date Drilled 4/5/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB1

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly graded sand; loose; light brown & olive gray; dry; 95% fine sand; 5% fines.
2							No change.
5							Poorly graded sand; loose; brown & greenish gray; dry; mostly fine sand; trace fines.
15							Poorly graded sand; loose; yellowish brown & olive gray; damp; 90% fine sand; 10% fines.
25							Silty sand; med. stiff; light brown; damp; 50% fine sand; 50% fines. low plasticity.
35							Poorly graded sand; loose; olive gray & light gray; dry; 85% med to fine sand; 15% fines.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0064

Location Seam Masters

Surface Elevation n/a

Logged By E. Gillera

Date Drilled 4/1/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB03

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly graded sand; loose; olive gray & dark gray; dry; mostly fine sands; trace fines.
2							No change.
5							Silty sand; med. stiff; olive gray; dry; 60% fine sand; 40% fines; low plasticity.
15							Silty sand; med. stiff; olive gray & dark gray; damp; 50% fine sand; 50% fines; low plasticity
25							No change.
35							Poorly graded sand; loose; light gray & olive gray; dry; 90% fine sand; 10% fines.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0004

Location Steam Masters

Surface Elevation n/a

Logged By E. Gilbert

Date Drilled 4/1/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB4

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly graded sand; loose; olive gray; dry; mostly fine sand; trace fines.
2							No change.
5							Poorly graded sand; loose; olive gray; dry 70% med to fine sand; 30% fines.
15							Silty sand; med. stiff; brown & dark gray; damp; mostly fine sand; 25% fines; med. plasticity.
25							Silty sand; soft; olive gray & dark gray; damp; 60% ~~fine~~ fine sand; 40% fines; low plasticity.
35							No change.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0004

Location Steam Masters

Surface Elevation n/a

Logged By E. Gillera

Date Drilled 4/3/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB6

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Moderately graded sand; loose; ~~tan~~ light gray to dark gray; dry; mostly sand, med. to fine; trace fines.
2							No change.
5							Poorly graded sand; loose; olive gray; dry; 75% fine sand; 25% fines.
15							silty sand; med. stiff; light gray; damp; 60% fine sand; 40% fines; med. plasticity.
25							Silty sand; med. stiff; light gray to dark gray; moist; 70% fine sand; 30% fines; med. plasticity.
35							Poorly graded sand; loose; olive gray & light gray; damp; 65% fine sand.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0064

Location Seam Masters

Surface Elevation w/a

Logged By E. Gillera

Date Drilled 4/3/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB8

Sheet 1 Of 1

Boring Location Sketch

AZ

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly ~~sorted sand~~ graded sand: loose; olive gray; dry; 95 % fine sand; 5 % fines
2							Moderately graded sand; loose; light gray & light brown; dry; Mostly sand, med. to fine; trace fines.
5							Poorly graded sand; loose; light gray & olive gray; dry; 60 % fine sand; 40 % fines.
15							Silty sand; med. stiff; light gray; damp; 60 % fine sand; 40 % fines; med. plasticity.
25							No change.
35							Poorly graded sand: loose; greenish gray & light brown; dry; 90 % med to fine sand; 10 % fines.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

ITSI Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0064

Location Steam Masters

Surface Elevation n/a

Logged By E. Gillera

Date Drilled 4/5/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB9

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly graded sand; loose; dark gray; dry; mostly sand, fine; trace fines.
2							No change
5							No change
15							Poorly graded sand; loose; olive gray; dry; 80% fine sand; 20% fines.
25							Poorly graded sand; loose; olive gray & greenish gray; damp; 70% fine sand; 30% fines.
35							Poorly graded sand; loose; olive gray; dry; 75% fine sand; 25% fines.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

ITSI Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0064

Location Seam Masters

Surface Elevation w/g

Logged By E. Gallera

Date Drilled 4/5/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB10

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly graded sand; loose; olive gray & light gray; dry; mostly sand, fine; trace fines.
2							No change.
5							No change.
15							Silty sand; med. stiff; olive gray; damp; mostly fines; some fine sand; med. plasticity.
25							No change.
35							Poorly sorted sand; loose; greenish gray; ~~damp~~ moist; 90% fine sand; 10% fines.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

Innovative Technical Solutions, Inc.

Project SAIA

Project Number 07163.0004

Location Scam Masters

Surface Elevation n/a

Logged By E. Gillera

Date Drilled 4/3/13

Total Depth 35'

Boring Diameter 2"

Drillers Gregg Drilling

Method direct push

Boring No. SAIA-SB11

Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0.5							Poorly graded sand; loose; yellowish brown & dark gray; dry; 95% med to fine sand; trace fines.
2							No change.
5							No change.
15							Poorly graded sand; loose; olive gray & dark brown; damp; 80% sand, fine; 20% fines.
25							Silty sand: med stiff; olive gray & light gray; moist; mostly fines; some fine sand; med. plasticity.
35							Poorly graded sand; loose; olive gray & light brown; damp; 90% fine sand; 10% fines.

Casing Diameter _____ Casing Length _____ From _____ To _____

Screen Size _____ Screen Length _____ From _____ To _____

Sand Type _____ From _____ To _____

Bentonite Type _____ From _____ To _____

Cement/Grout _____ From _____ To _____

Surface Completion _____

ITSI Innovative Technical Solutions, Inc.

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Soils Log Form

Boring No.	SAIA - SB/SG 19

Project: SAIA RI/FS
Project No.: 07163-0064.FJ0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/16/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/16/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (X PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
														SCN	
4.2												CONCRETE (5" THICK)			
4												LIGHT YELLOWISH BROWN (2.5Y 6/4) SILTY SAND. VERY FINE TO FINE GRAINED, MODERATELY WELL SORTED, WELL ROUNDED TO SUB-ANGULAR, CLEAR, MILKY AND FROSTED QUARTZ, BIOTITE, CHERT, FELDSPAR. DRY	SP	4.5	5.0
12'				0.7								DARK GREENISH GRAY (GLEY1 4/1) SILTY SAND. VERY FINE TO FINE GRAINED, MODERATELY SORTED, WELL ROUNDED TO SUB-ROUNDED. CLEAR, MILKY AND FROSTED QUARTZ, BIOTITE, CHERT. STRONG PETROLEUM ODOR, STAINED SOIL. MOIST	SP	14.5	15.0
17'				32.4								SAA (BAGGED BULK SOIL SAMPLE - 32.4 PPM)			
22'												SAA WITH INCREASE IN SILT AND DECREASE IN PETROLEUM ODOR		24.5	25.0
26'												DARK GREENISH GRAY (GLEY1 4/1) SANDY CLAY. ELASTIC, MEDIUM STIFF. SLIGHT TO MODERATE PETROLEUM ODOR. MOIST	CL		
31'												GREENISH GRAY (GLEY1 5/1) SILTY SAND. VERY FINE GRAINED, VERY WELL SORTED, WELL ROUNDED TO SUB-ANGULAR. CLEAR, SMOKEY AND FROSTED QUARTZ, BIOTITE, CHERT, FELDSPAR, ULTRAMAFICS. SLIGHT PETROLEUM ODOR. VERY MOIST	SP	34.5	35.0
35												PALE GREEN (GLEY1 6/2) SAND. VERY FINE GRAINED, VERY WELL SORTED, SUB-ANGULAR TO SUB-ROUNDED. CLEAR, MILKY, FROSTED QUARTZ, BIOTITE, CHERT, MAFICS. SLIGHT PETROLEUM ODOR. VERY MOIST	SP		

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG 20

Project: SAIA RI/FS
Project No.: 07163.0064.FI0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/18/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/18/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (X PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const. Annulus	Casing
0												CONCRETE (3" THICK)			SCN
8"				2.3								DARK GRAY (GLEY1 5/1) GRAVELLY SAND. VERY COARSE GRAINED SAND TO COARSE PEBBLE GRAVEL CLASTS. VERY STRONG PETROLEUM ODOR. TAR STAINING ON GRAVEL CLASTS. DRY	GP		
5'				79.8								GREENISH GRAY (GLEY1 5/1) SILTY SAND FINE TO VERY FINE GRAINED, MODERATELY SORTED, WELL ROUNDED. CLEAR, MILKY, FROSTED AND SMOKEY QUARTZ, BIOTITE, CHERT, ULTRA MAFICS. EVIDENCE OF PETROLEUM STAINING AND ODOR. MOIST (BAGGED BULK SOIL SAMPLE 79.8 PPM)	SP	4.5	5.0
10'												SAA WITH PERSISTANCE OF PETROLEUM ODOR			
15'												SAA WITH INCREASE IN SILT AND PERSISTANCE OF PETROLEUM ODOR	CL	14.5	15.0
17'												DARK GREENISH GRAY (GLEY1 4/1) SILTY CLAY, FIRM, MEDIUM PLASTIC. STRONG PETROLEUM ODOR. VERY MOIST			
22'				140.7								SAA WITH CONTINUED PERSISTANCE OF PETROLEUM CONTAMINATION (BAGGED BULK SOIL SAMPLE 140.7 PPM)			
26'				12.9								OLIVE BROWN (2.5Y 4/4) TO GRAYISH BROWN (2.5Y 5/2) SAND. VERY FINE GRAINED, WELL ROUNDED TO SUB-ANGULAR. CLEAR, MILKY, SMOKEY AND FROSTED QUARTZ, BIOTITE, CHERT, MAFICS AND ULTRA MAFICS. SLIGHT DECREASE IN PETROLEUM ODOR. VERY MOIST (BAGGED BULK SOIL SAMPLE 12.9 PPM)	SP	24.5	25.0
35'												SAA, VERY MOIST	34.5		35.0

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG21

Project: SAIA RI/FS
Project No.: 07163.0064.FJ0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/18/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/18/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus (SC)	Casing (N)
0												REDDISH BROWN (5YR 4/4) SILTY SAND. MEDIUM TO VERY COARSE GRAINED, VERY POORLY SORTED. CLEAR, MILKY, SMOKY QUARTZ, BIOTITE, ULTRA MAFICS WITH COMMON IRON STAINING. MINOR AMOUNTS TO TRACE AMOUNTS OF CLAY. VERY MOIST.	SP		
														4.5	
5'												OLIVE BROWN (2.5Y 4/4) SILTY SAND. FINE TO VERY FINE GRAINED, MODERATELY TO SUB-ROUNDED. CLEAR, MILKY AND SMOKY QUARTZ, BIOTITE, CHERT, ULTRA MAFICS. SLIGHTLY MOIST	SP	5.0	
11'				39.7								SAA WITH STRONG PETROLEUM ODOR (BAGGED SAMPLE 39.7 PPM			
														14.5	
16'												GREENISH GRAY (GLEY1 5/1) SILT. FIRM, MOIST. STRONG PETROLEUM ODOR	ML	15.0	
				29.1								(BAGGED BULK SOIL SAMPLE 29.1 PPM)			
21'												SAA WITH PRESENCE OF CLAY IN MODERATELY MINOR AMOUNTS. STRONG PETROLEUM ODOR			
26'												SAA		24.5	
														25.0	
31'												GREENISH GRAY (GLEY1 5/1) SAND. VERY FINE TO FINE GRAINED, SUB-ANGULAR TO ROUNDED. CLEAR, MILKY QUARTZ, BIOTITE, CHERT, ULTRA MAFICS, FELDSPAR. CONTINUED EVIDENCE OF PETROLEUM CONTAMINATION.	SP		
35'				4.3								SAA WITH SIGNIFICANT DECREASE IN PETROLEUM ODOR.		34.5	
														35.0	

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG22

Project: SAIA RI/FS
Project No.: 07163.0064.FJ0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/18/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/18/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (X PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
6"				53.7								GREENISH GRAY (GLEY 1 5/1) SILTY SAND. MEDIUM TO VERY FINE GRAINED, POORLY SORTED, ANGULAR TO SUB-ROUND. CLEAR, MILKY AND SMOKY QUARTZ, BIOTITE, CHERT, ULTRA MAFICS. STRONG PETROLEUM ODOR. (BAGGED BULK SOIL SAMPLE 53.7 PPM)	SP	4.5	5.0
7'												OLIVE BROWN (2.5Y 4/4) SILTY SAND. MEDIUM TO VERY FINE GRAINED, POORLY SORTED, SUB-ANGULAR TO ROUND. CLEAR AND MILKY QUARTZ, BIOTITE, CHERT, MAFICS, FELDSPAR. MOIST	SP		
12'												SAA		14.5	15.0
15'												GREENISH GRAY (GLEY 1 5/1) SANDY SILT. FIRM TO STIFF WITH SLIGHTLY PLASTIC CLAY	ML		
20'												SAA WITH DECREASE IN SAND AND INCREASE IN CLAY			
25'												SAA W/ INCREASE IN SAND		24.5	25.0
26'												GRAY (2.5Y 5/1) CLAY. MEDIUM PLASTIC. FIRM, VERY MOIST	CL		
30'												GREENISH GRAY (GLEY 1 5/1) SAND. VERY FINE GRAINED, WELL SORTED, SUB-ANGULAR TO WELL ROUNDED. CLEAR, MILKY, FROSTED QUARTZ, BIOTITE, CHERT. MOIST TO VERY MOIST	SP	34.5	35.0
35'												SAA			

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG23

Project: SAIA RI/FS
Project No.: 07163.0064.FI0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/14/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/14/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (X PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const. Annulus	Casing
0												CONCRETE (8" THICK)	SZ		
8"												OLIVE BROWN (2.5 Y 4/4) SILTY SAND. VERY FINE TO MEDIUM GRAINED, WELL ROUNDED TO SUB-ANGULAR, WELL SORTED. CLEAR AND MILKY QUARTZ, BIOTITE, ULTRA MAFICS, FELDSPAR. SLIGHTLY MOIST.			
														4.5	5.0
5'												SAA			
10'												SAA			
16'												OLIVE BROWN (2.5Y 4/4) CLAYEY SILT. SOFT TO MEDIUM FIRM. VERY MOIST	ML	14.5	15.0
19'												DARK GRAYISH BROWN (2.5 Y 4/2) SILTY CLAY. MEDIUM PLASTIC, FIRM. VERY MOIST	CL		
24'												SAA		24.5	25.0
28'												GRAYISH BROWN (2.5 Y 5/2) CLAYEY, SANDY SILT	ML		
31'												GRAY (2.5 Y 4/1) SAND. VERY FINE TO FINE GRAINED, MODERATELY WELL SORTED, SUB-ANGULAR TO ROUNDED. CLEAR, MILKY, FROSTED QUARTZ, BIOTITE, ULTRA MAFICS. MOIST	SP		
35'												SAA		34.5	35.0

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG Z4

Project: SAIA RI/FS
Project No.: 07163.0064.FJ0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/16/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/16/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (✓ PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const. Annulus	Casing
41.2												CONCRETE (3" THICK)		SCN	
+1												OLIVE BROWN (2.5Y 5/6) SILTY SAND, VERY FINE TO FINE GRAINED, MODERATELY-WELL SORTED, WELL ROUNDED TO ROUNDED. CLEAR, MILKY AND FROSTED QUARTZ, BIOTITE, CHERT, ULTRAMAFICS. SLIGHTLY MOIST	SP	4.5 5.0	
4'												SAA			
9'												SAA			
14'												SAA WITH INCREASE IN MOISTURE AND COLOR CHANGE TO BROWN (10YR 5/3) AND GREENISH GRAY (GLEY 1 5/1)		14.5 15.0	
19'												GREENISH GRAY (GLEY 1 5/1) SILTY CLAY. FIRM, MEDIUM PLASTIC, VERY MOIST	CL		
24'												SAA		24.5 25.0	
29'												GRAYISH BROWN (10YR 5/2) SAND, VERY FINE GRAIND, WELL ROUNDED, WELL SORTED. CLEAR AND MILKY QUARTZ, BIOTITE, ULTRA MAFICS. VERY MOIST	SP		
35'												SAA		34.5 35.0	

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG Z5

Project: SAIA RI/FS
Project No.: 07163.0064.FJ0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/14/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/14/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (X PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0														SCN	
												CONCRETE (6" THICK)			
4"												LIGHT OLIVE BROWN (2.5Y 5/6) SILTY SAND. VERY FINE TO FINE GRAINED, MODERATELY TO WELL ROUNDED, MODERATELY-WELL SORTED. CLEAR AND SMOKEY QUARTZ, BIOTITE, ULTRA MAFICS, CHERT, FELDSPAR. MOIST	SP		
														4.5	
														5.0	
5'												SAA			
9'												OLIVE GRAY (5Y 5/2) TO GRAYISH BROWN (2.5Y 5/2) CLAYEY SILT / SILTY CLAY. SLIGHTLY PLASTIC, FIRM, MOIST	ML/CL		
17'												SAA		14.5	
														15.0	
18'												GRAYISH BROWN (2.5Y 5/2) SILTY CLAY. PLASTIC, FIRM, MOIST	CL		
21'												DARK GRAY (2.5Y 4/1) SILTY SAND. VERY FINE GRAINED, WELL ROUNDED, WELL SORTED. CLEAR, SMOKEY, MILKY AND FROSTED QUARTZ, BIOTITE, MAFICS, CHERT. MOIST	SP		
														24.5	
25'														25.0	
												DARK GRAY (2.5Y 4/1) CLAYEY, SANDY SILT.	ML		
32'												GRAY (2.5Y 5/1) SAND. VERY FINE GRAINED, WELL SORTED, WELL ROUNDED TO SUB-ANGULAR. CLEAR AND MILKY QUARTZ, BIOTITE, CHERT. VERY MOIST			
35'														34.5	
												SAA		35.0	

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Gilbane

Soils Log Form

Boring No.	SA1A-SB/SG26

Project: SA1A RI/FS
Project No.: 87163.0064.FI0301
Page 1 of 1
Client: US EPA
Start Date: 4/16/14
Logged By: PJP
Location: SOUTH GATE, CA.
Completion Date:
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
+1.5												CONCRETE			
+1												YELLOWISH BRN (10YR 5/4) SILTY SAND. VF TO FG., MOD. WELL SORTED, WELL RND., CLR, MILKY & FROSTED QTZ, BIOT, LC. STAIN MOIST			
5												SAA w/↑ MOISTURE			
11'												GRAYISH BRN (10YR 5/2) SILTY SAND VF TO FG. MOD WELL SORTED, WELL RND, LITH AS ABOVE, VERY MOIST			
16												SAA w/ M. YELLOWISH BRN. MOTTLES, V. MOIST			
21												SAA w/ LOW ↑ MOISTURE AND FE STAINING			
23												GREENISH OK GRAY (GLEY 1 5/1) SILTY CLAY/ CLAYEY SILT. V. SL PLASTIC, FIRM, V MOIST. W/ MOD. COMMON FE STAINING AND LT GRAY MOTTLES			
28												SAA w/ ↑ SILT & FE STAINING & SATURATED CONDITIONS			

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Gilbane

Soils Log Form

Boring No.	SAIA - SB/SS27

Project: SAIA RI/FS
Project No.: 0763.006k.F03B
Page 1 of 1
Client: US EPA
Start Date: 4/14/14
Logged By: PJP
Location: South Gate CA.
Completion Date: 4/14/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
4''												GRAYISH BRN (10 YR 5/2-5/3) SILTY SAND, VF TO FG, MOD. SORTED, MOD W RND. BIOT, CLEAR & MILKY QTZ, ULTRA MAFICS, SLIGHTLY MOIST			
2'												BRN (7.5YR 5/3) SILTY SAND / SANDY SILT, VFG, WELL SORTED, CLEAR AND MILKEY QTZ., BIOT, CHERT, MINOR IRON STAINING, MOIST			
7'												SAA			
12'												SAA W/ ↑ MOISTURE AND SILT			
17''												SAA W/ ↑ SILT & CLAY			
18'												DK GRAYISH BRN (2.5Y 4/1) SILTY CLAY / CLAYEY SILT, MOD. PLASTIC, MOD FIRM, LOW PLASTICITY, MOD TO COMMON IRON STAINING, MODERATELY MOIST TO MOIST			
22''												MOD. BRN (7.5YR 5/3) SILTY SAND / SANDY SILT. VFG, V. WELL SORTED, CLR & MILKY QTZ., BIOT., ULTRA MAFICS, V SL MOIST			
24''												GREENISH GRAY (GLEY1 5/1-5/2) CLAYEY SILT, MOIST, BIOT., ULTRA MAFICS, CLR, MILKY, FROSTED QTZ.			
28'												M GRAY (GLEY1 6/ —) SAND, VW RND, VW SORTED, MILKY, CLR & FROSTED QTZ., CHERT, BIOT. KSPAR ULTRAMAFICS, V SL MOIST			
35'												SAA			

Signature (logging geologist): [signature] Date: 4/21/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA - SB/SG 28

Project: SAIA RI/FS
Project No.: 07163.0064.FJ0301
Page 1 of 1
Client: U.S. EPA
Start Date: 4/14/14
Logged By: P. PHILLIPS
Location: SOUTH GATE, CA.
Completion Date: 4/14/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
4"												LT. YELLOWISH BROWN (2.5Y 6/4) SAND. VFG WELL SORTED, SLIGHTLY SILTY; CLEAR, FROSTED AND MILKY QUARTZ, BIOTITE, FELDSPAR, CHERT; VERY SLIGHTLY MOIST W/ IRON STAINING			
5'												SAA			
9'												SAA W/ ↑ SILT AND MOISTURE			
14'												DARK GREENISH GRAY (GLEY1 4/1) CLAYEY SILT/SILTY CLAY. MODERATE TO SLIGHTLY PLASTIC, FIRM, MODERATELY MOIST.			
19'												SAA			
21'												DARK GREENISH GRAY (GLEY1 4/1) CLAYEY SILT. ABUNDANT BIOTITE AND MAFICS, MOIST TO MODERATELY MOIST			
26'												SAA			
29'												GRAY (2.5Y 6/-) SAND. VFG TO FG, MOD.-WELL SORTED, WELL ROUNDED; CLEAR, FROSTY AND MILKY QUARTZ, BIOTITE, CHERT, FELDSPAR, MINOR ULTRA MAFICS; SLIGHTLY MOIST			
35'												SAA W/ ↑ MOISTURE			

Signature (logging geologist): [signature] Date: 4/14/14
Signature (reviewer): [signature] Date: 4/23/14

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Soils Log Form

Boring No.	SAIA SB/SG29

Project: SAIA RI/FS
Project No.: 07163.0064.FI0301
Page 1 of 1
Client: US EPA
Start Date: 4/16/14
Logged By: PJP
Location: SOUTH GATE, CA.
Completion Date: 4/16/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
+1.5												YELLOWISH BRN TO MED REDDISH BRN (5YR 4/4) GRAVELY SAND. MG TO VFG, V. POORLY SORTED ANG TO VW RND. CLR, SMOKY & FROSTED QTZ, BIOT, ULTRA MAFICS, CHERT. & UNIDENTIFIABLE			
4															
9'												SAA			
12'												M. DK BRNISH GRAY / GRAYISH BRN (10YR 5/2) SILTY SAND. QTZ., BIOT, ULTRA MAFICS, V. MOIST			
17'												SAA w/ SIG. ↑ MOISTURE			
18'												GREENISH GRAY (GLEY 1 5/1) SILTY CLAY. M. PLASTIC., FIRM, MOD. DILATANCY, MOIST			
23												GREENISH TO YELLOWISH BRN (2.5Y 6/4) SILTY SAND. VFG., W SORTED, WELL RND. CLR, MILKY, FROSTED QTZ., BIOT., ULTRA MAFICS, K-SPAR, MOD. MOIST			
26												GREENISH GRAY (GLEY 1 5/1) SILTY SAND / SAND & SILT. VFG, V WELL SORTED, WELL RND. W/ FE STAINING AND DESICATED LT GRAY ~~VFG SS~~ RX CLASTS, MOIST			
28												YELLOWISH BRN (10YR 5/6) SILTY SAND. VERY FG, W RND, VW SORTED, CLR., FROSTED, SMOKY QTZ., BIOT., K-SPAR, ULTRA MAFICS CHERT, MODERATELY TO SL. MOIST			
35												SAA			

Signature (logging geologist): [signature] Date: 4/16/14
Signature (reviewer): [signature] Date: 4/24/14

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Soils Log Form

Boring No.	SA1A · SB 1/SG 30

Project: SA1A RI/FS
Project No.: 07163.0064.F10301
Page 1 of 1
Client: US EPA
Start Date: 4/15/14
Logged By: PJP
Location: South Gate, CA.
Completion Date: 4/15/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
3"												ASPHALT			
5												M BRN (10YR 5/4) SILTY SAND. VFG. W RND, VW SORTED, MILKY, CLR, FROSTED QTZ., BIOT., ULTRA MAFICS			
9												SAA W/ SL ↑ MOISTURE			
14'												SAA W/ CONT. ↑ MOISTURE			
19'												SAA W/ SL. ↑ IN SILT			
23												GRAYISH BRN (10YR 5/2) SANDY SILT. MOD ABUNDANT VFG, W RND. SAND, BIOT.			
30												M BRN (10YR 4/3) SILTY SAND. VFG. W RND, VW SORTED; BIOT., CLR, FROSTED & SMOKEY QTZ., CHERT., K-SPAR			
35												SAA			

Signature (logging geologist): [signature] Date: 4/15/14
Signature (reviewer): [signature] Date: 4/24/14

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Soils Log Form

Boring No.	SAIA-SB/SG31

Project: SAIA RI/FS
Project No.: 07163.0064.FD0301
Page 1 of 1
Client: US EPA
Start Date: 4/15/14
Logged By: PJP
Location: South Gate, CA.
Completion Date: 4/15/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
5"												ASPHALT			
5'												GREYISH BRN (10YR 5/2) SILTY SAND. VFG, WELL TO MOD WELL RND, MOD SORTED, CLR, FROSTED/ MILKY QTZ., BIOT, ULTRA MAFICS, MOIST			
—															
9												SAA			
13												SAA w/ ↑ MOISTURE AND SILT			
17'												SAA w/ CONT ↑ MOISTURE & SILT, SOME FE STAINING			
—															
19'												GRAYISH BRN (10YR 4/2) CLAYEY SILT / SILTY CLAY, FIRM, SL TO MOD PLASTIC, MOD. DILATANCY, MOD MOIST w/ STREAKED TO MOTTLED FE STAINS			
—															
24												GRAYISH BRN (10YR 4/2) SILTY SAND. VFG, VW SORTED, W RND., CLR., FROSTED & SMOKED/ QTZ., BIOT., CHERT, MAFICS, MOD. MOIST			
—															
28'												SAA w/ ↓ SILT			
—															
32	33											SAA			
35'												SAA w/ CONT. ↓ SILT TO < 20%			
—															
—															
—															
—															
—															
—															

Signature (logging geologist): [signature] Date: 4/15/14
Signature (reviewer): [signature] Date: 4/28/14

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Soils Log Form

Boring No.	SAIA - SB/SG32

Project: SAIA RI/FS
Project No.: 07163.0064.F10301
Page 1 of 1
Client: US EPA
Start Date: 4/15/14
Logged By: PJP
Location: SOUTH GATE, CA.
Completion Date: 4/15/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (__ PID __ FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												ASPHALT			
2"												YELLOWISH BRN (10YR 5/4) SILTY SAND, W/ RND VF TO FG, MOD. SORTED, CLR, MILKY & FROSTED QTZ, BIOT., CHERT			
12'												GREENISH GRAY (GLEY 1 5/1) SANDY SILT, QTZ., BIOT.			
16												GREENISH GRAY (GLEY 1 5/1) SILTY CLAY / CLAYEY SILT. FIRM, LOW PLASTICITY, SL MOIST			
22												YELLOWISH TO GREENISH GRAY (GLEY 1 5/2) SILTY CLAY. MOD. PLASTIC, FE STAINING			
26												SAA W/ ↑ SILT			
28												YELLOWISH BRN (2.5YR 6/4) SILTY SAND, W/ RND VF TO FG, MOD-WELL SORTED, CLR, MILKY AND FROSTED QTZ., BIOT., ULTRA MAFICS, K-SPAR			
33												SAA			
35												SAA W/ ↑ FG SAND PERCENTAGE TO 20%			

Signature (logging geologist): [signature] Date: 4/15/14
Signature (reviewer): [signature] Date: 4/24/14

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Soils Log Form

Boring No.	SAIA-SB/SG 33

Project: SAIA RI/FS
Project No.: 07163.0064.FD0301
Page 1 of 1
Client: US EPA
Start Date: 4/15/14
Logged By: PJP
Location: SOUTH GATE, CA.
Completion Date: 4/15/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
6"												MBRN (10YR 4/3) SILTY SAND. VFTO FG, MOD. WELL SORTED. CLR, SMOKY, FROST QTZ BIOT, V SL MOIST			
5'												GREENISH GRAY (GLEY 1 6/1) SILTY SAND. VFG, W SORTED, MOIST, CLR, SMOKY, FROSTED QTZ., BIOT, ULTRA MAFICS, SL PETRO ODER			
11'															
16'												SAA w/ ↑ PETROL. ODER (BREATHING ZONE 0.0 PPM SAMPLE ≈ 340 PPM BORE HOLE ≈ 3.2 PPM)			
21'												SAA w/ SL. ↑ SILT. PETROL ODER ↓ (WORK BREATHING ZONE 0.2 PPM, SAMPLE - 27 PPM, BOREHOLE - 1.2 PPM)			
23												GREENISH GRAY (GLEY 1 5/1) SILTY CLAY / CLAYEY SILT, MOD. FIRM, LOW PLASTIC, SL PETROL ODER			
27												GREENISH GRAY (GLEY 1 5/1) SILTY SAND. VFG, W SORTED, CLR, MILKY QTZ., BIOT., CHERT, ULTRA MAFICS, V SL MOIST			
31												MBRN (10YR 4/2) SAND. VFTO FG, MOD SORTED, MOD W RND, CLR, SMOKEY, FROSTED QTZ, BIOT., CHERT, ULTRA MAFICS, K-SPAR, MOIST			
35												SAA			

Signature (logging geologist): [signature] Date: 4/15/14
Signature (reviewer): [signature] Date: 4/24/14

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Soils Log Form

Boring No.	SAIA-SB/SG 34

Project: SAIA RI/FS
Project No.: 07163.0064.FI0301
Page 6 of 1
Client: US EPA
Start Date: 4/15/14
Logged By: PJP
Location: SOUTH GATE, CA
Completion Date: 4/15/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												ASPHALT AND BACKFILL DEBRIS (SLAG, VITREOUS GLASS, ETC.)			
1.5'															
5'												M BRN (10YR 4/2) SILTY SAND. VF TO FG, W RND. MOD. WELL SORTED. CLR., SMOKY & FROSTED QTZ., BIOT. CHERT			
11'												M BRN (10YR 4/2) SANDY SILT. V SL. MOIST			
15'												SAA W/ ↑ MOISTURE & MNR. FE STAINING			
20'												SAA			
21												GREENISH GRAY (GLEY 1 5/1) SILTY CLAY/ CLAYEY SILT. V SL. PLASTIC, BRITTLE. V SL. MOIST			
24												GREENISH GRAY (GLEY 1 5/1) SILT, V. MNR VFG SAND, MOIST			
29'												SAA W/ IN VF TO FG SAND TO APPROX. 20% OF SAMPLE			
31												YELLOWISH BRN (2.5YR 6/4) SAND. VFG, W RND., V W SORTED. CLR., FROSTED & MILKY QTZ., BIOT., K-SPAR, CHERT, ULTRA MAFICS., V SL MOIST			
35'												SAA W/ V MNR HINTS OF SLT.			

Signature (logging geologist): [signature] Date: 4/15/14
Signature (reviewer): [signature] Date: 4/24/14

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Soils Log Form

Boring No.	SAIA-SB/SG35

Project: SAIA RI/FS
Project No.: 07163.0004.FD0301
Page 1 of 1
Client: US EPA
Start Date: 4/18/14
Logged By: PJD
Location: Santa Ana, CA.
Completion Date: 4/18/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (__PID __FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												ASPHALT			
3"												YELLOWISH BRN (2.5Y R 6/4) SILTY SAND. MOD W. SORTED, W RND F TO VFG., CL, MILKY & FROST. QTZ, BIOT., CHERT. SL MOIST TO DRY			
5½												SAA w/ ↑ MOISTURE			
11												M BRN (10YR 4/2) SILTY SAND, LITH AS ABOVE MOIST TO ✓ MOIST			
16												SAA			
21												SAA w/ SL. ↓ MOISTURE			
23												GREENISH BRN (10YR 5/2) TO BRNISH GRAY (2.5YR 5/2) CLAYEY SILT. MOD FIRM. SL MOIST			
27												GREENISH BRN (10YR 5/2) SILTY SAND/SANDY SILT. VFG., W SORTED, WELL RND TO SUB-ANG. CL, MILKY QTZ., BIOT., CHERT, MAFICS, MOIST SL.			
32												SAA w/ ↑ MOISTURE			
35												SAA			

Signature (logging geologist): [signature] Date: 4/18/14
Signature (reviewer): [signature] Date: 4/24/14

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Soils Log Form

Boring No.	SA14 - SB/SG36

Project: SA/A RIFS
Project No.: 07163.0064.F0301
Page 1 of 1
Client: US EPA
Start Date: 4/17/14
Logged By: PJP
Location: SOUTH GATE, CA
Completion Date: 4/17/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
6"												REDDISH BRN (2.5 YR 5/4) TO YELLOWISH BRN (2.5 YR 6/4) GRAVELLY SAND. VC TO VFG, ANG TO W RND. FE STAINING COMMON DUE TO ABANDONT. WASTE SLAG AND METALLIC DEBRIS IMMEDIATELY BELOW CONCRETE PAD (BASE MATERIAL)			
5'												YELLOWISH BRN (2.5 YR 6/4) SILTY SAND. CLR, SMOKEY, FROSTED QTZ., BIOT., CHERT, K-SPAR. DRY			
10'												SAA w/ SIG. ↑ IN MOISTURE APPROACHING SATURATED CONDITIONS W/ COMMON FE STAINING			
15'												SAA w/ V. MOIST TO WET SAMPLE			
25'												GREENISH GRAY (GLEY1 5/1-5/2) SILTY CLAY. FIRM, MOD. PLASTIC, WET, FE STAINING COMMON AND ROOT STRUCTURE			
28												GREENISH GRAY (GLEY1 5/1-5/2) CLAYEY SILT MOD. FIRM, MOIST			
31												YELLOWISH BRN (2.5 YR 6/4) SAND. VFG, W RND., W SORTED, CLR, SMOKEY, FROSTED QTZ., BIOT., ULTRA MAFICS, CHERT, K-SPAR, V. SL. MOIST			
35												SAA			

Signature (logging geologist): [signature] Date: 4/17/14
Signature (reviewer): [signature] Date: 4/29/14

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Soils Log Form

Boring No.	SAIA-SB/SG37

Project: SAIA RI/FS
Project No.: 07163.0064.FI0301
Page 1 of 1
Client: US EPA
Start Date: 4/17/14
Logged By: PJP
Location: South Gate, CA.
Completion Date: 4/17/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
6'												REDDISH BRN (2.5YR 5/4) TO YELLOWISH BRN (2.5YR 6/4) GRAVELLY SAND AND DEBRIS, VC TO FG, V POORLY SORTED W/ ACCOMPANYING METAL SLAG FRAGMENTS, VITRIFIED SOIL, CONCRETE AND COBBLES.			
5'															
9'												GREENISH GRAY (GLEY 1 5/1) SILTY SAND. VFG, W. SORTED. W. RND. CLR, MILKY & FROST. QTZ, BIOT., CHERT. VERY MOIST			
13												M BRN (10YR 4/2) SANDY SILT. BIOT., QTZ., VERY MOIST			
15												GREENISH GRAY (GLEY 1 5/2) SILTY SAND/SANDY SILT. LITH AS ABOVE. V. MOIST TO WET			
19												GREENISH GRAY (GLEY 1 5/2) SILTY CLAY, FIRM MOD. PLASTIC. MED. DILATENCY, V-MOIST COMMON FE STAINING, ROOT STRUCTURE AND DESICATED CLAST INCLUSIONS			
22												DK GRAY (GLEY 1 4/—) SILTY SAND. CLR, MILKY QTZ., BIOT. ULTRAMAFICS, V MOIST TO WET			
27												SAA W/ ↑ SILT, SL ↓ MOISTURE			
29												YELLOWISH BRN (2.5YR 6/4) SAND VFG, V. W SORTED, W RND, CLR, FROSTED & MILKY QTZ. BIOT, CHERT, K-SPAR, MAFICS MOD AMTS SILT, SL MOIST			
35												SAA W/ ↓ MOISTURE			

Signature (logging geologist): Date: 4/17/14
Signature (reviewer): Date: 4/24/14

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Gilbane

Soils Log Form

Boring No.	SAHA-SB/SG38

Project: SAHA RI/FS
Project No.: 07163.006A.FI0301
Page 1 of 1
Client: US EPA
Start Date: 4/17/14
Logged By: PJP
Location: SOUTH GATE, CA
Completion Date: 4/17/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (__ PID __ FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
8"												YELLOWISH BRN (2.5 YR 6/4) SILTY SAND CLR, MILKY, FROSTED QTZ., BIOT., CHERT. DRY			
12'												GREENISH BRN ( ) SILTY SAND SAA AS DESCRIBED ABOVE. VERY MOIST TO WET			
17'												SAA W/ SL ↑ SLT. VERY MOIST TO WET			
20												GREENISH GRN (GLEY 1 5/1) SILTY CLAY/CLAYEY SILT. SL PLASTIC, FIRM, WET			
25												SAA W/ ↑ SILT			
30												SAA W/ CONT ↑ SILT ↓ MOISTURE			
36												YELLOWISH BRN (2.5YR 6/4) SAND. VFG W RND TO SUB ANG. W SORTED, CLR, SMOKEY, FROSTED QTZ., BIOT., CHERT., K-SPAR, MAFICS AND ULTRA MAFICS. MOIST TO SL. MOIST			
35												SAA W/ CONT. ↓ MOISTURE			

Signature (logging geologist): [signature] Date: 4/17/14
Signature (reviewer): [signature] Date: 4/24/14

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Gilbane

Soils Log Form

Boring No.	SAIA-SB/SG39

Project: SAIA RI/FS
Project No.: 07163.0064.FI0301
Page 1 of 1
Client: US EPA
Start Date: 4/17/14
Logged By: PJB
Location: SOUTH GATE, GA.
Completion Date: 4/17/14
Reviewed By:

Depth	Sampled Interval: Driven	Blows /	Recovery	OVA (PID / FID)	Grain Size & Distribution (to nearest 5 %): % fines	% sand: f	m	c	% gravel: f	c	max size	Remarks: Visual/Manual description of soil (ASTM D 2488 / USBR 5005). Description shall provide enough information so that a reviewer can understand the basis of the classification. Include also: Sample IDs; Start/Stop Times; Drilling data, Water levels, Other comments.	Group Symbol	Well Const.: Annulus	Casing
0												CONCRETE			
4"												YELLOWISH BRN (2.5Y 6/4) SILTY SAND. F TO VFG., MOD. WELL SORTED, MOD. RND TO SUB ANG., CLR, FROSTED & MILKY QTZ, BIOT., LITTLE MAFICS. DRY			
5'												SAA			
11'												GREENISH GRAY (GLEY1 5/1) SANDY SILT. FIRM, V. MOIST. LITH AS DESCRIBED ABOVE			
16'												GREENISH GRAY (GLEY1 5/1) SILTY CLAY / CLAYEY SILT. FIRM, SL. PLASTIC, V. MOIST			
21												SAA w/ ↑ SILT, V. MOIST			
26'												SAA. SL ↓ MOISTURE			
29												GREENISH GRAY TO YELLOWISH BRN (GLEY1 5/1 - 2.5Y 6/4) SILTY SAND, F TO VFG., MOD TO VERY WELL SORTED, SUB-RND TO SUB-ANG, CLR, SMOKY QTZ., CHERT., BIOT, K-SPAR. MOIST TO SL. MOIST			
35'												SAA. CONT. ↓ IN MOISTURE			

Signature (logging geologist): [signature] Date: 4/17/14
Signature (reviewer): [signature] Date: 4/24/14

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SAJA

Project ~~Jervis Webb~~ Superfund Site
Project Number J163007200
Location South Gate
Surface Elevation N/A

Logged By Rogerio Leong
Date Drilled 04/25/2017
Total Depth 35'
Boring Diameter 2"
Drillers Gregg Drilling
Method DPT

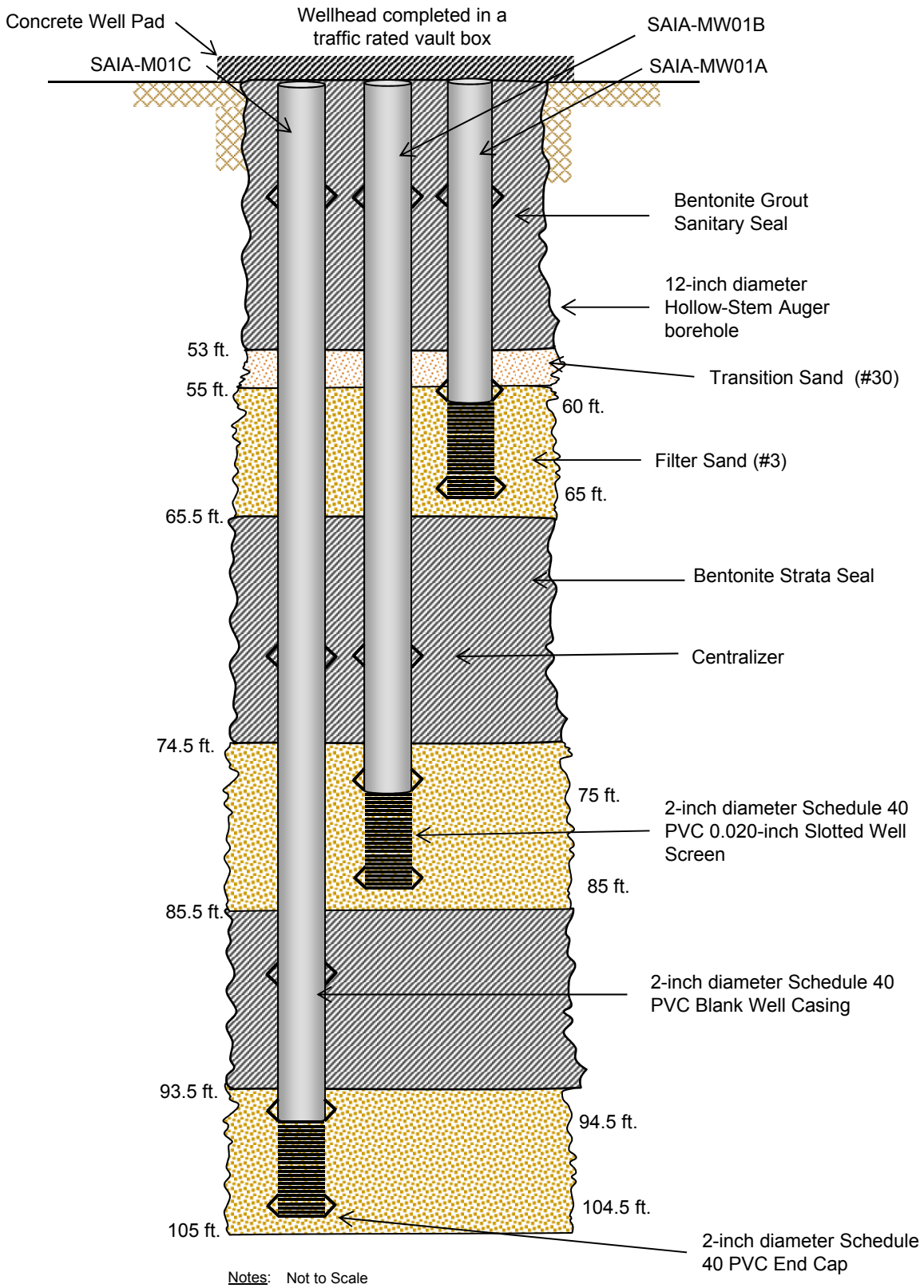
Boring No. SAJA SG/SB-44
Sheet 1 Of 1

Boring Location Sketch

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
			0				silty sand, dark brown, loose, moist, some gravel, no odor
			0				
5			0				
10							silty clay, dark brown, moist, stiff, no odor
15			0				
20							moist
25			0				clay, dark brown, stiff, moist, no odor
30							
			0				

Casing Diameter _____ Casing Length _____ From _____ To _____
Screen Size _____ Screen Length _____ From _____ To _____
~~Sand Type~~ _____ From _____ To _____
Bentonite Type _____ From _____ To _____
Cement/Grout _____ From _____ To _____
Surface Completion _____

Gilbane



Notes: Not to Scale

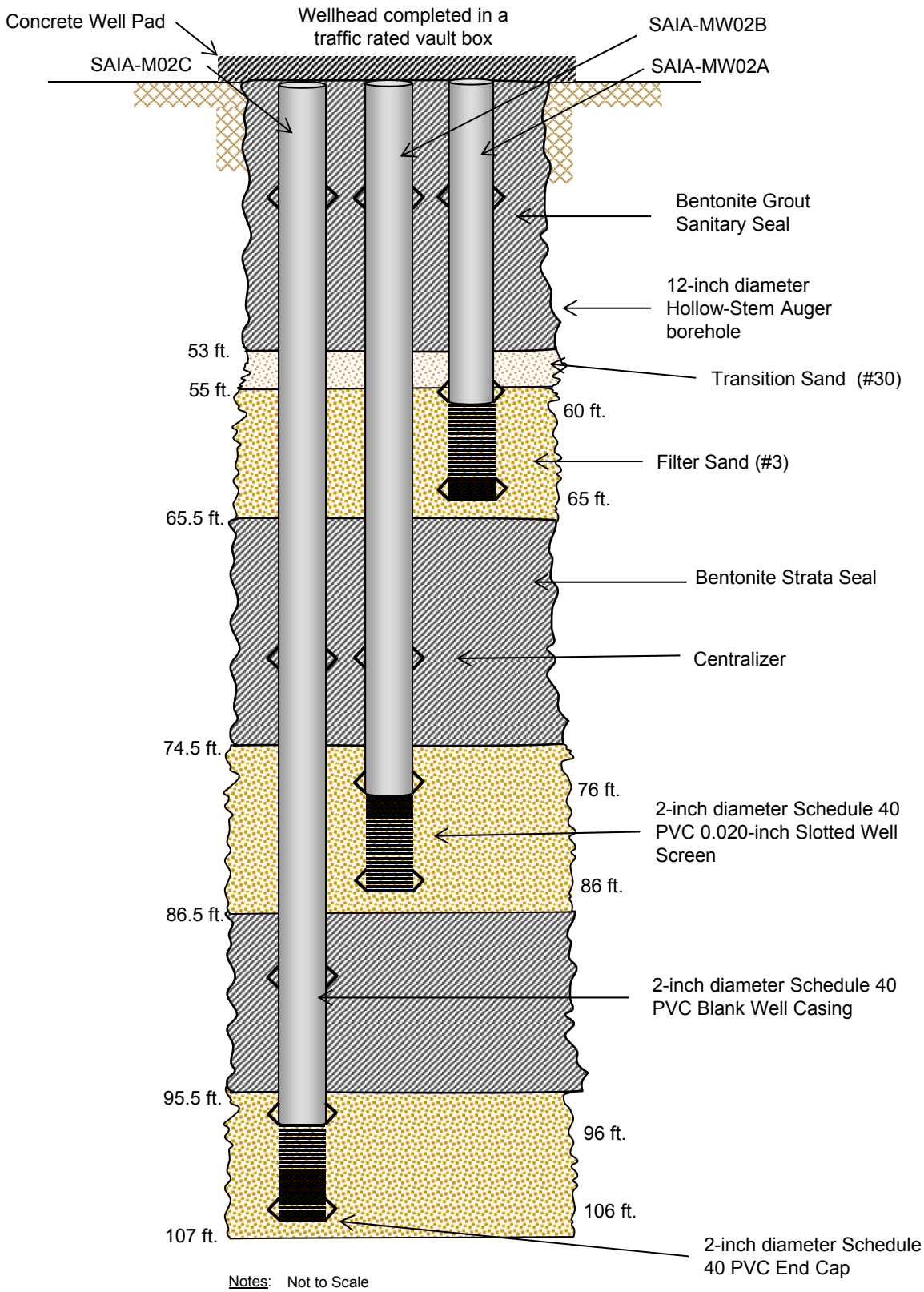
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW01A/B/C As Built

South Gate, California



Notes: Not to Scale

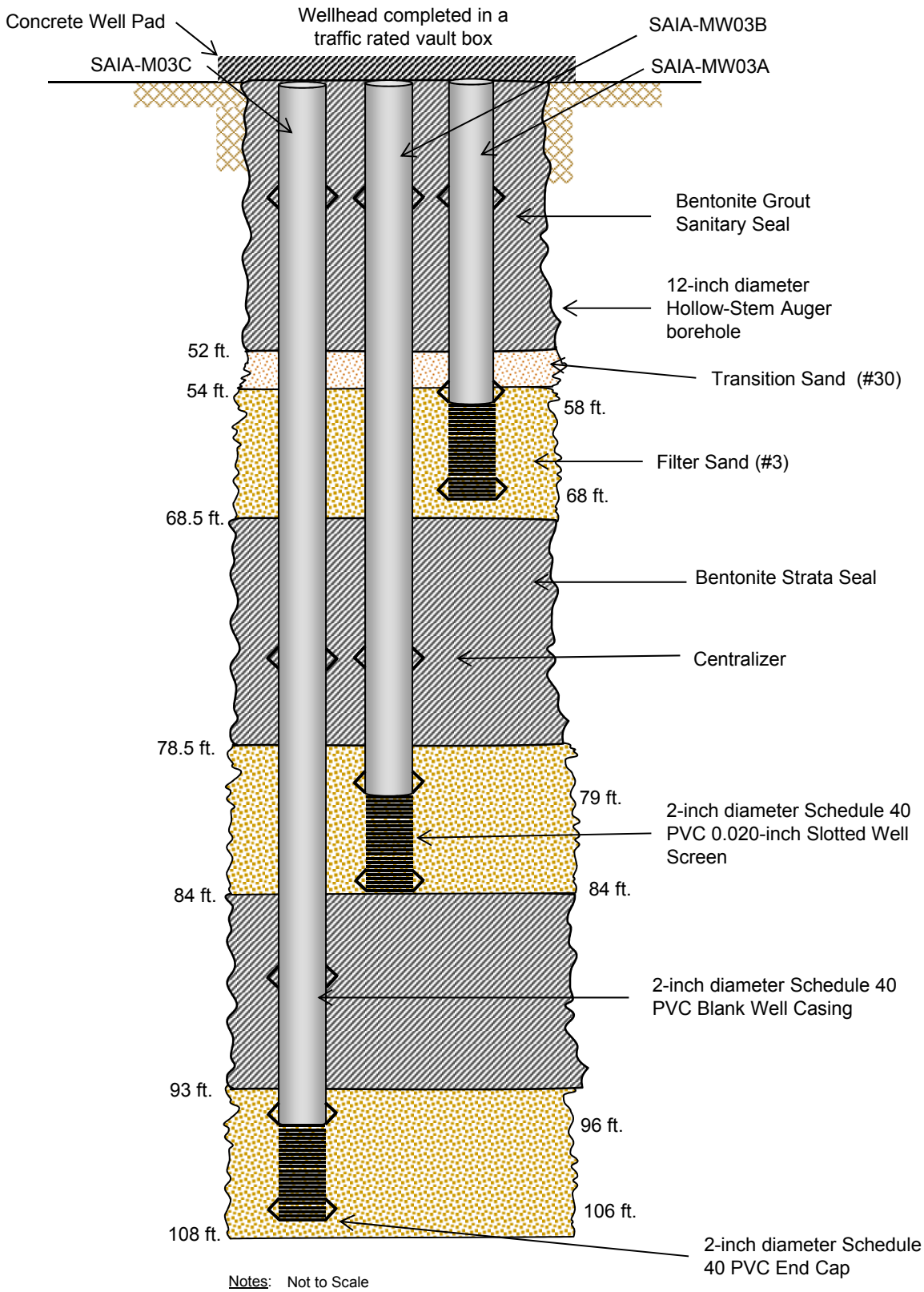
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW02A/B/C As Built

South Gate, California



Notes: Not to Scale

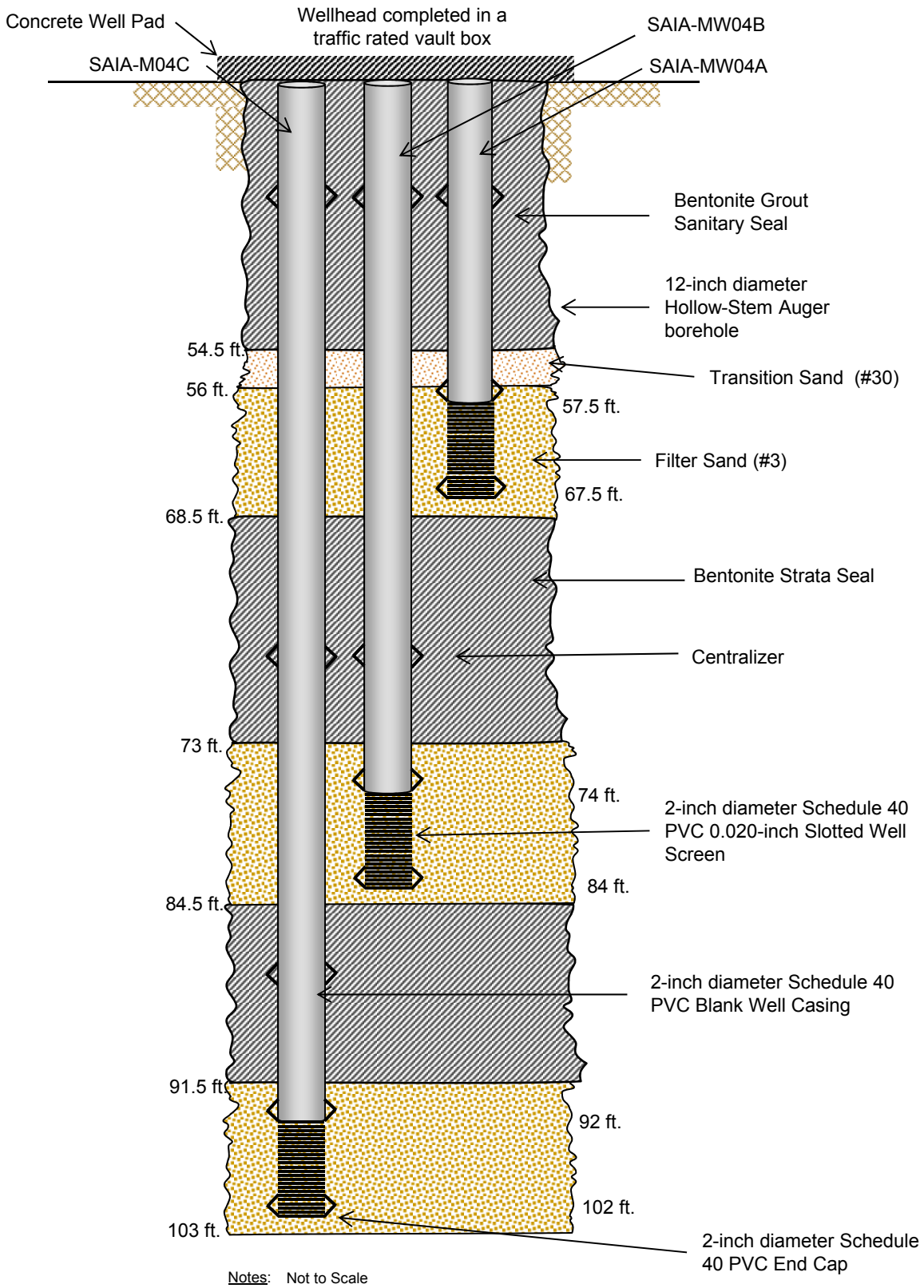
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW03A/B/C As Built

South Gate, California



Notes: Not to Scale

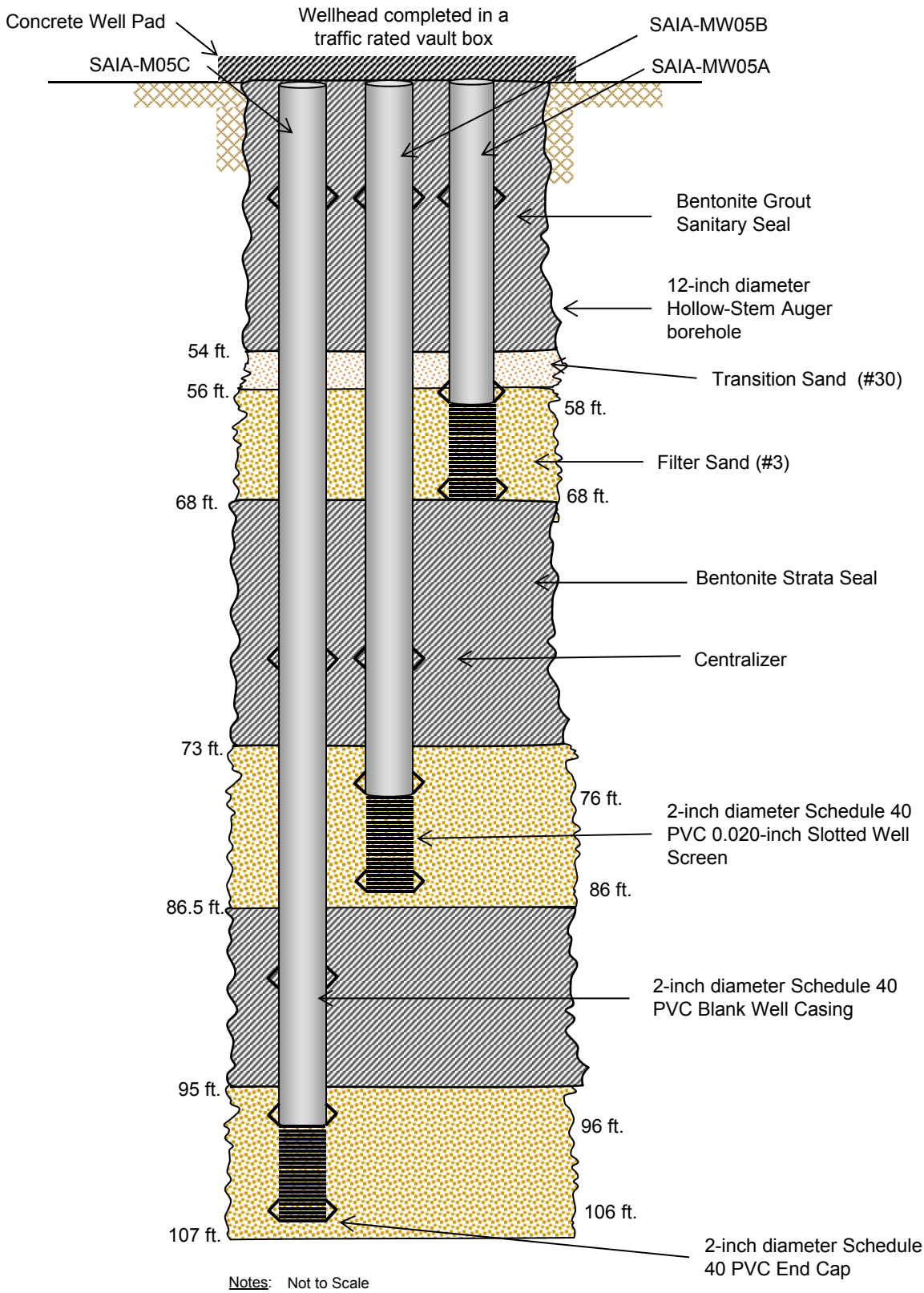
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW04A/B/C As Built

South Gate, California



Notes: Not to Scale

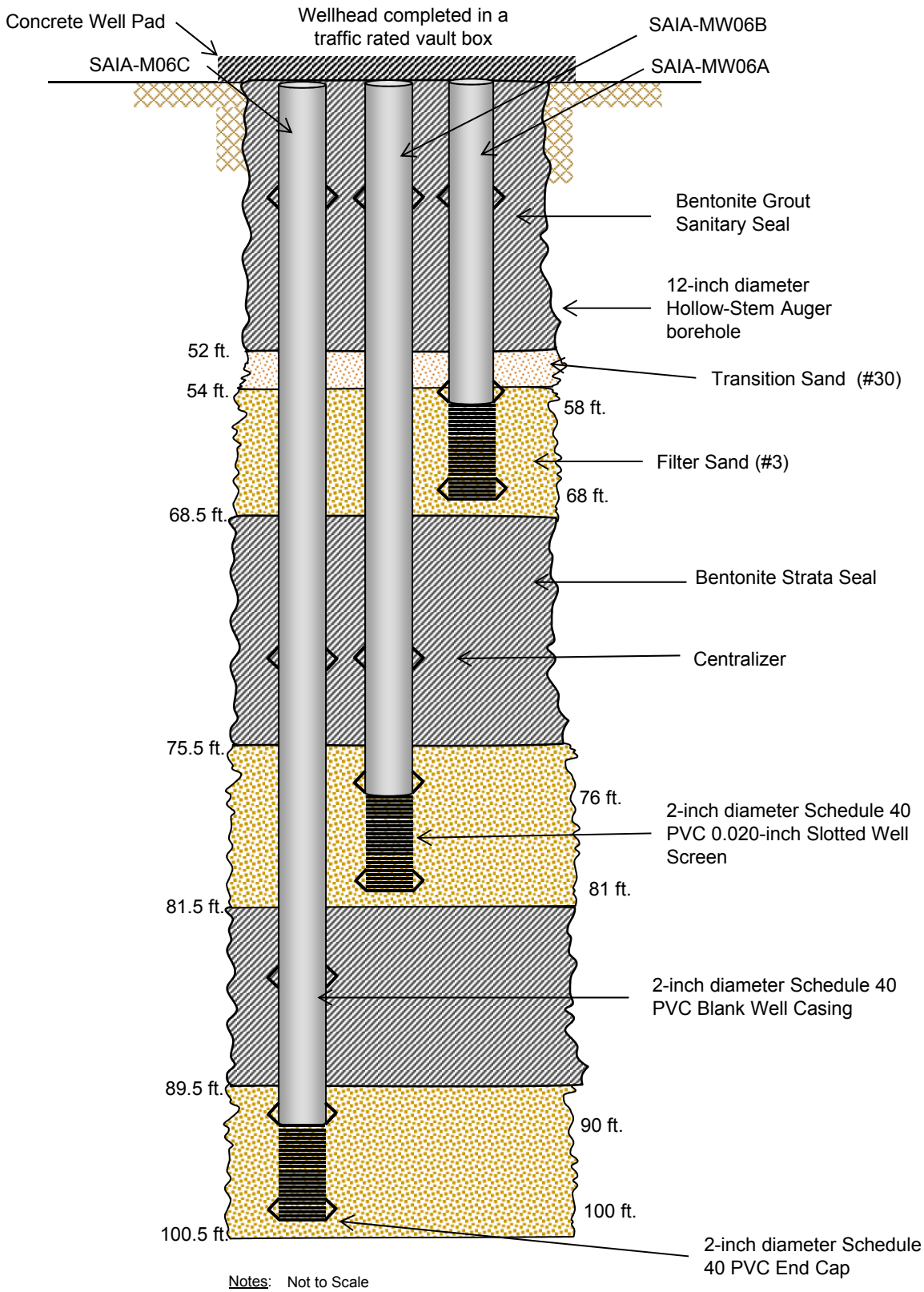
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW05A/B/C As Built

South Gate, California



Notes: Not to Scale

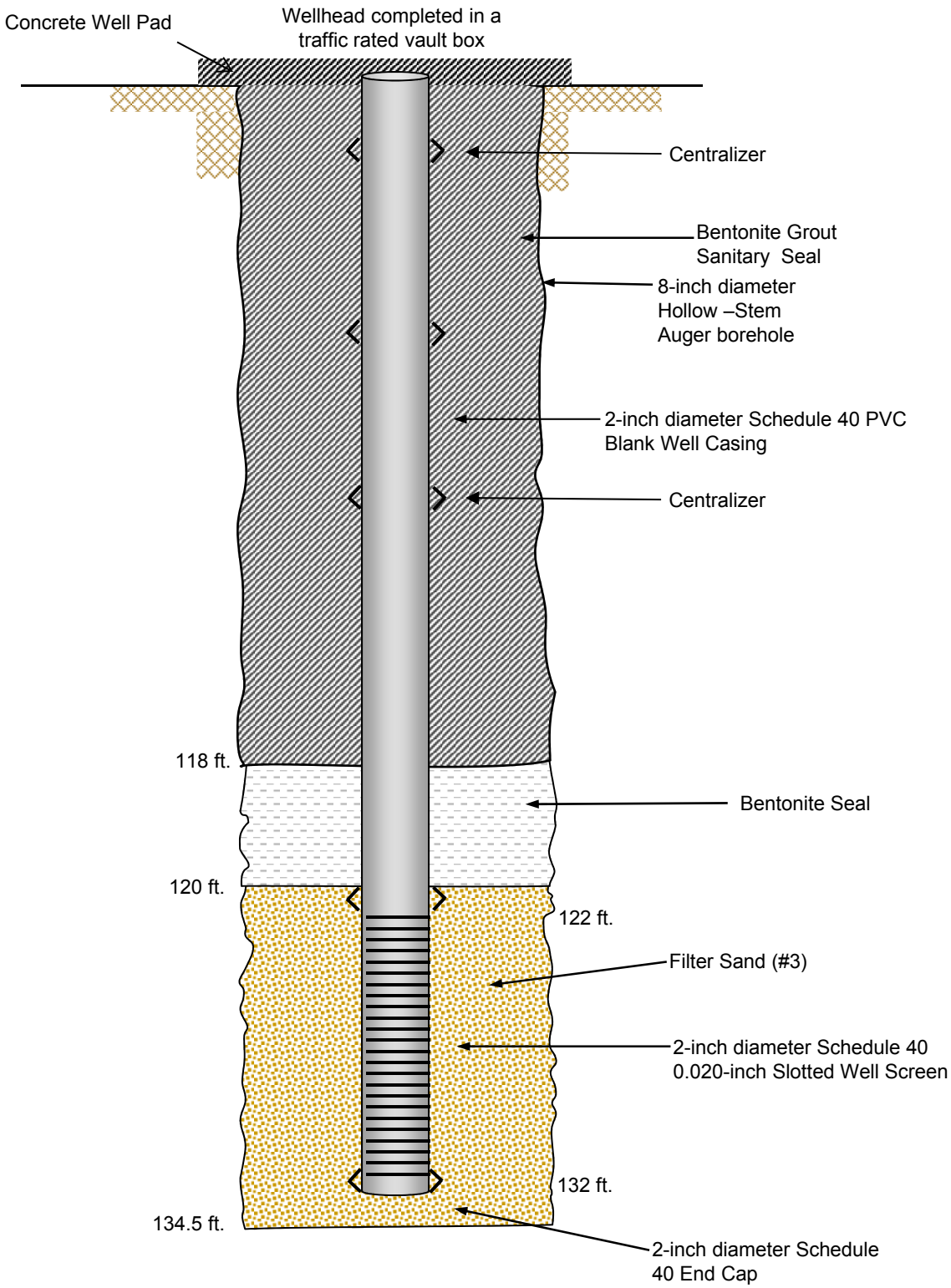
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW06A/B/C As Built

South Gate, California



Notes:

Not to Scale

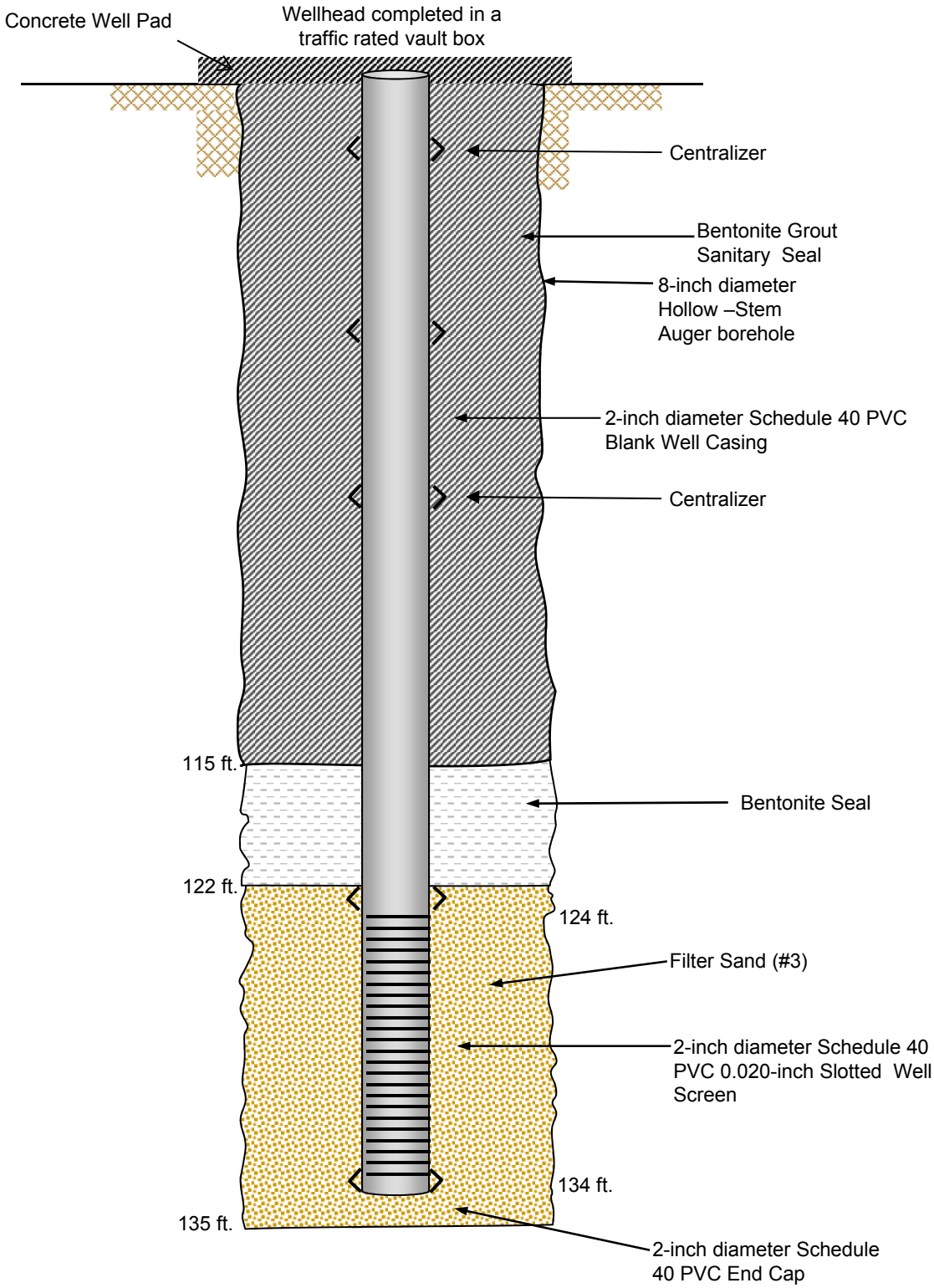
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW07 As Built

South Gate, California



Notes:

Not to Scale

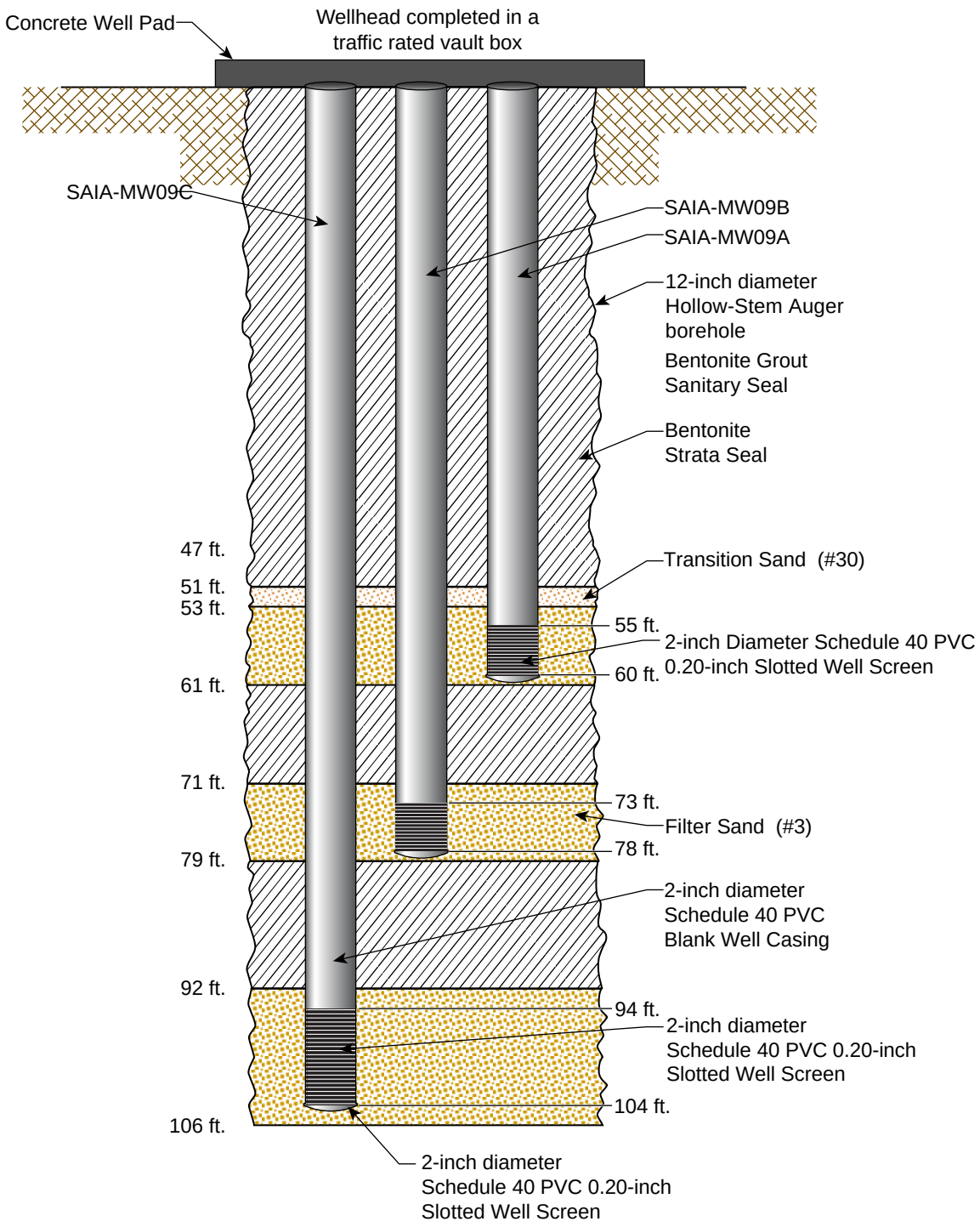
All diameters are O.D. except the well screen, which is nominal

PVC – polyvinyl chloride

Gilbane

SAIA-MW08 As Built

South Gate, California



Notes:
Scale is Approximate
All diameters are O.D. except the well screen, which is nominal
PVC - polyvinyl chloride

Gilbane

Southern Avenue Industrial Area
Los Angeles County, California
US Environmental Protection Agency

SAIA-MW09A/B/C
As Built

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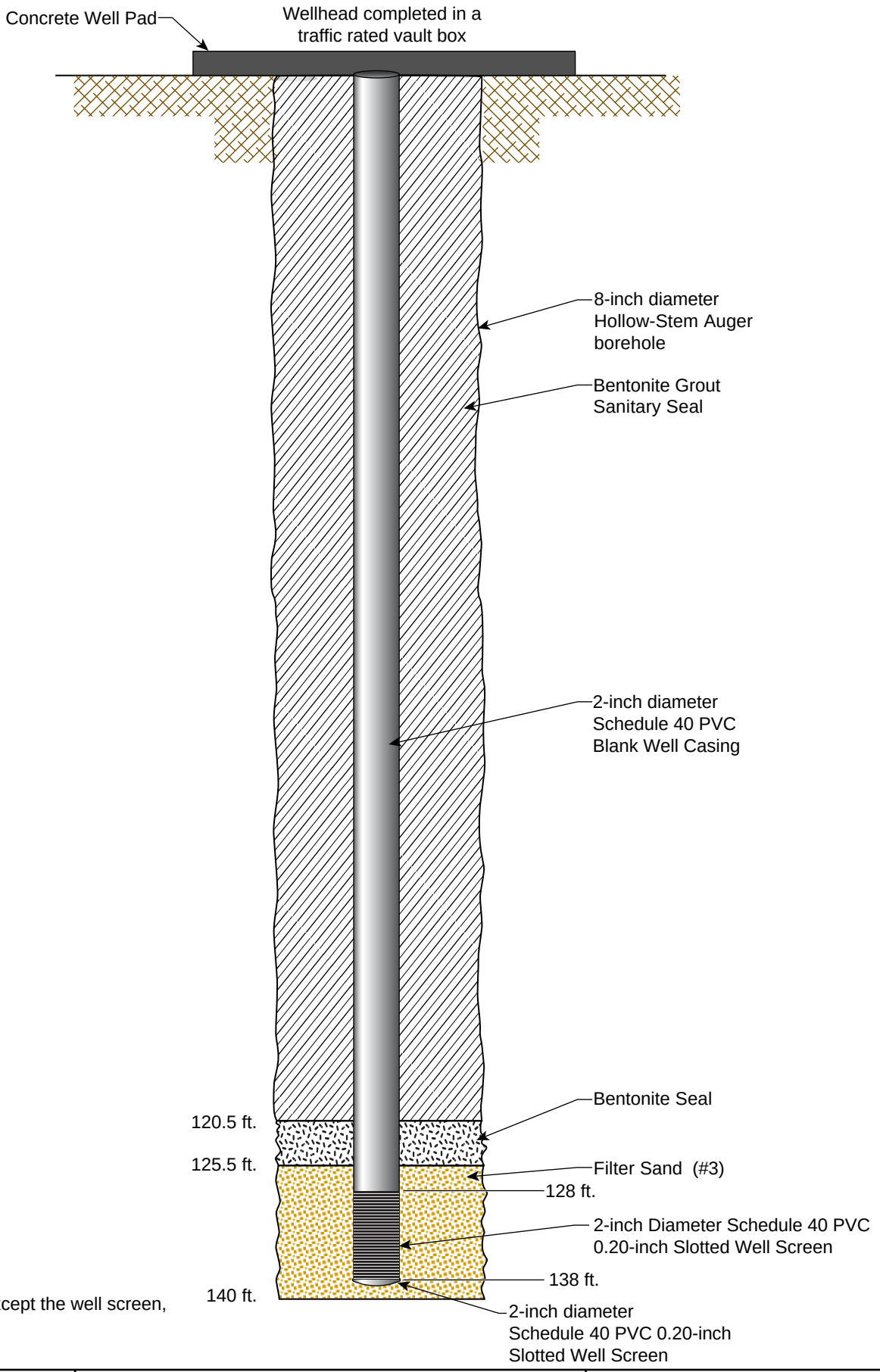

Notes:
Scale is Approximate
All diameters are O.D. except the well screen, which is nominal
PVC - polyvinyl chloride

Gilbane

Southern Avenue Industrial Area
Los Angeles County, California
US Environmental Protection Agency

SAIA-MW10
As Built

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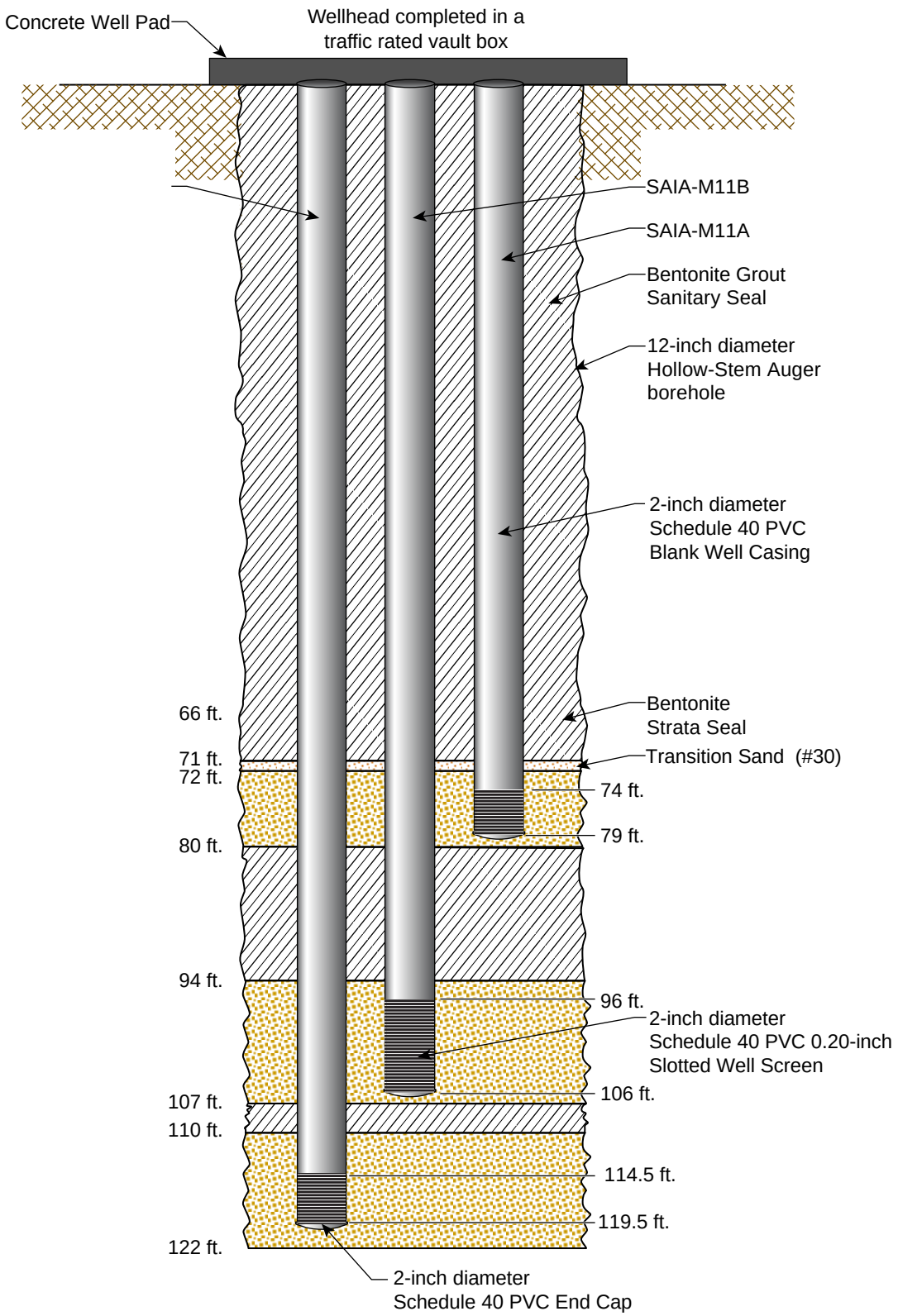

Notes:
Scale is Approximate
All diameters are O.D. except the well screen, which is nominal
PVC - polyvinyl chloride

Gilbane	**Southern Avenue Industrial Area** Los Angeles County, California US Environmental Protection Agency	**Figure X** SAIA-MW11A/B/C As Built

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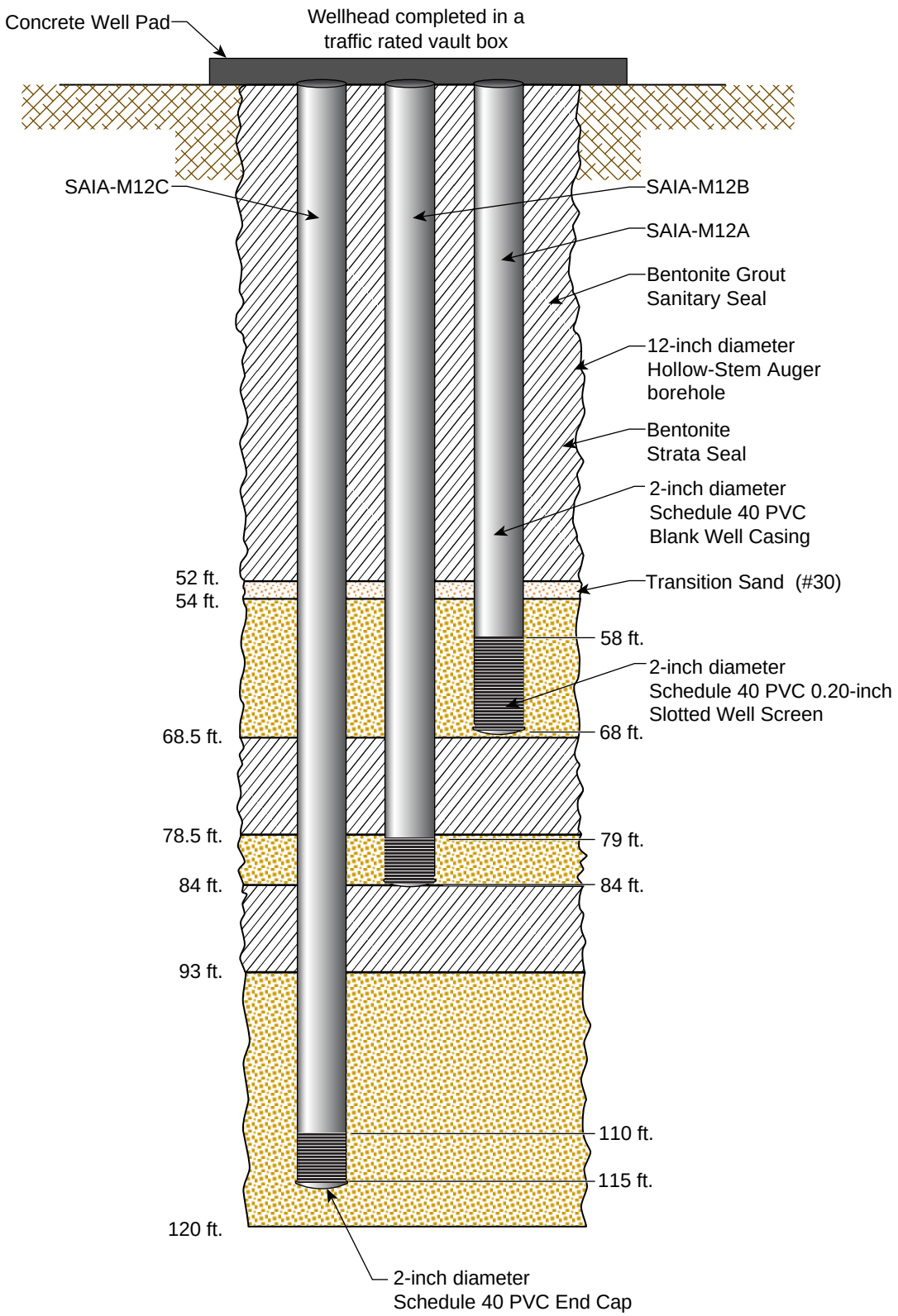
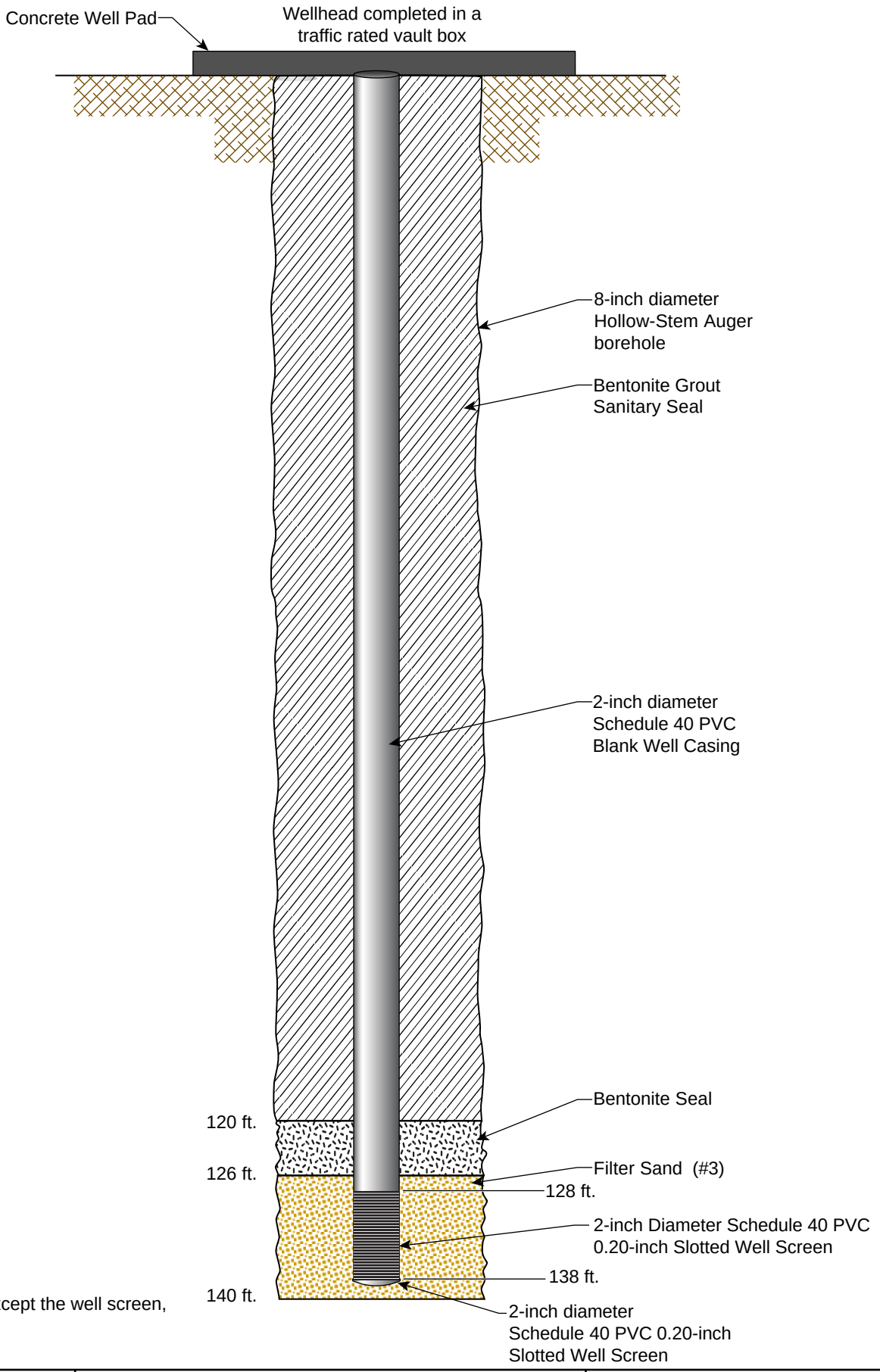


Notes:
Scale is Approximate
All diameters are O.D. except the well screen, which is nominal
PVC - polyvinyl chloride

Gilbane	**Southern Avenue Industrial Area** Los Angeles County, California US Environmental Protection Agency	**Figure X** SAIA-MW12A/B/C As Built

P:\EPAR9\0064 TO 063-RICO-09WS, So. Ave Indstl Area\13.0 Graphics\SAIA-MW11 asbuilt.ai 08/24/2016



Notes:
Scale is Approximate
All diameters are O.D. except the well screen, which is nominal
PVC - polyvinyl chloride

Gilbane

Southern Avenue Industrial Area
Los Angeles County, California
US Environmental Protection Agency

Figure X
SAIA-MW13 As Built

P:\EPAR9\0064 TO 063-RICO-09WS, So. Ave Indstl Area\13.0 Graphics\SAIA-MW13 asbuilt.ai 08/24/2016