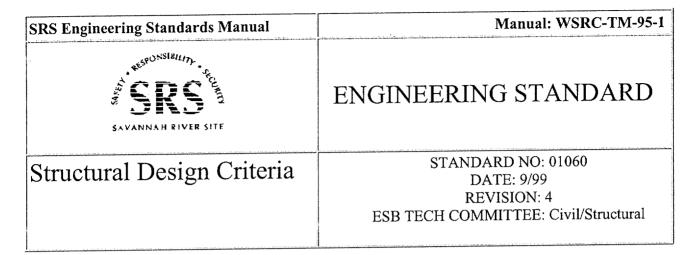
Return to Engineering Standard Home Page, Index



REVISION HISTORY

REV	DATE	DESCRIPTION OF REVISION
0	8/1/95	INITIAL ISSUE
1	10/1/96	Included <u>DOE Order 420.1</u> , the SBC, requirements for concrete anchors and chipping, deleted unused acronyms and references, and editorials.
2	07/28/97	Included site specific design spectra for PC3 and PC4, UBC 1997 seismic loads and loading combinations and editorials. Revised basic wind speed from "fastest mile" to "three seconds gust".
3	07/98	Added UBC seismic ductility provisions and earthquake load factor of 1.2 for new PC-3 and PC-4 structures, increase PC-3 design basis tornado speed to 178 mph, added automobile in the PC-3 tornado missile criteria, took out dates of reference National Codes and Standards, and added notes to some loading combinations.
4	09/99	Added reference criteria for stacks, removed the SBC, added dynamic settlement load factor of 1.2 for new PC-3 and PC-4 structures, added correlation between Functional Classification and Performance Categories, revised PC1 and PC2 design wind speeds, and revised PC-3 design basis spectra.



1.0 PURPOSE AND SCOPE

1.1 This document provides minimum structural design criteria for all new facilities and modifications to existing facilities, both permanent and temporary, at the Savannah River Site (SRS).

1.2 The code year is established by the issue date of the project criteria documents. For modifications and additions to existing facilities, the Code of Record shall be established by the Design Authority. DOE Order 420.1 (Ref. 6.1.3) requires validation of existing designs, including designs with natural phenomena hazards assessment older than 10 years, against the current DOE natural phenomena hazard design criteria.

2.0 DOE ORDER AND STANDARDS APPLICABILITY

2.1 DOE Orders as included in WSRC S/RID and DOE and Standards applicable for the evaluation, modification or addition to SRS facilities are listed in Section 6.1.

2.2 Conflict between the DOE Orders as included in WSRC S/RID and DOE Standards, National Codes and Standards, and this Engineering Standard shall be brought to the attention of Engineering Standards Board's Civil/Structural Committee Chairman for resolution.

3.0 NATIONAL CODES AND STANDARDS APPLICABILITY

3.1 National Codes and Standards incorporated by reference in this document shall be the revision number and date at the time this document is invoked in the Design Output Documents, or as otherwise noted.

3.2 The Design Output Document shall specify the applicable Codes and Standards utilized and their associated revision and date.

3.3 The applicability of the codes and standards given in this section is limited to the extent of the references in the text.

4.0 ACRONYMS & DEFINITIONS

4.0 DEFINITIONS

4.1 Acronyms

The following is a list of acronyms and shortened titles used for the reference documents in this Engineering Standard. Load related symbols and factors are defined in Sections 5.2 and 5.3.

REVISION HISTORY

ACI	American Concrete Institute
AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
APC	Atmospheric Pressure Change
API	American Petroleum Institute
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASCE	American Society of Civil Engineers
ASD	Allowable Stress Design
AWWA	American Water Works Association
CFR	Code of Federal Regulation
CMAA	Crane Manufacturers Association of America
DBFL	Design Basis Flood
DOE	Department of Energy
DOE-STD	Department of Energy Standard
MBMA	Metal Building Manufacturers Association
NPH	Natural Phenomena Hazard
OSHA	Occupational Safety and Health Administration
PC	Performance Category
PGA	Peak Ground Acceleration
SCDHEC	South Carolina Department of Health and Environmental Control
SD	Strength Design
SDI	Steel Deck Institute
SGS	Site Geotechnical Services
S/RID	Standards/Requirements Identification Document
SRS	Savannah River Site
SSC	Structures, Systems, and Components
SQP	Structural Qualification Program for Savannah River Site Facilities
UBC	Uniform Building Code
WSRC	Westinghouse Savannah River Company

4.2 Definitions

Key words and terms used in this document are defined as follows:

4.2.1 Natural Phenomena Hazard (NPH) - An act of nature (e.g., earthquake, wind, hurricane, tornado, flood, rain or snow precipitation, volcanic eruption, lightning strike, or extreme cold or heat) which threatens workers, the public, or the environment by potential damage to structures, systems, and components.

4.2.2 Performance Category (PC) - A classification based on a graded approach which is used to establish the NPH design and evaluation requirements for SSCs in accordance with DOE Standard 1021 (Ref. 6.1.2). Table 7.1.4 provides the methodology for assigning Performance categories for all SSCs.

4.2.3 SQP - Structural Qualification Program for Savannah River Site Facilities, Revision 3, 1995 - The SQP provides

requirements to assess the structural design basis of SRS pre-operational and operating facilities to current DOE Orders and Standards, industry consensus codes and SRS standards and guidelines. DOE 420.1(Ref. 6.1.3) requires the contractor/operator to establish an implementation plan for evaluating and upgrading existing SSC for NPH mitigation. This program provides a plan for backfit evaluation for each facility, which will satisfy the requirements in DOE 420.1, Section 4.4.3. The methodologies used in this program are for the evaluation and upgrade of existing facilities.

5.0 REQUIREMENTS

5.1 Performance Categories

There are five Performance Categories, PC-0 through PC-4, associated with the SSC at the SRS (DOE Guide 420.1-Y, Ref. 6.1.4, andDOE-STD-1021, Ref.6.12). The Performance Categories are based on the performance goals associated with these SSC and are expressed in terms of the annual probability of exceedance of the design basis natural phenomena hazards (See Table 7.1.1).

Interaction effects shall be considered in accordance with DOE-STD-1020 and DOE-STD-1021. See Ref. 6.2.14.7 for guidance.

5.2 Design Loads

SSC shall be designed for the loads prescribed in this standard and as supplemented by project specific criteria.

For additions or modifications to existing facilities, the effects of new loads transmitted to the existing SSC shall be considered. Modifications and additions shall not degrade the performance of existing SSC to the extent that they will not withstand NPH loads, provide confinement, or provide safe operation of essential facilities, protection of government property and the protection of life safety for occupants.

5.2.1 Dead Load (D)

Dead loads are loads that remain permanently in place.

5.2.2 Live Load (L & L_r)

5.2.2.1 Live loads (L) are those loads produced by the use and occupancy of a building or other structure. Live loads on a roof (L_r) are those produced (1) during maintenance by workers, equipment, and

materials and (2) during the life of the structure by movable objects such as temporary equipment. Also considered as live loads are the dynamic effects of operating equipment (such as cranes and pumps).

5.2.2.2 Live loads on roofs shall be as stipulated in ASCE 7, (Ref. 6.2.6.2), AASHTO HB, (Ref. 6.2.1.1) or AREMA Manual (Ref. 6.2.5.1) as applicable.

5.2.2.3 For modifications or analysis of existing structures, loading based on the actual use of the structure may be used. Loads identified as live loads in the original design, when known, may be counted as dead loads for the evaluation of existing structures.

5.2.2.4 For yard structures exposed to wheel traffic, HS 20-44 (Ref. 6.2.1.1) truck loading shall be used, as a minimum, for wheel loading design. In areas subject to yard cranes, the crane wheel, track loading

or outrigger loads during lifts shall be considered.

5.2.3 Soil Load (H)

Structures and elements of structures retaining soil shall be designed for the lateral earth pressure and any surcharge plus any hydrostatic pressure corresponding to the maximum probable groundwater level.

5.2.4 Fluid Load (F)

The fluid load is the load resulting from the pressure of the fluid.

5.2.5 Rain Load (R)

Rain loads shall be obtained in accordance with ASCE 7. The minimum design shall be for a 25-year, 6 hour rainfall event at all performance categories. The curves provided in Engineering Standard 01110 (Ref. 6.2.14.2) shall be used to quantify the rainfall event.

5.2.6 Snow Load (S)

Snow loads shall be obtained in accordance with ASCE 7. Development of SRS specific snow hazard curves is not planned. The importance factor shall be 1.0 for PC-1 and PC-2 structures, and 1.2 for PC-3 and PC-4 structures.

5.2.7 Wind Load (W)

Wind load design for buildings and other structures shall be determined in accordance with the procedures in ASCE 7, using exposure "C", with the basic three-second gust wind speeds given in Table 7.1.1. The effect of the importance factor "I" is incorporated in the tabulated values for the basic wind speeds; "I" shall be taken as 1.0. The design wind speeds are derived from a DOE Memorandum (Ref. 6.1.5). For Probabilistic analysis wind hazard curve for SRS in three-second-gust speeds is available in Ref. 6.2.14.8.

For PC-3 and PC-4 structures, the design shall include consideration of wind driven missiles in accordance with DOE-STD-1020 (Ref. 6.1.1). The wind-driven missiles and the barrier thicknesses to preclude damage are provided in DOE-STD-1020. Barriers other than those given in DOE-STD-1020 may be analyzed or designed per the missile barrier criteria given in ASCE-58 (Ref. 6.2.6.3).

5.2.8 Tornado Load (W_t)

Tornado wind load design for buildings and other structures shall be also determined in accordance with the procedures in ASCE 7, using exposure "C", with the basic wind speed obtained from Table 7.1.1. The importance factor "I" shall be taken as 1.0. Tornado hazard curve for SRS in three-second -gust speeds is available in Ref. 6.2.14.10.

Tornado -driven missile criteria are given in Table 7.1.1. They are derived from requirements in DOE-STD-1020 and from recommendations in Ref. 6.2.14.10. The barrier thicknesses to preclude damage from tornado missiles are provided in DOE-STD-1020. Barriers other than those given in DOE-STD-1020 may be analyzed or designed per the missile barrier criteria given in ASCE-58.

APC shall apply for enclosed structures per provisions in DOE-STD-1020. Partially enclosed or open structures shall follow provisions in ASCE 7.

5.2.9 Earthquake Load (E)

5.2.9.1 General

Earthquake load design for buildings and other structures shall be determined in accordance with DOE-STD-1020 and UBC (Ref. 6.2.9.1) for PC-1 and PC-2, and in accordance with DOE-STD-1020 and ASCE 4 (Ref. 6.2.6.1) dynamic analysis methods for PC-3 and PC-4.

5.2.9.2 PC-1 and PC-2 Structures

For the purposes of earthquake load design for PC-1 and PC-2 structures using the UBC, the following modifications shall be made:

I = Importance factor, = 1.0 for PC-1 = 1.25 for PC-2

The Soil Profile type at SRS may be taken as S_{D} . A review by a qualified Geotechnical Engineer of the subsurface conditions is recommended for the determination of the facility specific soil profile type.

For PC-1 and PC-2 structures regulated by SCDHEC (Ref. 6.2.15.1) UBC requirements for PC-2 shall be used for earthquake load.

5.2.9.3 PC-3 and PC-4 Structures

Earthquake loads for PC-3 and PC-4 structures shall be determined in accordance with DOE-STD-1020. The site specific response spectra for PC-3 (Ref. 6.2.14.11) and PC-4 (Ref. 6.2.14.3) are given in Figure 7.2.1 and Table 7.1.3 for horizontal ground motion. The vertical site specific response spectra shall be taken as two-thirds of the horizontal spectra given in Figure 7.2.1 and Table 7.1.3.

The spectra given in Table 7.1.3 and Figure 7.2.1 are considered "preliminary" in accordance with WSRC E7 Manual. To become "confirmed" SGS must review the facility specific soil conditions.

For structures with deep foundations, design response spectra appropriate for the depth shall be used.

For PC-3 and PC-4 structures regulated by Ref. 6.2.15.1, the earthquake loads given in this standard shall be considered to meet the seismic loading requirements of SCDHEC.

5.2.9.4 Systems and Components

For systems and components, additional NPH evaluation requirements apply as described in Section 2.4 of DOE-STD-1020. PC-1 and PC-2 systems and components shall be designed for loads defined by the UBC. Seismic loads for PC-3 and PC-4 sub-structures or sub-systems shall be based on in-structure response spectra, or in-structure acceleration and displacement time histories. Where in-structure response spectra are needed, the methods given in Section 3.4.2 or ASCE 4 (Ref. 6.2.6.1) shall be used. Earthquake loads on new PC-3 and PC-4 systems and components shall be increased by twenty percent either through amplification of in-structure response spectra or in-structure time histories by a factor of

1.2, or through the use of the increased load factor for E in loading combinations given in Section 5.3.2.

5.2.10 Self Limiting Loads (T&T_a)

Three types of self limiting loads (T, unless otherwise noted) shall be considered: thermal loads, creep and shrinkage, and settlement.

5.2.10.1 Thermal Loads

The design of structures shall consider the effects of stresses and movements resulting from variations in temperature.

5.2.10.2 Creep and Shrinkage

Concrete and masonry structures shall be investigated for stresses and deformations induced by creep and shrinkage.

5.2.10.3 Settlement

Buildings and structures shall be designed for the total and differential foundation settlements, resulting from the combined static and dynamic loads. The dynamic settlement is due to dissipation of pore pressure and/or redistribution of soil stresses from the effects of a design basis earthquake. The dynamic portion of the settlement is to be factored by 1.2 for new facilities. The combined static and dynamic differential settlement is denoted as T_a in the load combinations. The dynamic component of settlement is not taken concurrent with E.

For existing facilities, the dynamic settlement factor may be taken as 1.0.

5.2.11 Accident Load (P_a)

The consequences of a design basis accident resulting in internal pressurization shall be considered. Consequences of accidental explosions (internal or external to the facility) and generated missiles shall be considered in the design or evaluation of facilities. Consequences of potential heavy load drops shall be considered in the design or evaluation of structures.

Loads resulting from internal pressure, explosions, missile impact and heavy load drop shall be considered a P_a loading.

5.2.12 Pipe Break Load (Y)

Effects of pipe breaks on structures, including reaction, jet, and movement, shall be considered.

5.2.13 Flood Load (F_a)

The structure shall be designed for the flooding and wave action consequences associated with flooding events with return periods of 500, 2000, 10,000, or 100,000 years for PC-1, PC-2, PC-3, or PC-4 respectively per DOE-STD-1020. Loads resulting from flooding and wave action shall be considered per Table7.1.1.

5.3 Load Combinations

Load combinations used for the design of an SSC are based on the SSC Performance Category and its structural material. For load combinations where a load reduces the effect of other loads, and at any time it may not be present, the load combinations shall be considered assuming the worst conditions for the load present or not.

Where loads may reverse, such as wind and seismic, both directions of loading shall be considered.

Floor live load shall be considered to vary from zero to its full value to determine the worst condition of loading for each element. Crane hook loads need not be combined with roof live load or with more than three fourths of the snow load or one half of the wind load.

5.3.1 Performance Categories 0, 1, and 2

NPH loads need not be considered for PC-0 SSC.

For Allowable Stress Design (ASD), the PC-1 and PC-2 SSC shall be designed for the most critical condition resulting from the following load combinations as modified from the UBC:

ASD
1.
$$A = D$$

2. $A = D + L + F + H + (L_r \text{ or } S \text{ or } R)$
3. $f_1 A = D + L + F + H + (W \text{ or } E/1.4)$
4. $f_1 A = D + L + F + H + W + 0.5S$
5. $f_1 A = D + L + F + H + S + 0.5W$
6. $f_1 A = D + L + F + H + S + E/1.4$
7. $f_2 A = D + L + F + H + (L_r + S + R) + (W \text{ or } E/1.4) + T$
8. $f_2 A = D + L + F + H + 0.5W + F_a$

Where:

- A is the required allowable stress capacity.

- $f_1 = 1.33$ for all stresses.

- $f_2 = 1.4$ for shear and 1.5 for all other stresses.

- For axial tension, the factored allowable stress (1.33A, or 1.5A) shall not exceed 0.7 times the ultimate tensile strength of the material.

When the design of the SSC is based on ultimate strength design (concrete) or load resistance factor design (steel), each element shall be designed to resist the most critical effects of the load factors and load combinations from the following load combinations as modified from the UBC:

 $\frac{\text{Concrete and Masonry (SD)}}{1. \text{ U} = 1.4\text{D} + 1.7 \text{ L}_{T} + 1.4\text{F}}$

2. $U = 1.05D + 1.3L_T + 1.05F + 1.3H + 1.3W$ 3. U = 0.9D + 1.05F + 1.3H + 1.3W4. $U = 1.1 (1.2D + 1.0 L_T + 1.0F + 1.0H + 1.0E + 1.0T)$ 5. U = 1.1 (0.9D + 1.0F + 1.0H + 1.0E + 1.0T)6. $U = 1.4D + 1.7L_T + 1.4F + 1.7H$ 7. U = 0.9D + 1.4F + 1.7H8. $U = 1.05 D + 1.3L_T + 1.05F + 1.05T$ 9. U = 1.4D + 1.4T10. $U = 1.05D + 1.3 L_T + 1.05F + 0.8W + 1.3H + 1.3F_a$ 11. $U = 0.9D + 1.05F + 0.8W + 1.3H + 1.3F_a$

Where

- U is the required ultimate strength capacity.

- L_T is the most critical value obtained from the following:

 $= L + 0.5 L_r, = 0.5L + L_r,$ = L + 0.5S, = 0.5L + S, = L + 0.5R, = 0.5L + RSteel (SD) 1. U = 1.4D $2. U = 1.2D + 1.6L + 1.3F + 1.6H + 0.5 (L_r \text{ or S or R})$ $3. U = 1.2D + (0.5L \text{ or } 0.8W) + 1.3F + 1.3H + 1.6 (L_r \text{ or S or R})$ $4. U = 1.2D + 0.5L + 1.3F + 1.3H + 0.5 (L_r \text{ or S or R}) + 1.2T$ 5. U = 1.2D + 0.5L + 0.2S + 1.3F + 1.3H + 1.0E + 1.2T 6. U = 0.9D + 1.3F + 1.3H + (1.3W or 1.0E) + 1.2T $7. U = 1.2D + 0.5L + 1.3F + 1.3H + 0.8W + 1.3F_a$ $8. U = 0.9D + 1.3F + 1.3H + 0.8W + 1.3F_a$

Where

- U is the required ultimate strength capacity.

5.3.2 Performance Categories 3 and 4

For Allowable Stress Design (ASD), the PC-3 and PC-4 SSC shall be designed for the most critical condition resulting from the following load combinations as modified from the UBC:

 $\frac{ASD}{1. A = D}$ $\frac{2. A = D + L + F + H + (L_{r} \text{ or } S \text{ or } R)}{3. f_{1}A = D + L + F + H} + (W \text{ or } 1.2E^{*})$ $4. f_{1}A = D + L + F + H + W + 0.5S$

5. $f_2A = D + L + F + H + S + 0.5W$ 6. $f_4A = D + L + F + H + S + 1.2E^* + T + P_a + Y$ 7. $f_3A = D + L + F + H + (L_r \text{ or } S \text{ or } R) + (W \text{ or } 1.2E^*) + T$ 8. $f_3A = D + L + F + H + 0.5W + F_a$ 9. $f_3A = D + F + H + W_t$ 10. $f_3A = D + L + L_r + F + H + W_t$ 11. $f_3A = D + L + L_r + F + H + W_t + T$ 12. $f_4A = D + L + L_r + F + H + T_a^{**}$ 13. $f_4A = D + L + F + H + (L_r \text{ or } S \text{ or } R) + 1.2E^* + T + P_a + Y$

* For existing SSC the load factor for E may be taken as 1.0. For new systems and components the load factor for E may be taken as 1.0 if the in-structure response spectra has been amplified by a factor of 1.2 as stated in Section 5.2.9.4.

**For settlement, T_a, see Section 5.2.10.3

Where

- A is the required allowable stress capacity.

- $f_1 = 1.33$ for all stresses.

- $f_2 = 1.4$ for shear and 1.5 for all other stresses.

- $f_2 = 1.4$ for shear and 1.6 for all other stresses.

- $f_4 = 1.4$ for shear and 1.7 for all other stresses

For axial tension the factored allowable stress (1.33A, 1.5 A, 1.6A, or 1.7A) shall not exceed 0.7 times the ultimate tensile strength of the material.

When the design of the SSC is based on ultimate strength design (concrete) or load resistance factor design (steel), each element shall be designed to resist the most critical effects of the load factors and load combinations from the following load combinations as modified from the UBC:

Concrete and Masonry (SD) 1. $U = 1.4D + 1.7L_T + 1.4F$ 2. $U = 1.0D + 1.15L_T + 1.0F + 1.15H + 1.15W$ 3. U = 0.9D + 1.0F + 1.15H + 1.15W4. $U = 1.1 (1.2D + 1.0L_T + 1.0F + 1.0H + 1.2E^* + 1.0T)$ 5. $U = 1.1 (0.9D + 1.0F + 1.0H + 1.2E^* + 1.0T)$ 6. $U = 1.4D + 1.7L_T + 1.4F + 1.7H$ 7. U = 0.9D + 1.4F + 1.7H8. $U = 1.05D + 1.3L_T + 1.05F + 1.05T$ 9. U = 1.4D + 1.4T10. $U = 1.05D + 1.3L_T + 1.05F + 1.3H + 0.8W + 1.0F_a$ $11. U = 0.9D + 1.05F + 1.3H + 0.8W + 1.0F_{a}$ $12. U = 1.0D_{@} + 1.0F + 1.0H + 1.0W_{t} + 1.0T$ $13. U = 1.0D_{@} + 1.0L_{T} + 1.0F + 1.0H + 1.0W_{t} + 1.0T$ $14. U = 1.1 (1.2D + 1.0L_{T} + 1.0F + 1.0H + 1.2E^{*} + 1.0T_{a}^{**} + 1.0P_{a} + 1.0Y)$ $15. U = 1.0D_{@} + 1.0T_{a}^{**} + 1.25P_{a}$

* For existing SSC the load factor for E may be taken as 1.0. For new systems and components the load factor for E may be taken as 1.0 if the in-structure response spectra has been amplified by a factor of 1.2 as stated in Section 5.2.9.4.

@ Combination with 0.9D, in place of 1.0D, shall also be considered.

**For settlement, T_a, see Section 5.2.10.3.

Where

- U is the required ultimate strength capacity.

- L_T is the most critical value obtained from the following:

$= L + 0.5 L_{r}$,	$= 0.5L + L_{r}$,
= L + 0.5S,	= 0.5L + S,
= L + 0.5R,	= 0.5L + R

Steel (SD)

1. U = 1.4D 2. U = 1.2D + 1.6L + 1.3F + 1.6H + 0.5 (L_r or S or R) 3. U = 1.2D + (0.5L or 0.8W) + 1.3F + 1.3H + 1.6 (L_r or S or R) 4. U = 1.2D + 0.5L + 1.3F + 1.3H + 0.5 (L_r or S or R) + 1.2T 5. U = 1.2D + 0.5L + 0.2S + 1.3F + 1.3H + 1.2E* + 1.2T 6. U = 0.9D + 1.3F + 1.3H + (1.3W or 1.2E*) + 1.2T 7. U = 1.2D + 0.5L + 1.3F + 1.3H + 0.8W + 1.0F_a 8. U = 0.9D + 1.3F + 1.3H + 0.8W + 1.0F_a 9. U = 1.0D_@ + 1.3F + 1.3H + 1.0W_t + 1.0T 10. U = 1.0D_@ + 1.0L + 1.0L_r + 1.3F + 1.3H + 1.0W_t + 1.0T 11. U = 1.0D_@ + 1.0L + 1.0L_r + 1.0F + 1.0H + 1.2E* + 1.0T_a** + 1.0P_a + 1.0Y 12. U = 1.0D_@ + 1.0F + 1.0H + 1.0T_a** + 1.25P_a

* For existing SSC the load factor for E may be taken as 1.0. For new systems and components see also the load factor for E may be taken as 1.0 if the in-structure response spectra has been amplified by a factor of 1.2 as stated in Section 5.2.9.4. @ Combination with 0.9D, in place of 1.0D, shall also be considered.

**For settlement, T_a , see Section 5.2.10.3.

Where

- U is the required ultimate strength capacity.

5.3.3 Load Combinations for Highway and Railway Structures

Load combinations for highway structures shall be in accordance with AASHTO HB (Ref. 6.2.1.1). Load combinations for railway structures shall be in accordance with AREMA Manual (Ref. 6.2.5.1).

5.4 Materials

The UBC shall be followed consistent with the code used in conjunction with Sections 5.2 and 5.3 for allowable material strength capacities and detailing requirements for all structures except as noted below.

Highway Structures:	AASHTO HB (Ref. 6.2.1.1)
Railway Structures;	AREMA Manual (Ref. 6.2.5.1)
Steel Decks:	SDI-28 and SDI DDM02 (Ref. 6.2.13.1 and 6.2.13.2)
Pre-engineered Buildings:	MBMA Metal Building System Manual (Ref. 6.2.10.1)
Austenitic Stainless Steel:	UBC ASD steel provisions with N690 (Ref. 6.2.3.1) allowables for axial compression
Cold Formed Stainless Steel	ANSI/ASCE 8 (Ref. 6.2.6.5)
PC-1 and PC-2 Atmospheric Steel Water Tanks:	AWWA D100 (Ref. 6.2.7.1)
PC-1 and PC-2 Atmospheric Steel Petroleum Storage Tanks	API 650 (Ref. 6.2.4.1)
Sanitary Concrete Structures:	ACI 350 (Ref. 6.2.2.5)
PC-3 and PC-4 Concrete Anchorage:	ACI 349, Appendix B (Ref. 6.2.2.4)
PC-1 and PC-2 Fiber Reinforced Plastic	ASCE Manual 63 (Ref. 6.2.6.4)
Concrete Chimneys	ACI 307 (Ref. 6.2.2.6)
Steel Stacks	ASME STS-1 (Ref. 6.2.12.1)

5.5 Miscellaneous Requirements

5.5.1 Sliding, Overturning, and Buoyancy

Buildings and structures shall be designed to resist overturning, sliding and buoyancy due to earthquake, wind, tornado, lateral earth pressures, or fluid loads in accordance with Section 5.2 of this Engineering Standard with minimum safety factors provided in Table 7.1.2.

5.5.2 Foundation Design

Foundations shall be designed in accordance with the requirements of the UBC, except as noted below:

- Drilled piers shall comply with ACI 336.3R (Ref. 6.2.2 3).

- Design of piers, posts or poles per UBC is acceptable for depths less than 20 feet and provided that the ratio of length to relative stiffness factor is greater than 5 (see ACI 336.3R, Ref. 6.2.2.3).

- Ribbed-mat slabs shall comply with ACI 336.2R (Ref. 6.2.2.2).

5.5.3 Shoring Design

Shoring design shall comply with requirements of UBC, and OSHA 29 CFR Part 1926 (Ref. 6.2.11.1).

5.5.4 Craneway Design

Crane runway and supporting structure shall be designed per CMAA Specification #70 (Ref. 6.2.8.1) or #74 (Ref. 6.2.8.2) requirements as applicable.

5.5.5 Fire Enclosure Evaluations of Concrete Elements

In the structural evaluation of concrete elements for fire events, where necessary, the provisions found in ACI 216 (Ref. 6.2.2.1) shall be followed.

5.5.6 Concrete Anchors

PC-1 and PC-2 concrete anchors shall be designed per requirements of UBC (Ref. 6.2.9.1).

PC-3 and PC-4 concrete anchors shall be designed per requirements of ACI 349 Appendix B (Ref. 6.2.2.4).

Information useful for the design, selection and qualification of concrete expansion anchors, cast-in-place anchors and grouted anchor bolts is provided in 03251-G (Ref. 6.2.14.4). Information useful for installation and testing of concrete expansion anchors, cast-in-place anchors and grouted anchor bolts is provided in 03252-G (Ref. 6.2.14.5).

5.5.7 Coring, Chipping, and Drilling in Concrete

Coring, chipping and drilling in concrete elements or structures shall be per 03010-G (Ref. 6.2.14.6).

5.5.8 Concrete for Confinement

Concrete used for confinement shall consider liquid containment strategies given in Ref. 6.2.6.6.

5.5.9 Fragility Analysis

The existing SSC that do not meet the deterministic limits of this standard may be further evaluated using median failure limits and variabilities calculated for the given SSC.

5.5.10 Ductility Provisions

Seismic ductility provisions for UBC Seismic Zone 3 shall be used for new PC-3 and PC-4 structures.

6.0 REFERENCES

6.1 DOE Orders as included in WSRC S/RID, and DOE Orders and Standards and Memoranda

6.1.1 <u>DOE-STD-1020-94 - NPH Design and Evaluation Criteria for DOE Facilities</u>, Change Notice 1, January 1996.

6.1.2 <u>DOE-STD-1021-93 - NPH Performance Categorization Criteria for Structures</u>, <u>Systems, and Components</u>, Change Notice 1, January 1996.

6.1.3 DOE Order 420.1 - Facility Safety, Change 2 dated October 24, 1996.

6.1.4 DOE Guide 420.1-Y, Interim Guidelines for the Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities.

6.1.5 A Memorandum of January 22, 1998 from DOE to the Office of Nuclear Safety Policy and Standards: H. Chander, Newsletter (Interim Advisory on Straight Winds and Tornados).

6.2 Codes and Standards

6.2.1 American Association of State Highway and Transportation Officials (AASHTO)

6.2.1.1 Standard Specification for Highway Bridges (AASHTO HB)

6.2.2 American Concrete Institute (ACI)

6.2.2.1 ACI 216 Guide for Determining the Fire Endurance of Concrete Elements

6.2.2.2 ACI 336.2R Suggested Analysis and Design Procedures for Combined Footings and Mats

6.2.2.3 ACI 336.3R Design and Construction of Drilled Piers

6.2.2.4 ACI 349 Code Requirements for Nuclear Safety Related Concrete Structures

6.2.2.5 ACI 350 Environmental Engineering Concrete Structures

6.2.2.6 ACI 307 <u>Standard Practice for the Design and Construction of Reinforced</u> <u>Concrete Chimneys</u>

6.2.3 American Institute of Steel Construction (AISC)

6.2.3.1 ANSI/AISC N690 <u>Nuclear Facilities: Steel Safety-Related Structures for Design</u>, <u>Fabrication and Erection</u>

6.2.4 American Petroleum Institute (API)

6.2.4.1 API 650 Welded Steel Tanks for Oil Storage

6.2.5 American Railway Engineering and Maintenance-of-Way Association (AREMA)

6.2.5.1 AREMA Manual for Railway Engineering, Volume I and II

6.2.6 American Society of Civil Engineers (ASCE)

6.2.6.1 ASCE 4 Seismic Analysis of Safety Related Nuclear Structures

6.2.6.2 ANSI/ASCE 7 Minimum Design Loads for Buildings and Other Structures

6.2.6.3 ASCE 58 Structural Analysis and Design of Nuclear Plant Facilities

6.2.6.4 ASCE Manual 63 Structural Plastic Design Manual

6.2.6.5 ANSI/ASCE 8 Specification for the Design of Cold-Formed Stainless Steel Structural Members

6.2.6.6 <u>Concrete Watertight Structures and Hazardous Liquid Containment</u>, Robert Hengst, ASCE

6.2.7 American Water Works Association (AWWA)

6.2.7.1 AWWA D100 Welded Steel Tanks for Water Storage

6.2.8 Crane Manufactures Association of America (CMMA)

6.2.8.1 CMMA Specification #70, Electrical Overhead Traveling Cranes

6.2.8.2 CMMA Specification #74, <u>Specifications for Top Running and Under Running</u> Types of <u>Single Girder Electric Overhead Traveling Cranes</u>

6.2.9 International Conference of Building Officials (ICBO)

6.2.9.1 Uniform Building Code (UBC)

6.2.10 Metal Building Manufacturers Association (MBMA)

6.2.10.1 Low Rise Building Systems Manual

6.2.11 Occupational Safety and Health Administration (OSHA)

6.2.11.1 29 CFR Part 1926 OSHA Safety and Health Standards

6.2.12 American Society of Mechanical Engineers

6.2.12.1 ASME STS-1 Steel Stacks

6.2.13 Steel Deck Institute (SDI)

6.2.13.1 SDI - Publ 28 <u>Design Manual for Composite Decks from Decks and Cellular</u> Metal <u>Deck with Electrical Distribution</u>

6.2.13.2 DDM02 Diaphragm Design Manual

6.2.14 SRS Standards, Reports and Calculations

6.2.14.1 SQP Seismic Qualification Program, Rev. 3, 1995

6.2.14.2 Engineering Standard 01110, Civil Site Design Criteria

6.2.14.3 <u>SRS Seismic Response Analysis and Design Basis Guidelines</u>, WSRC-TR-97-0085, Rev. 0, R. C. Lee, M. E. Maryak and M. D. McHood, March 1997

6.2.14.4 <u>Concrete Expansion Anchors, Cast-in Place Anchors and Grouted Anchor Bolts</u> Engineering Guide 03251-G

6.2.14.5 Installation and Testing of Concrete Anchors, Engineering Guide 03252-G

6.2.14.6 Coring, Chipping and Drilling in Concrete, Engineering Guide 03010-G

6.2.14.7 <u>Evaluation of Seismic Spatial Interactions Between Facility Structures, Systems,</u> and <u>Components</u>, Engineering Guide, 11520-G

6.2.14.8 <u>Tornado, Maximum Wind Gust, and Extreme Rainfall Event Occurrence</u> <u>Frequencies at the Savannah River Site (U), WSRC-TR-98-00329, September 1998.</u>

6.2.14.9 Engineering Standard 01060, Rev. 2, Data Letter, TCDL-037, Rev. 0, August 1997.

6.2.14.10 <u>Tornado Hazard Assessment, Memo from McDonald-Mehta Engineers to Brent</u> Gutierrez, November 9, 1997.

6.2.14.11 <u>"Revised Envelope of the Site Specific PC3 Surface Ground Motion", Memo</u> from Brent Gutierrez to Lawrence Salomone and Fred Loceff, September 9, 1999.

6.2.15 State of South Carolina, Department of Health and Environmental Control (SCDHEC)

Second St

·----

6.2.15.1 Final Regulation, Department of Health and Environmental Control, Chapter 61, <u>61-104, Hazardous Waste Management Location Standards</u>, Statutory Authority: 1976 Code Section 44-56-30, -35, et. seq.

6.2.16 U.S. Nuclear Regulatory Commission (USNRC)

6.2.16.1 NUREC-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, U.S. NRC

7.0 TABLES and FIGURES

7.1 Tables

7.1.1 Natural Phenomena Hazards Criteria

7.1.2 Factors of Safety

7.1.3 PC-3 and PC-4 Site Specific Spectra, Horizontal 5% Damping

7.1.4 Performance Categories

7.2 Figures

7.2.1 PC-3 and PC-4 Site Specific Spectra, Horizontal 5% Damping

	TABLE 7.	1.1 - Natu	ral Phenomer	ia Hazards C	riteria	
	Performance Category	PC-0	PC-1	PC-2	PC-3	PC-4
	Performance Goal [.] Annual Probability of Exceedance	NA	1x10 ⁻³	5x10 ⁻⁴	1x10 ⁻⁴	1x10 ⁻⁵
S* E I S	Required Minimum Annual Hazard Exceedance Probability	NA	2x10 ⁻³	1x10 ⁻³	5x10 ⁻⁴	1x10 ⁻⁴
M I C	Peak Ground Acceleration(PGA)**	NA	**	**	**	**
	Annual Hazard Exceedance Probability	NA	2x10 ⁻²	1x10 ⁻²	1x10 ⁻³	1x10 ⁻⁴
w	Three Second Wind Speed, mph	NA	100	107	133	160

I N D	Missile Criteria	NA	NA	NA	2x4 timber plank 15 Ib. @ 50 mph (horiz); max height 30 ft.	2x4 timber plank 15 lb. @ 50 mph (horiz); max height 50 ft.
	Annual Hazard Exceedance Probability	NA	NA	NA	2x10 ⁻⁵	2x10 ⁻⁶
	Three Second Wind Speed, mph	NA	NA	NA	178	TBD
	Atmospheric Pressure Change (APC)	NA	NA	NA	TBD	TBD
T O R N A D O	Missile Criteria	NA	NA	NA	150 ft; 70 mph (vert) 3 in dia std steel pipe, 75 lb @ 50 mph (horiz);	mph (vert) 3 in dia std steel pipe, 75 lb @ 75 mph (horiz); max height 100 ft; 50
F L O D	Annual Hazard Exceedance Probability	NA	2x10 ⁻³	5x10 ⁻⁴	1x10 ⁻⁴	1x10 ⁻⁵
<u>}</u>	Roof Design	NA	TBD	TBD	TBD	TBD
	DBFL	NA	TBD	TBD	TBD by Facility	TBD by Facility

* The SCDHEC (Ref. 6.2.15.1) seismic provisions for Hazardous Waste Management locations of 10% probability of occurrence in 250 years is equivalent to a return period of about 2400 years. This corresponds to an annual exceedance probability of approximately 4.2E-4. The PGA determined for a PC-3 (annual hazard exceedance probability of 5E-4) is 0.16g. The typical PGA for PC-2 exceeds that required by the SCDHEC provisions.

** For PC-1 and PC-2 seismic provisions, see Section <u>5.2.9.2</u>. For PC-3 and PC-4 seismic provisions, see Section 5.2.9.3.

Table 7.1.2 - Factors of Safety					
Performance Category	Analysis	DBE	DBT	DBFL	DBW
PC-4 ¹	Overturning	1.1 ³	1.1 ⁵		1.54
	Sliding	1.1 ³	1.1 ⁵		1.54
	Buoyancy			1.16	
PC-3 ¹	Overturning	1.1 ³	1.15		1.54
	Sliding	1.1 ³	1.1 ⁵		1.54
	Buoyancy			1.1 ⁶	
PC-2 ²	Overturning	1.0 ³			1.54
	Sliding	1.0 ³			1.54
	Buoyancy			1.0 ⁶	
PC-1 ²	Overturning	1.0 ³		-	1.54
t <u></u>	Sliding	1.0 ³			1.5 ⁴
	Buoyancy			1.0 ⁶	

Notes:

1. For PC-3 and PC-4 facility foundation design, these values are taken from the Standard Review Plan, NUREG 0800, Section 3.8.5 (Ref. 6.2.16.1). These factors of safety are *for* combinations provided in Notes 3, 4, 5, or 6, as applicable.

2. For PC-2 and PC-1, the factors of safety are consistent with the SBC and UBC for

earthquake loads and ASCE 7 for normal wind loads and are *for* combinations provided in Notes 3, 4, and 6, as applicable.

3. D + H + $(1.2E^*/1.4)$	Where:
	D = Dead Load
4. $D + H + W$	H = Lateral Earth Pressure
	W = Wind Load
5. D + H + $(W_t/1.4)$	E = Earthquake Loads
	$F_a = Buoyant Forces$
6. D + F_a	W _t = Tornado Loads

* For existing structures the 1.2 load factor for E may be taken as 1.0 For clarification on the unfactored earthquake load see the Data Letter (Ref. 6.2.14.9).

Spectra,
<u>G</u> 1
Spectral tion (g)
75
0
.9
5
5
)4
21
5
77
'5
'5
50
50
<u> </u>
Spectral tion (g)
67
11
32
52 19
17

0.3	U.3411
0.7	0.4813
1.5	0.760
7	0.655
18	0.350
33	0.227
100	0.227

Table 7.1.4 Performance Categories

Performance Categories are used as a means to ensure a graded level of protection for structures, systems, and components during Natural Phenomena Hazard (NPH) events. Functional Classifications are used to determine the minimum Performance Categories (PC) of SSCs in accordance with DOE Order 420.1 and DOE-STD-1021-93. Performance Categories PC-0 through PC-4 are assigned based on the function of the SSC as determined during the Functional Classification process. The table below provides the correlation between Functional Classification and Performance Categories. For replacement SSCs, Natural Phenomena Hazard (NPH) qualification, as a minimum, shall be the same as the original SSC through the provisions of DOE Order 420.1 Section 4.4.2. For all other conditions, SSCs shall be NPH qualified commensurate with the assigned Performance Category. This table provides the minimum requirements for compliance with DOE Order 420.1. Factors other than Functional Classification that are to be considered in determining the PC include programmatic mission, cost and replaceability of the SSC. It may be prudent based on other considerations such as mission importance or economic reasons to increase the performance category to provide a higher level of assurance.

Functional Classification (Note 1)	Performance Category
Safety Class (Reactors)	PC-4
Safety Class (Non-reactor)	PC-3
Safety Significant	PC-2
Production Support (Note 2) and General Services (Notes 2 and 5) except for the following:	PC-1
Criterion 3 for Production Support in Attachment 8.5 to the Procedure 2.25, Note 1, (Emergency Plan)	PC-2
Assembly of more than 300 people (Note 3)	PC-2
Emergency Equipment (Note 4)	PC-2

Notes:

(1) Criteria for Functional Classifications are identified in Manual E7, Procedure 2.25.

(2) In buildings that have routine human occupancy, the structure and any system or component whose failure could cause fatality or serious injury to in-facility workers shall be designed, as a minimum, to PC1.

(3) This Performance Category is defined in DOE Order 420.1 and DOE Standard 1021-93.

(4) Per DOE STD-1021-93, this includes SSCs such as emergency handling (fire station, medical facilities), hazard recovery, those related to emergency preparedness (emergency operations facilities) and communications that may be needed to preserve the health and safety of workers and visitors.

(5) Some General Services SSCs may be designed without consideration of NPH loads (PC0). This may be done when there is non human occupancy, no safety, and no mission considerations, and it is more cost effective to replace or repair the SSC than to design it to withstand NPH effects. Any SSC whose failure can affect the performance of a Performance Category 1,2,3 or 4 SSC, as determined by an interaction (two over one) evaluation, shall not be placed in PC-0.

- -

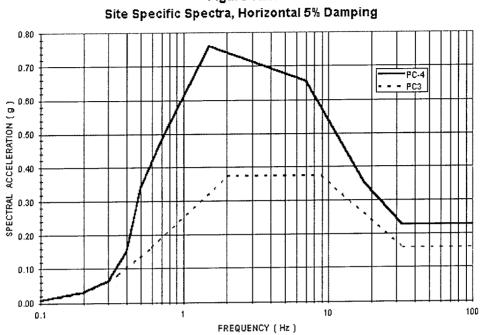


Figure 7.2.1

-

K-TRT-F-00001 Rev. 0 May 1999

F-Area Northeast Expansion Report (U)

Site Geotechnical Services Department

x :

UNCL ____

Westinghouse Savannah River Company Savannah River Site Aiken, SC 29808

Prepared for the U.S. Department of Energy Under Contract No. DE-AC09-89SR18035

UNCLASSIFIED

OSR 31-688 (Rev 11-20-97) Stores: 26-8910.00

WESTINGHOUSE SAVANNAH RIVER COMPANY INTEROFFICE MEMORANDUM



Date: February 26, 2001

PEC-SGS-2001-00011

To: Distribution

From: Frank Syms, 730-2B/1084 5.

Subject: Revisions to K-TRT-F-00001, F-Area Northeast Expansion Report (U)

Summary of revisions made to K-TRT-F-00001, Rev 1, dated January 2001 include:

- 1. Pages 12 and 13- Text revised on engineering stratigraphy.
- 2. Table 3.3-1- Stratigraphic picks revised on CPT soundings 176, 180 and 186.
- 3. Table 3.3-3- Soft zone thickness revised for SPT boring FB-20.

If you have questions, please contact me at (803) 952-6927.

c: Russ Beckmeyer, 730-2B/130 Mike Lewis, 730-2B/116 Larry Salomone, 730-B/304 Chester Reeves, 730-2B/1083 SGS Files, 730-2B/1102

Site Geotechnical Services F-Area Northeast Expansion Report (U)

ii

K-TRT-F-00001 Rev 0 May 1999

Project:

F-Area Northeast Expansion

Document:

K-TRT-F-00001, Rev.0

Title:

F-Area Northeast Expansion Report (U)

Prepared by:

F. H. Syms, Geotechnical Engineering, SGS Department

Approvals:

M.R. Lewis, Manager, Geotechnical Engineering, SGS Department

2 \overline{Z}

L. A. Salomone, Site Chief Geotechnical Engineer, SGS Department

Date

6/1 99

Date

<u>5-28-99</u>

Date

,'

DISCLAIMER

This product was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

TABLE OF CONTENTS

TABLE OF CONTENTSiv
LIST OF TABLES
LIST OF FIGURESvi
1 INTRODUCTION
2.1 Field Test Location and Clearance52.2 Equipment and Field Test Methods52.2.1 Exploration Contractor(s) and Equipment62.2.2 Standard Penetration Test (SPT)72.2.3 Undisturbed Sampling82.2.4 Piezocone Penetration Test Soundings92.2.5 Borehole and Penetration Abandonment92.3 Sample Prep, Handling, Strorage, Transportation and Control10
3. SUBSURFACE CONDITIONS 11 3.1 Shallow Engineering Stratigraphy 11 3.1.1 TR1 and TR1A Layers 12 3.1.2 TR2A and TR2B Layers 12 3.1.3 TR3/4 and DB1/3 Layers 13 3.1.4 DB4/5, ST1 and ST2 Layers 13 3.1.5 GC Layer 14 3.2 Groundwater Conditions 15 3.3 Engineering Soil Characteristics 15 3.3.1 Soft Zone Characteristics 16 3.3.1.1 Northeast Expansion Area Soft Zones 17 3.3.1.3 Soft Zone samples and Analysis 18
 GEOTECHNICAL AND FOUNDATION ASSESSMENT
6. REFERENCES

APPENDICES

Appendix A	Borings	Logs
------------	---------	------

- Appendix B Laboratory Test Data Appendix C Cone Penetrometer Test Data

LIST OF TABLES

.

v

.

Table 3.3-1 Summary of CPT Layer Picks

- - - - - - - - - -

- Table 3.3-2 Comparison of Engineering Soil Properties
- Table 3.3-3 Summary of SCPTU Soft Zone Intervals
- Table 3.3-4 Summary of Soft Zone Soil Properties

LIST OF FIGURES

- Figure 1.0-1 Location Map of F-Area and the Northeast Expansion Area
- Figure 1.0-2 Location Map of the Northeast Expansion Area and APSF
- Figure 2.0-1 Exploration Location Map
- Figure 3.0-1 Subsurface Cross-section 1
- Figure 3.0-2 Subsurface Cross-section 2
- Figure 3.0-3 Subsurface Cross-section 3
- Figure 3.0-4 Subsurface Cross-section 4
- Figure 3.0-5 Subsurface Cross-section 5
- Figure 3.0-6 Subsurface Cross-section 6
- Figure 3.0-7 Subsurface Cross-section 7
- Figure 3.0-8 Subsurface Cross-section 8
- Figure 3.1-1 Typical CPTU Sounding Plot Showing Stratigraphic Layers
- Figure 3.2-1 Hydrograph of Water Table Measurements for Well NBG-5
- Figure 3.3-1 Range of SPT N-value Measurements
- Figure 3.3-2 CPT Corrected Tip Resistance
- Figure 3.3-3 CPT CPT Friction Ratio
- Figure 3.3-4 Average Shear Wave Velocity
- Figure 3.3-5 Map of APSF Area and Mapped Extent of Lower Soft Zone
- Figure 3.3-6 Map of APSF Area and Mapped Extent of Upper Soft Zone

1. INTRODUCTION

A geotechnical program has been completed in F-Area at the Savannah River Site (SRS) in South Carolina. This program investigated the subsurface conditions for the area known as the "northeast expansion" located in the F-Area (Figure 1.0-1). The primary focus was to gather subsurface information within the expansion area and tie this information with the detailed studies completed for the Actinide Packaging and Storage Facility (APSF) located southwest and adjacent to the northeast expansion area (Figure 1.0-2) and the balance of F-Area.

Data acquired from the APSF investigation includes both field exploration and laboratory data, which are included within this report for summary and comparison purposes. Results of this investigation are intended to be used as baseline subsurface conditions for the siting of potential new mission facilities. Further, this data will augment specific foundation design investigations for the proposed new mission facilities to be constructed in this area. Specifically, the program consisted of a field exploration program consisting of Standard Penetration Test (SPT) borings and Seismic Piezocone Penetration Test (SCPTU) soundings; a laboratory testing program and an evaluation of subsurface conditions.

This geotechnical program was performed by SRS Projects Engineering and Construction Division (PE&CD), Site Geotechnical Services (SGS) Department, in conformance with DOE Order 420.1, Procedure Manual E7, (WSRC, 1996a), and SGS Procedure Manual E9 (WSRC, 1996b).

1.1 Purpose and Objectives

The purpose of the investigation was to obtain geotechnical information to characterize the subsurface conditions within the northeast expansion area and compare these conditions with the adjacent APSF area. Specific objectives included:

• define the engineering stratigraphy and compare the continuity, thickness and relative elevation of stratigraphic units across the study site respective to the APSF area;

- determine the index properties of each stratigraphic layer and make a direct comparison to properties determined for the APSF stratigraphy;
- evaluate the presence, thickness and stratigraphic position of soft zones; and
- evaluate the subsurface conditions in terms of relative geotechnical and foundation capability.

1.2 Report Organization

The text of this report includes five sections. These sections are: Section 1, Introduction; Section 2, Subsurface Exploration; Section 3, Subsurface Conditions; Section 4, Geotechnical and Foundation Assessment, Section 5, Conclusions and Recommendations; and Section 6, References. These sections are followed in succession by tables and figures.

Appendices to this report include: Appendix A, Boring Logs; Appendix B, Laboratory Test Data; and Appendix C, Seismic Piezocone Penetrometer Test Soundings.

This report is divided into two volumes: Volume 1 contains the text, tables, and figures, Volume 2 contains appendices A, B and, C.

1.3 **Quality Assurance**

Quality related activities performed by WSRC/BSRI organizations during the Geotechnical Investigation were controlled in accordance with the WSRC QA Program as delineated in WSRC Procedure Manual 1Q. Activities were also controlled via compliance to the applicable administrative and technical procedures contained in WSRC Procedure Manual E9, "Site Geotechnical Services."

Cone Penetration Testing was conducted in accordance with the Quality Assurance Plan for WSRC Subcontract AA82276N, with Applied Research Associates, Inc. (ARA) and the ARA Quality Assurance Program for Cone Penetration Testing, Revision 3 (7/30/96). Subcontractor compliance with their implementing procedures and instructions (ARA-Q-101 through 107) also ensured the integrity of the CPT results and interpretations.

.

Soil testing performed by Law Engineering of Atlanta, Georgia (WSRC Subcontract No. AB80111N) was accomplished through compliance with the Law Engineering QA Program as delineated in the Law Engineering Quality Assurance Manual, Revision 1 (7/25/97), and applicable national/industry test standards (as specified in procurement specification K-SPC-G-00016, Revision 0).

SGS QA provided quality oversight over all quality related activities of the geotechnical investigation. SGS QA oversight activities included: the review and approval of all technical and quality procedures and instructions developed specifically for the investigation; monitoring field activities, sample handling, and soil testing laboratory activities; and providing direct QA oversight over seismic piezocone penetration testing activities.

QA/QC activities were also performed by Law Engineering and Applied Research & Associates personnel as prescribed in their respective QA plans, QA programs, and QA technical procedures.

2. SUBSURFACE EXPLORATION

Between August, 1995 and June, 1998, field exploration programs to support various design stages of the Actinide Packaging and Storage Facility (APSF) were completed. The information from both programs forms the basis for this report. The exploration program for the F-Area northeast expansion area was completed between February 1998 and April 1999. Within this time frame, the majority of the field investigation was completed between February 1998 and May 1998 after which work was suspended until the following fiscal year. Field work resumed in March of 1999 and was completed in April 1999.

The exploration programs consisted of a series of Standard Penetration Test (SPT) borings, Piezocone Penetration Test (CPTU) and Seismic Piezocone Penetration Test (SCPTU) soundings, both of which are referred to as CPT hereafter. Some SPT borings and CPT sounding locations were paired so that a site-specific comparison of results could be obtained. Figure 2.0-1 shows the locations of all borings and soundings.

The borings and soundings were advanced in a grid pattern, roughly 150 feet by 150 feet, covering the expansion area to the north and east of the APSF area. However, in heavily wooded areas, areas where site topography was too steep, or where access could not be obtained due to existing construction trailers, the exploration locations were not performed. This was limited to eight points in the northern and eastern most extent of the area (Figure 2.0-1). Exploration in these areas would be required as construction of new facilities is planned.

The SCPTU was used as the primary exploration technique. SPT borings were located adjacent to selected soundings to measure N-values and retrieve soil samples for laboratory classification testing. Test methods, equipment, and general field procedures, are summarized in the following sections. The following list summary field exploration completed for the northeast expansion investigation:

- 39 Seismic Piezocone Penetrometer Test (SCPTU) Soundings
- 4 Cone Penetrometer Samples
- 9 Standard Penetration Test (SPT) Borings (4 of which were continuous)

2.1 Field Test Location and Clearance

The selection of the boring locations, CPT soundings, and other field work was based primarily on the following criteria and factors:

- Existing Data;
- Data coverage;
- Site conditions (topography, wooded areas, etc.);
- Type of data required;
- Under-and-above ground interferences; and
- Presence of known soft zones.

Approval of the selected location for the field work was preceded by a series of work coordination steps as summarized below (the organization responsible for each step is noted in parentheses):

- Selection of general area based upon the factors listed above (SGS);
- Preliminary interference research (Construction Layout);
- Ground penetrating radar survey (Operations Department);
- Preparation of work package (SGS);
- Work Process Control (Operations Department); and
- Field survey (Construction Layout).

This detailed site clearance routine was essential for safe field operations. Any obstacles or restrictions encountered in any step during this process required the relocation of the proposed boring or sounding location, and therefore the re-initiation of the process.

2.2 Equipment and Field Test Methods

All equipment used in the field investigations met applicable ASTM standards and site standards and procedures as listed below:

- WSRC E9 SGS-GT-202 Drilling Practices;
- WSRC E9 SGS-GT-203 Sample Preparation, Handling and Storage;
- WSRC E9 SGS-GT-206 Engineering Soil Descriptions;
- WSRC E9 SGS-GT-207 Field Log Preparation;
- WSRC E9 SGS-GT-210 Standard Penetration Test;

- WSRC E9 SGS-GT-211 Cone Penetration Test Soundings; and
- WSRC 3Q5 Manual Hydrogeologic Data Collection.

2.2.1 Exploration Contractor(s) and Equipment

One drilling contractor was utilized for the borings, SPT testing and undisturbed soil sampling (Shelby tubes) and one contractor was used for all SCPT soundings. A description of the scope of each contractor and the equipment used is provided below.

Graves Environmental, Inc.

Graves Environmental, Inc., of Jackson, South Carolina performed the drilling and sampling for SPT and undisturbed borings. All Graves Environmental drillers involved with the drilling and sampling activities were experienced with geotechnical investigations and performed the drilling and sampling for the APSF investigation. The drilling equipment utilized is described below.

Failing 1500

The Failing 1500 drill rig is gas-driven with a 40-foot mast. The rig has a 23-foot Kelly assembly which allows for a 20-foot stroke and is capable of mud rotary, augering, and rotary coring techniques. The drill string is controlled by the Kelly arrangement, as well as, by a mechanical winch. This rig was used for all deeper borings requiring mud rotary.

Applied Research Associates (ARA)

Applied Research Associates (ARA) of Royalton, Vermont performed all CPT field and data processing activities including the CPT soundings completed for the APSF investigation. The CPT rig used for this investigation is described below.

Mac I

The Mac I CPT rig is a 22 ton rig capable of 30 ton mass push when fully ballasted. The push rod and piezocone utilized conformed with ASTM D5778 (ASTM 1995) consistent with WSRC E9 SGS-GT-211 - Cone Penetration Test Soundings. This rig was equipped with a hydraulic skid coupled to the surface beneath the rig for generating a shear wave source. Compressional waves were generated with a hydraulic vertical hammer located on the outside of the rig. All components were controlled by the operator.

2.2.2 Standard Penetration Test (SPT)

Tests were performed in accordance with WSRC E9 SGS-GT-210 using a standard 24-inch long by 2-inch outside diameter (OD), split-spoon sampler with a 2-foot bleeder and check valve located above the sampler, NX drill stem, and a 140-lb safety hammer falling 30 inches. SPT N-values were determined by adding the number of blows required to drive the split-spoon sampler the last 12 inches of the standard 18-inch drive.

The general test procedure, as noted in sequence, is outlined below:

- 1. Split spoon is lowered into nominal 4-inch diameter borehole;
- 2. Depth is checked and any rod settlement noted;
- 3. Six-inch intervals, totaling 18 inches, are marked on the drill rod above the turntable;
- 4. Sampler is driven by blows applied using a 30-inch stroke with the rope wrapped twice over the cathead;
- 5. Sampler retrieved and recovery noted;
- 6. Sampled interval reamed and drilled out to next sample interval; and
- 7. Process repeated.

Prior to each SPT test, the Geotechnical Oversight professional verified that the spoon was properly assembled, making sure the bleeder and check valve were clean and the drive shoe was in good condition.

÷ '

2.2.3 Undisturbed Sampling

All undisturbed soil samples referenced within this report pertain to samples collected for the APSF investigation. No undisturbed samples were obtained specifically from the northeast expansion area.

Undisturbed (UD) soil samples were obtained for laboratory testing with direct push shelby tubes. The shelby tubes used were either brass or galvanized steel with a 3 inch OD, 0.065 inch wall thickness, and a length of 30 inches. Sampling was performed in accordance with ASTM D1587 (ASTM 1996).

The selection of the sampling interval was based on the results of previously pushed CPT soundings and/or SPT borings located within 10 to 15 feet from the UD boring. Prior to sampling, a sampling plan was developed for each UD boring. Generally, sampling was performed on the more cohesive soil layers encountered.

Drilling requirements for undisturbed sampling boreholes required that fluid pressures be kept as low as practical, while maintaining fluid return up the borehole. Drill bits with side discharge, or, in the case of tricone bits, with bottom deflectors, were required for reaming and advancing the borehole. Drilling was accomplished by mud rotary methods to the predetermined sampling depth. The drill stem was then tripped out and the bit removed. The Shelby tube head with a ball check valve was then attached and lowered to the bottom of the borehole. Borehole depth was checked against the drilled depth and noted. The maximum push length was marked on the drill stem and the rod hydraulically advanced a full 24 inches or until 600 psi hydraulic pressure was reached. Once the advance was made, the tube was allowed to sit for 5 minutes. When ready to retrieve the sample, the drill string was rotated about 90 degrees to shear the sample off the surrounding soil. When each sample was brought out of the borehole, the bottom and top were capped with plastic slip-on caps. If a gap was noted between the bottom tube edge and sample, a filler material was placed in the gap prior to placing the cap. Details of final sample preparation are provided in Section 2.3.

2.2.4 Piezocone Penetration Soundings

CPTU, including seismic (SCPTU) soundings, were performed in accordance with ASTM D5778. The CPT was used because of the relatively quick and clean operation and its ability to provide a continuous soil profile for determining stratigraphy and defining the extent of soft and/or loose soil zones. In general, all CPT soundings included shear wave velocity surveys at 3-foot intervals. Target depths were based upon the estimated elevation of the top of the Congaree formation (approximately EI. 130 feet MSL), a dense sandy layer (see section 3) that is considered incompressible. However, actual depths varied, depending upon ground surface elevations and subsurface conditions.

2.2.5 Borehole and Penetration Abandonment

Abandonment of borings and soundings was performed per WSRC Manual 3Q5, Hydrogeologic Data Collection (WSRC, 1992). The standard grout mix consisted of the following:

- One sack Type 1 Portland Cement (94 lb sack);
- Two pounds of dry sodium bentonite; and
- 6.5 to 7.5 gallons of potable water.

All borings were abandoned immediately upon completion of testing. Grouting was accomplished via the tremie method. The grout pipe was lowered to the bottom of the boring and grout was injected until the boring fluid was displaced and grout returned to the surface. All borings were grouted to the surface and topped off until the column remained static.

Cone penetrometer soundings were abandoned by pressure grouting through a push rod which was re-pushed down to the bottom of the sounding. A grout tube extending to the bottom of the push rod was used to pump grout into the hole as the push rod was retracted. Holes were topped off until the column remained static.

2.3 Sample Preparation, Handling, Storage, Transportation, and Control

Samples were prepared and handled in accordance with WSRC E9 SGS-GT-203 - Sample Preparation, Handling and Storage. Shelby tubes were checked for conformance with ASTM D1587-83 (ASTM 1996).

The undisturbed samples were maintained in vertical tube boxes capable of holding four tubes as prescribed by ASTM D 4220 (ASTM 1996). Once the samples were obtained, the samples were trimmed, measured, and sealed. Plastic caps were placed over both ends of each tube, then taped and each tube labeled. For SPT borings, a sample was collected from the top and bottom of the sample spoon. If a material change occurred within the sample, additional samples were collected, as appropriate. Samples were placed in 8-ounce glass jars. The tops were closed tightly, wrapped, sealed with electrical tape, and samples were labeled on both the jar and the lid. Prior to sample turnover to Law Engineering, all samples were stored in accordance with WSRC E9 Procedure SGS-GT-203.

All soil samples selected for testing were turned over to Law Engineering for transporting to their laboratory in Atlanta. All tube samples tested by Law Engineering in Atlanta were transported in tube boxes and were maintained in a vertical position. Once in Atlanta, the samples were maintained in a controlled area according to the Law Engineering Quality Assurance Program.

, *'*

3. SUBSURFACE CONDITIONS

Information obtained from the field exploration program has been used to characterize the subsurface (surface to about 180 feet in depth) conditions in the F-Area northeast expansion area. This included establishing the engineering stratigraphy and soil index properties and making a direct comparison with the adjacent APSF subsurface soils. Further, the presence of soft sediments defined as zones with measured tip resistances less than 15 tons per square foot (tsf) or SPT N-values of 5 or less, were evaluated. Groundwater conditions were determined from nearby monitoring well information. Eight subsurface cross-sections (Figures 3.0-1 through 3.0-8) were developed to show the engineering stratigraphy across the northeast expansion area, as well as, the APSF area. These subsurface sections are based on presently available information. Some variation from these conditions can be expected.

3.1 Engineering Stratigraphy

subsurface engineering stratigraphy was determined from CPT The measurements including tip resistance, sleeve resistance, friction ratio, and pore pressure signatures, shear wave velocity as well as correlations with adjacent soil boring data. The layering system is based on observed changes in the CPT measurements that are correlatable between soundings and nearby borings. The layer nomenclature was developed for mapping subsurface units across various parts of the SRS. For specific application to the APSF and F-Area northeast expansion area, it is only used to differentiate units based on similar engineering characteristics that can be mapped in the investigation area. Typical stratigraphic layering is shown on Figure 3.1-1.

The layer nomenclature follows an alphanumeric system with layer numbers increasing from top to bottom. Subdivided layers are identified with a letter designation (e.g., TR1A). Some layer boundaries correspond to geologic formations. Some upper portion of the layers TR1 and TR1A layers are most probably the Altamaha formation overlying the Tobacco Road formation, however, due to the similar material properties and an irregular erosional surface which separates these units, differentiating them is difficult. In some parts of the F-Area, the TR1 and TR2 layers have been subdivided to recognize sublayers with distinct soil properties (TR1A, TR2A, and TR2B). As described in the F-

11

Site Geotechnical Services	K-TRT-F-00001 Rev 0
F-Area Northeast Expansion (U)	May 1999

Area Geotechnical Characterization Report (WSRC, 1996c), the TR3/4 layer was first correlated to the lower portion of the Tobacco Road formation but based on more recent geologic investigations in the area has been reassigned to the upper portion of the Dry Branch formation. Layers DB1 through DB3 were combined into a DB1/3 layer because of similar properties. Likewise, layers DB4 and DB5 were combined into a DB4/5 layer. The DB1/3 layer corresponds to the Dry Branch formation while the DB4/5 layer corresponds to the upper Santee/Tinker formation. The Santee/Tinker formation, is the most variable layer in the shallow subsurface. It has been further subdivided into the ST1 and ST2 layer where practical. The green clay, which is an informal stratigraphic interval at the SRS, is considered the basal unit for the shallow engineering stratigraphy and is labeled as GC. This geologic unit is locally continuous and provides a reliable marker bed. The Green Clay overlays the Congaree Formation which is predominantly dense silty sands and where applicable is labeled CG.

The following sections describe the physical attributes used to delineate each layer, as well as, depositional environment and lithologic variability with the exception of the CG layer.

3.1.1 TR1 and TR1A Layers

The TR1 and TR1A layers are most probably the Altamaha formation consisting of red, purple and brown poorly sorted sands ranging from fine to gravel size with the dominant soil classification being clayey to silty sands (SC to SM). The depositional environment of these sediments is characterized as high energy fluvial such as river and stream channels. The base of the Altamaha is distinguished by an irregular erosional surface and can reach thicknesses of up to 70 feet at the SRS. This layer ranges in thickness from roughly 7 feet to nearly 36 feet thick. The TR1 layer is characterized by moderate SCPTU tip resistances and relatively high friction ratios while the underlying TR1A layer is generally less dense (lower tip resistances).

3.1.2 TR2A and TR2B Layers

The TR2A and TR2B layers have been used to differentiate the Tobacco Road formation. Sediments of the Tobacco Road formation were deposited in low energy shallow marine transitional environments such as tidal flats. Much of the sediments are laminated or otherwise bioturbated (mixed by burrowing

organisms after deposition) red, purple and brown poorly sorted sands and clayey sands.

The TR2A, and TR2B layers are predominantly sands and clayey sands (SP-SM to SP-SC) as determined by laboratory classification tests. The TR2B layer is distinguished from the overlying TR1A layer by increased tip resistance and notably lower sleeve friction values resulting in a lower friction ratio. The TR2A ranges from about 20 feet to 40 feet thick while the TR2B layer ranges from about 10 to 27 feet thick.

3.1.3 TR3/4 and DB1/3 Layers

The Dry Branch Formation consists of sands and clays deposited in a transitional sequence between near shore and bay or lagoon environments. The upper contact of the TR3/4 layer is defined by a marked decrease in CPT tip resistance and an increase in both the friction ratio and pore pressure measurements. As determined by laboratory classification tests, the TR3/4 layer is predominantly clays and sandy clays (SC). Thickness of this layer ranges from around 5 feet to around 10 feet thick over the balance of the area.

The DB1/3 layers correspond to the Irwinton Sands. On the CPT logs, the DB1/3 layer is a zone of variable, but generally high, CPT tip resistances and low friction ratios. In general, pore pressures are low or slightly above hydrostatic. The dominant unified soil classification for the DB1/3 is SP-SM with minor layers of CL material occurring as laminations. Thickness of this layer ranges from 25 to 35 feet thick.

3.1.4 DB4/5, ST1 and ST2 layers

The Santee/Tinker Formations represent the most complex geologic unit in the shallow subsurface of F-Area. It is depositionally complex and highly variable in both its lithology and material properties. Soils in the Santee/Tinker range from sands to silty sands (SP-SM). The contact between the Santee/Tinker Formation and the overlying Dry Branch Formation is generally seen on the CPT logs as a sharp decrease in the pore pressure measurement. This layer is characterized by thin, alternating layers of low and high CPT tip resistances and friction ratios. Characteristically, CPT soundings in this layer show a pronounced sawtooth trace with large variations over relatively small vertical intervals. This

highly variable pattern suggests interfingering of alternating lenses of clayey and silty sands with more resistant, silica-cemented sediments and less resistant, calcareous sediments, and appears to be a result of rapid lateral and vertical changes in the nature of the materials originally deposited in this interval. The unit consists of complex sequences of limestones, carbonate muds, carbonate sands, and muddy sands.

The soils of the DB4/5 interval are much more plastic than the overlying Irwinton Sand (DB1/DB3) and the underlying ST1 layer. Soils of the DB4/5 typically classify as SM to CL materials. The DB4/5 layer has moderate to low tip resistances and moderate friction ratios. The DB4/5 layer has been subject to extensive characterization within the APSF area because of observed soft zones (tip resistances less than 15 tsf and N-values of 5 or less). The thickness of this layer ranges from about 6 to 10 feet thick. The ST1 layer is characterized by higher tip resistances than the overlying DB4/5 layer underlying ST2 layer. Although not all soundings penetrated this layer, the ST1 layer ranges in thickness from about 13 to 22 feet. Soils of the ST2 layer are generally characterized by lower tip resistances and sleeve resistances than the overlying ST1 layer. Soils of the ST1 and ST2 layers generally classify and SM to SP-SM materials. Based on the number of soundings that fully penetrated the ST2 layer, the thickness ranges from about 6 to 14 feet thick.

In F-Area and elsewhere at SRS, the Santee/Tinker formation has been a primary focus of foundation investigations. In fact, nearly all foundation remediation programs have targeted this unit because of drilling problems such as lost drill fluid circulation or rod drops.

3.1.5 GC Layer

The "green clay" (GC) is an informal stratigraphic name at SRS for stiff, green to gray clays, silts, and clayey sands that are commonly found at the base of the Santee/Tinker Formation. In general, these soils classify as SM to ML with varying amounts of clay. This layer is locally continuous at F-Area and has been used to define the lower boundary of the shallow stratigraphy. Layer elevations and thicknesses have been determined from those borings and soundings that penetrate this layer. Most borings and CPT soundings do not reach or penetrate the GC layer. The top of the layer ranges from around El. 126 feet MSL in the

south and northwestern portions of the area to a high of around 140 feet MSL in the east-central part of the area. This is consistent with the correlating Gordon Confining Unit as mapped by Aadland (1995) which is correlatable to the "green clay" unit.

3.2 Groundwater Conditions

Groundwater data was derived from water table monitoring wells located in various locations around and within F-Area as well as from WSRC-TR-98-00045, The Regional Water Table of the Savannah River Site and Related Coverages. Monitoring well NBG-5 is the nearest to the F-Area northeast expansion area (see Figure 1.0-2). As shown on Figure 3.2-1, the water table elevation from May, 1986 to May, 1997, ranges from about El. 214 feet MSL to about El. 221 MSL. The dominant water table gradient in the F-Area expansion area is oriented to the north and is largely controlled by Upper Three Runs Creek located immediately north of the F-Area. Groundwater Table contours are shown on Figure 2.0-1.

3.3 Engineering Soil Characteristics

The engineering stratigraphy of the F-Area northeast expansion area was correlated with the APSF area and the engineering characteristics compared. This comparison was based on layer continuity and thickness, as well as, measured SPT N-values, CPT measurements and laboratory soil classification data. Layer continuity across the area is shown on eight subsurface cross-sections (Figures 3.0-1 through 3.0.8).

A summary of all CPT engineering layer picks for the F-Area northeast expansion area and APSF is given on Table 3.3-1, along with a generalized (average) stratigraphy for the area. Figures 3.3-1 through 3.3-3 show mean and standard deviations of shear wave velocities (V_s), CPT tip resistance (q_t) and CPT friction ratio (R_f) with the generalized average engineering stratigraphy. SPT N-values are plotted on Figure 3.3-4 to show the range of values versus elevation, as well as, the genralized engineering stratigraphy. Laboratory test results are included in Appendix C. A comparison of engineering soil properties between the F-Area northeast expansion area, APSF and the balance of F-Area is summarized in Table 3.3-2. As can be seen, the tabulated properties are very similar for all three areas.

3.3.1 Soft Zone Characteristics

Weight of rod and occasional rod drops have been described in numerous drilling reports for monitoring wells and geotechnical borings located in the central part of the SRS. Early subsurface investigations performed by the Unites States Army Corps of Engineers (COE) frequently described these zones as soft zones, or even voids, and numerous subsequent subsurface investigations have described these same conditions at the SRS. These soft zones typically occur in the carbonate-bearing sediments of the Santee Limestone, Utley Limestone, and the Griffins Landing Member of the lower Dry Branch Formation. The prevailing assumption about the origin of these soft zones is dissolutioning of carbonate-rich, clastic sediments, resulting in vugular porosity (open pore space). When drilling these zones, the drill rod meets little shear resistance and drops (COE, 1951). However, much of the time, recovery of soil in the sampler precludes the zone from being characterized as a void.

Soft zones are defined by SPT-N values \leq 5 or CPT tip resistance \leq 15 tsf. Also, thickness should be considered as well. These zones are generally restricted to the lower Dry Branch Formation and the Santee/Tinker Formation. However, soft zones can be found in other horizons at the SRS. The following sections discuss soft zones found in the northeast expansion and APSF areas.

Soft zones in two different horizons were identified on CPT sounding profiles. Two CPT soundings in the APSF area also had soft zone hits at about El. 240 feet MSL however these were considered to be isolated. Nineteen CPT soundings and five SPT borings had tip resistances and N-values meeting soft zone criteria however thirteen of these CPT soundings were pushed to delineate a soft zone within the APSF area (Figure 3.3-1). Four of the remaining six represented isolated hits in the APSF area and the other two were within the northeast expansion area. Of the five SPT borings, one was located in the APSF area while the other four were located in the northeast expansion area. Soft zone intervals noted on all CPT soundings and SPT borings are summarized on Table 3.3-3.

Site Geotechnical Services	K-TRT-F-00001 Rev 0
F-Area Northeast Expansion (U)	May 1999

3.3.1.1 Northeast Expansion Area Soft Zones

Soft zone intervals were noted in only two of the soundings pushed for the F-Area northeast expansion investigation (soundings 103 and 157). Sounding 103 had a soft zone between El. 177.6 and El. 171.2 feet MSL with a cumulative soft zone thickness in this interval of about 2.9 feet thick. Revisions made to the boundary of the northeast expansion area placed sounding 103 outside of the investigation area, therefore this area was not investigated further (see Figure 2.0-1). SPT boring FB-19 had measured soft zones from El. 189.6 to about El. 186.6 feet MSL. CPT Sounding 114 was pushed adjacent to FB-19 (prior to FB-19 being drilled) with no measured soft zones.

Sounding 157 had two soft zone intervals. The upper most interval was between EI. 215.1 and 211.2 feet MSL with a cumulative soft zone thickness of about 3.4 feet thick. The lower soft zone interval was between EI. 179.8 and EI. 173.5 feet MSL with a cumulative soft zone thickness of about 6.2 feet thick. SPT boring FB-17 was drilled about ten feet away from sounding 157. The upper soft zone interval between EI. 215.1 and 211.2 feet MSL was not encountered in the SPT boring. In fact, N-values of about 10 were measured through this interval. The lower soft zone interval was encountered in FB-17. An interval of low blow counts, including weight of rod, corresponding to the lower interval measured in sounding 157 was encountered between EI. 183.1 to EI. 176.1 feet MSL. In SPT boring FB-17, a lower interval with low blow counts and weight of rods was also encountered from EI. 157.6 to 151.6 feet MSL. This interval corresponds to a low tip resistance interval in CPT sounding 157 however tip resistances are higher than 15 tsf (about 20 tsf).

Additional indications of soft zones were noted in SPT boring FB-20 and FB-20A. FB-20 was drilled adjacent to sounding 179 for the purpose of obtaining a paired sounding and SPT boring. At about El. 179, a weight of rod over 37 inches was measured in boring FB-20. Drill fluid circulation was lost and the hole was abandoned. FB-20A was drilled adjacent to FB-20 and the interval from El. 194.9 to El. 181.4 was sampled with measured N-values greater than 20. At El. 181.4 however, circulation was lost in FB-20A and the hole was abandoned. These intervals in FB-20 and FB-20A correspond to a low tip resistance interval in sounding 179 which has thin layers of tip resistances measuring less than 15 tsf but have a cumulative thickness less than 2 feet.

3.3.1.2 APSF Area Soft Zones

The APSF area was extensively investigated for the extent and thickness of soft zones. Boring FB-1 located in the APSF area had low SPT N-values and weight of rod drop from El. 155.5 feet MSL to about El. 146.6 feet MSL. Soils from this interval were described as tan very fine silty and clayey sand with traces of shell fragments. Further investigation around this area with CPT soundings provided a reasonable mapped geometry of this soft zone. As shown on Figure 3.1-1, the soft zone actually occurred in two distinct horizons. The lowermost horizon within the Santee formation was delineated as shown on Figure 3.3-5. The upper Santee formation soft zone as shown on Figure 3.3-6 was not as continuous as the lower zone. Based on this investigative work it was reasonable to estimate the size, thickness and stratigraphic position of these soft zone intervals. SPT boring FB-4 in the APSF area also had a noted soft zone with low blow counts and weight of rod measurements from about El. 177.8 to 172.1 feet MSL.

3.3.1.3 Soft Zone Samples and Analysis

Four CPT tubes were taken from the soft zones identified in the APSF area. From these tubes the following laboratory tests were performed to identify soil parameters:

- 5 unit weight and moisture content tests
- 2 consolidation tests
- 5 Atterberg Limit tests
- 7 hydrometer suites including grain size analysis
- 1 unconfined compression test

Additional CPT samples were acquired from the lower soft zone interval in the vicinity of sounding 157 for the purpose of measuring the unit weight and moisture content for comparison with results from the APSF investigation. Results of the unit weights and moisture content were consistent with those made for the APSF area samples. The results of these tests are provided in Appendix B and are summarized on Table 3.3-5. It is important to note that the sample size for this type of sampler is smaller than that obtained from a shelby tube or other standard sampler. Arguments can be made that due to the smaller

diameter (1.75 inches compared to 3 inches for a shelby tube), disturbances will be greater. Additionally there is no precedent or standardized procedure for testing these smaller size samples. Therefore, the consolidation and strength results are solely for interpretation and engineering judgement and may not be representative of the in-situ properties of the soils tested.

•

.

4. GEOTECHNICAL AND FOUNDATION ASSESSMENT

The conditions encountered during this program are not unlike conditions found elsewhere at the SRS. In fact, they are very similar in terms of:

- Geology and soil classification;
- SPT N-values;
- CPT resistances;
- Shear wave velocity; and
- Presence of soft zones.

Figures 3.3-1 through 3.3-4 show the range of SPT N-values, the mean and and range of CPT corrected tip resistance (q_i), CPT friction ratio (R_f) and shear wave velocity (V_s) from this investigation. Based on these results, the soils encountered can support structure and foundation loads currently constructed at the SRS with no adverse consequences. Typical foundation loading for existing critical facilities at the SRS is in the range of 4 to 7 kips per square foot (ksf). Higher loads could be supported depending on the layout, geometry and foundation depths of the proposed facilities and the results of a structure specific geotechnical investigation program, which is required for the proposed new mission facilities.

The regional water table is approximately 60 to 70 feet below the ground surface, however, perched water should be expected. Construction cut slopes for the nearby APSF excavation have been stable since excavation in August and September of 1998, with slopes of one horizontal to one vertical. The slopes were benched and protected with a thin layer of emulsified asphalt. Heave markers placed within the excavation footprint measured heave between one-half to one inch for the 30 to 35 feet deep excavation. Thus, from a construction standpoint, there appears to be no apparent unusual issues.

5. CONCLUSIONS AND RECOMMENDATIONS

The shallow stratigraphy and average engineering properties determined for the F-Area northeast expansion are directly comparable to those determined for the Actinide Packaging and Storage Facility (APSF) area as well as the balance of the F-Area. Geologic conditions are also directly comparable between these two areas.

Soft zone intervals detected in the F-Area northeast expansion area are consistent with soft zone sediments encountered at the APSF area. Siting and design of new facilities in this area should account for the presence of these soils either by avoiding the placement of critical facilities where these zones are known to exist, or determining the potential settlement and designing the facility to accommodate the estimated movement. A thorough review of the data included in this report is recommended for planning further investigations.

Design and construction of new PC-3 and higher facilities, heavily loaded structures or capital investment projects in the F-Area northeast expansion area should not require extensive geotechnical characterization. However, structure specific investigations for foundation design and construction, as well as, proper characterization of soft zone intervals are required. Foundation specific investigations should consider structure size, geometry, foundation type and depth, performance classification and functional classification, etc. A limited program of field testing to confirm dynamic soil properties may be required to obtain baseline subsurface information such that a site-specific comparison with results of this investigation can be made.

Heave monitoring is required for excavations greater than ten feet deep. Settlement monitoring is required for all major and/or critical new facilities throughout the construction phase until final turn-over or when operations commence. After operations commence, settlement monitoring is required on an established interval. Settlement results should be compiled and reviewed by competent geotechnical and structural engineers.

New critical facilities should consider seismic instrumentation in the structure design and facility operation. An SRS Engineering Standard for seismic

21

Site Geotechnical Services	K-TRT-F-00001 Rev 0
F-Area Northeast Expansion (U)	May 1999

instrumentation is currently under development. This standard will provide specifications for seismic instrumentation installation and performance.

٠

.....

: '

۴

.

_

. '

6. REFERENCES

Aadland, R. K., Gellici, J. A., and Thayer, P. A. (1995), "Hydrogeologic Framework of West-Central South Carolina," S. C. Department of Natural Resources, Water Resources Division, Report 5.

Annual Book of ASTM Standards (1996), American Society for Testing and Materials.

WSRC (1992), "Procedure Manual 3Q5, Hydrogeologic Data Collection"

WSRC (1995) "In-Tank Precipitation (ITP) and H-Tank Farm (HTF) Geotechnical Report," WSRC-TR-95-0057, Rev. 0, September.

WSRC (1996a), "Procedure Manual E7, Conduct of Engineering and Technical Support."

WSRC (1996b), "Procedure Manual E9, Site Geotechnical Services."

WSRC (1996c), "F-Area Geotechnical Characterization Report, WSRC-TR-96-0069, Rev. 0, September 1996.

WSRC (1998a), "APSF Confirmatory Drilling Program Results, PECD-SGS-98-0115, June, 1998.

WSRC (1998b)," The Regional Water Table of the Savannah River Site and Related Coverages" WSRC-TR-98-00045, September 1998.

	· · · · · · · · · · · · · · · · · · ·			Lave	r Elevatior	n (ft above	MSL)				
	CPT-1	CPT-2	CPT-4	CPT-5	CPT-6	CPT-7	CPT-8	CPT-9	CPT-10	CPT-11	CPT-12
SURFACE	290.50	290.50	292.18	291.29	289.66	282.74	285.08	285.30	287.16	288.59	288.89
TR1	290.50	290.50	292.18	291.29	289.66	282.74	285.08	285.30	287.16	288.59	288.89
TR1A	273.01	274.96	277.99	272.89	276.94	275.88	273.16	278.92	273.80	274.94	271.70
TR2A	258.98	255.83	260.97	259.95	262.96	262.94	260.97	261.90	261.21	253.89	254.91
TR2B	231.98	228.94	230.92	229.95	234.01	237.87	233.56	234.96	234.15	234.93	236.93
TR3/TR4	209.01	203.45	210.00	209.93	210.99	213.87	209.04	211.89	209.94	211.90	215.29
DB1/DB3	203.02	200.03	206.00	201.94	204.00	203.90	203.27	200.90	205.27	207.95	208.94
DB4/DB5	172.02	176.62	178.00	175.98	175.96	176.93	173.37	172.90	172.98	176.90	177.22
ST1	164.03	169.86	176.00	169.99	169.92	171.88	168.90	167.96	168.50	168.96	171.14
ST2	151.96	152.01	151.99	152.93	151.99	152.88	149.90	149.90	151.88	151.89	149.00
GC	141.93	139.24	******	142.94	142.01	142.91	138.87	140.01	136.64	145.89	142.04
CG	132.99	133.11	******	136.00	133.93	133.88	132.72		132.22	141.90	
BASE	130.50	132.50	148.17	134.29	132.66	132.74	129.08	139.30	130.16	138.59	137.89
	i				Layer Thio	ckness (ft)					
	CPT-1	CPT-2	CPT-4	CPT-5	CPT-6	CPT-7	CPT-8	CPT-9	CPT-10	CPT-11	CPT-12
TR1	17.49:	15.54	14.19	18.40	12.72	6.86	11.92	6.38	13.36	13.65	17.19
TR1A	14.03 [.]	19.13	17.02	12.94	13.98	12.94	12.19	17.02	12.59	21.05	16.79
TR2A	27.00	26.89	30.05	30.00	28.95	25.07	27.41	26.94	27.06	18.96	17.98
TR2B	22.97	25.49	20.92	20.02	23.02	24.00	24.52	23.07	24.21	23.03	21.64
TR3/TR4	5.99	3.42	4.00	7.99	6.99	9.97	5.77	10.99	4.67	3.95	6.35
DB1/DB3	31.00	23.41	28.00	25.96	28.04	26.97	29.90	28.00	32.29	31.05	31.72
DB4/DB5	7.99	6.76	2.00	5.99	6.04	5.05	4.47	4.94	4.48	7.94	6.08
ST1	12.07	17.85	24.01	17.06	17.93	19.00	19.00	18.06	16.62	17.07	22.14
ST2	10.03	12.77		9.99	9.98	9.97	11.03	9.89	15.24	6.00	6.96
GC	8.94	6.13		6.94	8.08	9.03	6.15		4.42	3.99	
CG			******								

ĺ

t

Table 3.3-1A Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

				Layer	Elevation	(ft above M	ISL)				.
	CPT-13	CPT-14	CPT-15	CPT-16	CPT-17	CPT-18	CPT-19	CPT-20	CPT-21	CPT-22	CPT-22A
SURFACE	289.79	289.70	295.13	283.80	287.10	293.00	293.10	291.20	291.70	290.60	291.40
TR1	289.79	289.70	295.13	283.80	287.10	293.00	293.10	291.20	291.70	290.60	291.40
TR1A	280.02	271.70	277.94	270.65	271.95	278.03	278.00	279.99	279.08	276.70	274.98
TR2A	264.96	254.91	257.97	259.93	259.00	264.07	260.11	262.01	261.03	258.50	258.03
TR2B	238.91	236.93	222.93	232.86	230.99	236.99	233.04	234.00	235.03	230.02	227.96
TR3/TR4	216.91	215.29	197.97	209.97	211.95	213.98	211.94	210.98	211.95	204.85	199.01
DB1/DB3	208.98	208.94	195.02	203.15	202.90	208.00	204.04	204.96	205.00	200.90	196.02
DB4/DB5	176.93	177.22	172.01	174.93	176.00	179.00	176.03	178.01	179.04	176.80	170.02
ST1	171.93	171.14	163.02	169.00	169.99	172.98	170.95	173.96	171.04	168.73	167.03
ST2	152.91	149.00	149.00	149.16	153.96	151.03	150.92	151.97	155.00	152.27	149.95
GC	139.93	142.04	137.97	137.43	143.01	137.03	138.96	138.00	139.00	140.17	137.01
CG	132.99	133.07	131.98	132.90	135.98	130.96			133.02		
BASE	129.79	102.70	128.13	129.80	133.10	129.48	130.18	129.54	130.96	138.96	130.88
	:				Layer Thic	kness (ft)			-		
	CPT-13	CPT-14	CPT-15	CPT-16	CPT-17	CPT-18	CPT-19	CPT-20	CPT-21	CPT-22	CPT-22A
TR1	9.77	18.00	17.19	13.15	15.15	14.97	15.10	11.21	12.62	13.90	16.42
TR1A	15.06	16.79	19.97	10.72	12.95	13.96	17.89	17.98	18.05	18.20	16.95
TR2A	26.05	17.98	35.04	27.07	28.01	27.08	27.07	28.01	26.00	28.48	30.07
TR2B	22.00	21.64	24.96	22.89	19.04	23.01	21.10	23.02	23.08	25.17	28.95
TR3/TR4	7.93	6.35	2.95	6.82	9.05	5.98	7.90	6.02	6.95	3.95	2.99
DB1/DB3	32.05	31.72	23.01	28.22	26.90	29.00	28.01	26.95	25.96	24.10	26.00
DB4/DB5	5.00	6.08	8.99	5.93	6.01	6.02	5.08	4.05	8.00	8.07	2.99
ST1	19.02	22.14	14.02	19.84	16.03	21.95	20.03	21.99	16.04	16.46	17.08
ST2	12.98	6.96	11.03	11.73	10.95	14.00	11.96	13.97	16.00	12.10	12.94
GC	6.94	8.97	5.99	4.53	7.03	6.07	8.78	8.46	5.98		6.13
CG		30.37								******	

÷

ł

.

.

Table 3.3-1B Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

	· · · · · · · · · · · · · · · · · · ·			Lave	Elevation	(ft above M	ISL)	****			
	CPT-23	CPT-24	CPT-25	CPT-26	CPT-27	CPT-28	CPT-29	CPT-30	CPT-31	CPT-32	CPT-32A
SURFACE	290.90	290.00	290.10	289.50	290.30	289.80	288.10	288.80	290.70	289.50	288.00
TR1	290.90	290.00	290.10	289.50	290.30	289.80	******	288.80	290.70	289.50	288.00
TR1A	274.94	277.04	272.99	278.99	277.01	280.97	288.10	275.36	274.95	276.94	280.02
TR2A	258.03	261.99	255.97	265.00	259.04	263.96	265.97	267.01	257.94	267.75	265.00
TR2B	229.97	233.96	230.00	239.04	232.01	236.94	239.09	240.08	230.00	239.98	238.02
TR3/TR4	209.02	207.03	207.02	217.01	205.04	213.03	217.95	215.92	206.98	217.10	213.88
DB1/DB3	204.02	201.96	201.02	210.00	199.99	207.96	212.03	207.98	201.02	212.97	209.96
DB4/DB5	177.00	174.94	176.09	179.05	174.01	176.94	181.04	180.01	176.05	182.10	181.03
ST1	171.95	167.97	170.04	172.88	167.96	171.00	175.00	174.02	172.05	178.10	176.99
ST2	150.01	147.04	153.98	152.12	150.13	154.03	150.94	155.98	148.98	153.94	154.99
GC	137.94	134.99	139.97	143.03	137.03	138.03	144.98	146.00	135.97	140.89	139.94
CG	133.19		133.05		131.98		140.03				
BASE	131.92	128.31	132.04	139.34	131.73	131.05	138.91	143.33	131.96	133.51	133.86
					Layer Thic	kness (ft)					
	CPT-23	CPT-24	CPT-25	CPT-26	CPT-27	CPT-28	CPT-29	CPT-30	CPT-31	CPT-32	CPT-32A
TR1	15.96	12.96	17.11	10.51	13.29	8.83	0.00	13.44	15.75	12.56	7.98
TR1A	16.91 [:]	15.05	17.02	13.99	17.97	17.01	22.13	8.35	17.01	9.19	15.02
TR2A	28.06	28.03	25.97	25.96	27.03	27.02	26.88	26.93	27.94	27.77	26.98
TR2B	20.95	26.93	22.98	22.03	26.97	23.91	21.14	24.16	23.02	22.88	24.14
TR3/TR4	5.00	5.07	6.00	7.01	5.05	5.07	5.92	7.94	5.96	4.13	3.92
DB1/DB3	27.02 ³	27.02	24.93	30.95	25.98	31.02	30.99	27.97	24.97	30.87	28.93
DB4/DB5	5.05	6.97	6.05	6.17	6.05	5.94	6.04	5.99	4.00	4.00	4.04
ST1	21.94	20.93	16.06	20.76	17.83	16.97	24.06	18.04	23.07	24.16	22.00
ST2	12.07	12.05	14.01	9.09	13.10	16.00	5.96	9.98	13.01	13.05	15.05
GC	4.75	6.68	6.92		5.05	6.98	4.95			7.38	6.08
CG	*****		*****					*****	******		

Table 3.3-1C Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

				Lave	r Elevatior	ı (ft above	MSL)				
	CPT-33	CPT-34	CPT-35	CPT-36	CPT-37	CPT-38	CPT-39	CPT-40	CPT-41	CPT-42	CPT-43
SURFACE	290.10	290.30	290.00	291.70	292.00	290.00	290.00	286.60	289.50	287.50	289.00
TR1	290.10	290.30	290.00	291.70°	292.00	290.00	290.00		289.50		289.00
TR1A	275.99	274.97	275.96	276.94	278.35	274.97	272.01	286.60	270.97	287.50	270.00
TR2A	260.02	256.01	262.98	263.01	259.99	256.01	254.92	266.04	252.97	264.02	250.91
TR2B	232.04	229.97	236.06	236.16	232.21	238.00	233.92	240.04	232.97	237.05	234.94
TR3/TR4		- 204.03	212.01	213.83	212.05	217.05	211.98	218.06	208.99	217.01	215.02
DB1/DB3	201.97	199.97	205.94	205.85	204.81	210.02	204.95	211.08	205.04	210.08	210.03
DB4/DB5	175.90	174.93	176.94	180.04	174.37	178.96	174.98	178.02	169.99	178.07	
ST1	169.99	169.03	171.00	172.61	171.70	175.01	167.96	173.96	166.96	173.00	
ST2	151.07	147.99	151.01	155.49	154.93	154.93	153.04	153.97	147.01	153.98	
GC	138.10	137.00	136.95	139.08	137.36		139.07	141.03	133.99	148.95	
CG	133.00		130.02	134.93	132.96			*****			
BASE	132.83	131.73	129.91	134.81	132.10	147.02	133.32	136.78	130.85	145.66	206.13
					Layer Thio	ckness (ft)					
	CPT-33	CPT-34	CPT-35	CPT-36	CPT-37	CPT-38	CPT-39	CPT-40	CPT-41	CPT-42	CPT-43
TR1	14.11	15.33	14.04	14.76	13.65	15.03	17.99	0.00	18.53	0.00	19.00
TR1A	15.97	18.96	12.98	13.93	18.36	18.96	17.09	20.56	18.00	23.48	19.09
TR2A	27.98	26.04	26.92	26.85	27.78	18.01	21.00	26.00	20.00	26.97	15.97
TR2B	25.06	25.94	24.05	22.33	20.16	20.95	21.94	21.98	23.98	20.04	19.92
TR3/TR4	5.01	4.06	6.07	7.98	7.24	7.03	7.03	6.98	3.95	6.93	4.99
DB1/DB3	26.07	25.04	29.00	25.81	30.44	31.06	29.97	33.06	35.05	32.01	
DB4/DB5	5.91	5.90	5.94	7.43	2.67	3.95	7.02	4.06	3.03	5.07	
ST1	18.92	21.04	19.99	17.12	16.77	20.08	14.92	19.99	19.95	19.02	
ST2	12.97	10.99	14.06	16.41	17.57	7.91	13.97	12.94	13.02	5.03	
GC	5.10		6.93	4.15	4.40		5.75	4.25		3.29	
CG	·					******					

;

Table 3.3-1D Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

				Lave	r Elevation	(ft above l	MSL)				
	CPT-43A	CPT-44	CPT-45	CPT-46	CPT-48	CPT-51	CPT-52	CPT-53	CPT-103	CPT-104	CPT-113
SURFACE	289.00	285.50	287.40	286.00	285.80	286.70	288.80	289.90	271.70	274.20	276.70
TR1	289.00	285.50					288.80	289.90			
TR1A	267.99	271.89	287.40	286.00	285.80	286.70	269.89	276.77	271.70	274.20	276.70
TR2A	248.98	262.89	263.96	259.97	263.02	261.01	260.76	264.55	256.91	257.89	259.82
TR2B	234.93	236.97	238.05	235.00	235.95	235.94	236.80	235.74	238.88	240.95	236.01
TR3/TR4	213.95	217.93	217.04	213.01	212.96	215.04	216.81	215.48	209.90	211.89	210.03
DB1/DB3	208.95	207.94	210.02	204.02	205.03	204.97	209.98	209.12	199.94	199.96	203.85
DB4/DB5		177.95	177.97	176.93	173.92	179.90	176.99	177.47	177.86	178.88	181.92
ST1		171.87	172.99	171.03	166.94	172.92	172.98	173.78	167.91	171.87	172.08
ST2		155.00	155.02	152.97	149.94	154.01	149.92	153.35	151.93	155.92	152.68
GC		148.96	142.00		138.01	138.01	139.04	143.64	142.93	147.92	138.73
CG		145.01				132.98	132.95		132.89		133.52
BASE	204.71	144.30	136.46	139.70	130.71	132.10	132.44	139.90	115.85	143.08	130.76
	<u></u>				Layer Thie	ckness (ft)					
	CPT-43A	CPT-44	CPT-45	CPT-46	CPT-48	CPT-51	CPT-52	CPT-53	CPT-103	CPT-104	CPT-113
TR1	21.01	13.61	0.00	0.00	0.00	0.00	18.91	13.13	0.00	0.00	0.00
TR1A	19.01	9.00	23.44	26.03	22.78	25.69	9.13	12.22	14.79	16.31	16.88
TR2A	14.05	25.92	25.91	24.97	27.07	25.07	23.96	28.81	18.03	16.94	23.81
TR2B	20.98	19.04	21.01	21.99	22.99	20.90	19.99	20.26	28.98	29.06	25.98
TR3/TR4	5.00	9.99	7.02	8.99	7.93	10.07	6.83	6.36	9.96	11.93	6.18
DB1/DB3		29.99	32.05	27.09	31.11	25.07	32.99	31.65	22.08	21.08	21.93
DB4/DB5		6.08	4.98	5.90	6.98	6.98	4.01	3.69	9.95	7.01	9.84
ST1		16.87	17.97	18.06	17.00	18.91	23.06	20.43	15.98	15.95	19.40
ST2		6.04	13.02		11.93	16.00	10.88	9.71	9.00	8.00	13.95
GC		3.95	5.54		7.30	5.03	6.09		10.04	4.84	5.21
CG									~~~~-		

÷

Table 3.3-1E Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

7

.

Ì

		**		Layer	Elevation	(ft above M	SL)	· · · 			
	CPT-114	CPT-115	CPT-116	CPT-126	CPT-127	CPT-128	CPT-129	CPT-143	CPT-147	CPT-148	CPT-149
SURFACE	273.60	272.00	270.10	278.90	279.30	279.30	277.20	286.10	284.80	284.10	274.80
TR1	273.60	272.00	******	278.90	279.30	279.30	277.20	286.10	284.80	284.10	
TR1A	267.64	266.26	270.10	265.32	267.78	262.88	265.95	265.85	267.88	274.16	274.80
TR2A	259.83	260.15	258.03	258,49	259.91	250.83	253.90	246.90	252.67	252.56	256.92
TR2B	236.66	236.94	238.06	230.15	231.85	227.91	236.94	234.98	235.70	235.35	245.89
TR3/TR4	212.40	209.10	211.44	203.78	203.01	205.92	211.87	210.87	210.02	209.84	220.96
DB1/DB3	203.28	202.01	202.94	199.16	196.88	196.88	203.90	202.92	204.58	204.93	214.93
DB4/DB5	178.04	174.96	169.91	175.98	176.02	176,94	174.88	175.89	173.25	172.18	188.94
ST1	170.06	167.77		164.29	165.36	167.91	167.96	165.93	164.98	161.78	179.96
ST2	149.81	148.01	149.95	147.13	148.53	148.94	149.95	152.94	148.88	149.57	158.92
GC	142.45	140.91	140.72	140.83	135.07	141.88	140.88	141.91	135.60	137.01	149.94
CG	136.15	133.47		131.75	131.65	****	131.89	131.91	129.73	128.58	136.90
BASE	128.02	127.98	137.51	125.93	114.60	132.04	129.12	130.02	127.34	126.62	131.92
					Layer Thic	kness (ft)					
	CPT-114	CPT-115	CPT-116	CPT-126	CPT-127	CPT-128	CPT-129	CPT-143	CPT-147	CPT-148	CPT-149
TR1	5.96	5.74	0.00	13.58	11.52	16.42	11.25	20.25	16.92	9.94	0.00
TR1A	7.81 ·	6.11	12.07	6.83	7.87	12.05	12.05	18.95	15.21	21.60	17.88
TR2A	23.17	23.21	19.97	28.34	28.06	22.92	16.96	11.92	16.97	17.21	11.03
TR2B	24.26	27.84	26.62	26.37	28.84	21.99	25.07	24.11	25.68	25.51	24.93
TR3/TR4	9.12	7.09	8.50	4.62	6.13	9.04	7.97	7.95	5.44	4.91	6.03
DB1/DB3	25.24	27.05	33.03	23.18	20.86	19.94	29.02	27.03	31.33	32.75	25.99
DB4/DB5	7.98	7.19	19.96	11.69	10.66	9.03	6.92	9.96	8.27	10.40	8.98
ST1	20.25	19.76	0.00	17.16	16.83	18.97	18.01	12.99	16.10	12.21	21.04
ST2	7.36	7.10	9.23	6.30	13.46	7.06	9.07	11.03	13.28	12.56	8.98
GC	6.30	7.44		9.08	3.42	9.84	8.99	10.00	5.87	8.43	13.04
CG			~~~~~								

÷

Ŋ

•

 Table 3.3-1F
 Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

			·····	Lave	r Elevatior	ı (ft above	MSL)				
	CPT-151	CPT-155	CPT-156	CPT-157	CPT-159	CPT-163	CPT-167	CPT-171	CPT-172	CPT-173	CPT-174
SURFACE	290.10	289.10	289.20	283.10	293.70	293.90	296.70	298.50	295.40	297.60	301.50
TR1	290.10	289.10	·289.20	283.10	293.70	293.90	296.70	298.50		297.60	301.50
TR1A	269.57	276.66	278.85	273.38	277.77	278.97	280.31	284.98	295.40	287.49	292.68
TR2A	254.70	260.61	261.87	260.20	259.97	265.96	265.38	269.96	265.99	262.56	269.97
TR2B	232.48	232.44	233.47	239.80	232.20	237.99	239.72	232.80	239.98	241.93	241.63
TR3/TR4	210.09	204.92	209.68	216.16	210.68	217.00	218.16	212.85	220.96	221.08	219.01
DB1/DB3	203.10	199.95	204.57	207.35	204.09	213.62	211.86	204.59	215.03	214.07	212.00
DB4/DB5	171.03	167.94	164.94	180.04	171.58	178.00		180.05	189.03	186.01	184.19
ST1	165.12	163.61	163.07	173.37	168.37	174.53		173.57	185.00	177.57	171.52
ST2	143.80	146.95	149.97	158.34	149.71	154.00			163.02	161.54	159.53
GC	138.42	135.35	135.67	145.43	138.55	140.99		******	149.00	153.66	143.58
CG	134.66	128.40	130.04	135.92	132.25	132.10			138.07	******	135.63
BASE	134.14	126.05	128.15	130.92	129.13	128.87	181.49	166.43	133.28	147.41	130.12
					Layer Thio	kness (ft)					
	CPT-151	CPT-155	CPT-156	CPT-157	CPT-159	CPT-163	CPT-167	CPT-171	CPT-172	CPT-173	CPT-174
TR1	20.53	12.44	10.35	9.72	15.93	14.93	16.39	13.52	0.00	10.11	8.82
TR1A	14.87	16.05	16.98	13.18	17.80	13.01	14.93	15.02	29.41	24.93	22.71
TR2A	22.22	28.17	28.40	20.40	27.77	27.97	25.66	37.16	26.01	20.63	28.34
TR2B	22.39	27.52	23.79	23.64	21.52	20.99	21.56	19.95	19.02	20.85	22.62
TR3/TR4	6.99	4.97	5.11	8.81	6.59	3.38	6.30	8.26	5.93	7.01	7.01
DB1/DB3	32.07	32.01	39.63	27.31	32.51	35.62	30.37	24.54	26.00	28.06	27.81
DB4/DB5	5.91	4.33	1.87	6.67	3.21	3.47		6.48	4.03	8.44	12.67
ST1	21.32	16.66	13.10	15.03	18.66	20.53			21.98	16.03	11.99
ST2	5.38	11.60	14.30	12.91	11.16	13.01			14.02	7.88	15.95
GC	3.76	6.95	5.63	9.51	6.30	8.89			10.93		7.95
CG		**			~~~~				******		

•

Table 3.3-1G Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

				Laye	r Elevation	n (ft above	MSL)				
	CPT-175	CPT-176	CPT-177	CPT-178	CPT-179	CPT-180	CPT-181	CPT-182	CPT-183	CPT-185	CPT-186
SURFACE	303.10	297.60	301.70	305.60	301.40	302.30	304.90	304.80	301.70	308.20	304.50
TR1	303.10	297.60	301.70	305.60	301.40	302.30	304.90		301.70	308.20	304.50
TR1A	287.49	288.74	278.78	295.07	288.11	287.00	294.89	304.80	281.93	294.90	290.82
TR2A	280.12	267.97	267.07	272.77	276.49	245.96	271.29	278.00	272.72	271.45	267.44
TR2B	244.00	246.19	244.43	246.03	248.28	224.92	244.29	259.01	246.32	242.18	246.99
TR3/TR4	220.02	221.70	225.62	219.93	225.11	213.99	212.65	219.00	228.60	217.08	240.99
DB1/DB3	214.01	216.89	217.00	213.16	219.97		202.88	208.97	220.00	202.02	211.96
DB4/DB5	184.17	187.83	186.07	186.21	192.24	184.02	178.85	183.96	190.87	181.06	184.01
ST1	173.01	179.91	179.84	173.30	188.46		172.25	180.03	187.31	172.97	178.90
ST2	157.58	160.86		158.69	*						161.96
GC	143.80	158.27		144.96							153.98
CG	137.70			140.93							
BASE	136.17	150.95	169.10	137.25	177.46	181.45	166.17	164.70	186.74	171.34	149.52
					Layer Thic	kness (ft)					
	CPT-175	CPT-176	CPT-177	CPT-178	CPT-179	CPT-180	CPT-181	CPT-182	CPT-183	CPT-185	CPT-186
TR1	15.61	8.86	22.92	10.53	13.29	15.30	10.01	0.00	19.77	13.30	13.68
TR1A	7.37	20.77	11.71	22.30	11.62	41.04	23.60	26.80	9.21	23.45	23.38
TR2A	36.12	21.78	22.64	26.74	28.21	21.04	27.00	40.01	26.40	29.27	20.45
TR2B	23.98	24.49	18.81	26.10	23.17	10.93	31.64	10.03	17.72	25.10	24.68
TR3/TR4	6.01	4.81	8.62	6.77	5.14	29.97	9.77	28.94	8.60	15.06	10.35
DB1/DB3	29.84	29.06	30.93	26.95	27.73	0.00	24.03	3.93	29.13	20.96	27.95
DB4/DB5	11.16	7.92	6.23	12.91	3.78		6.60	3.56	3.56	8.09	5.11
ST1	15.43	19.05		14.61	*****						16.94
ST2	13.78	2.59		13.73							7.98
GC	6.10			4.03							1.90
CG									*****		

1

.

Table 3.3-1H Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

··· ·· ··			ation (ft abov		
	CPT-188	CPT-189	CPT-196	AVG	STD DEV
SURFACE	310.40	309.20	290.10	290.08	8.24
TR1	310.40		290.10	290.95	7.27
TR1A	296.70	309.20	273.07	278.42	8.71
TR2A	273.60	276.04	260.22	261.51	6.51
TR2B	246.28	242.99	235.74	236.46	5.59
TR3/TR4	221.38	219.99	212.36	213.08	5.63
DB1/DB3	210.87	212.96	208.42	206.30	5.26
DB4/DB5	186.99	187.98	173.50	177.99	5.13
ST1	181.00	179.95	168.87	171.72	5.13
ST2				152.42	3.75
GC				141.10	4.66
CG				133.87	3.29
BASE	168.56	175.16	168.31		
		ayer Thick	ness (ft)		
	CPT-188	CPT-189	CPT-196	AVG	STD DE
TR1	13.70	0.00	17.03	11.66	6.17
TR1A	23.10	33.16	12.85	16.90	5.79
TR2A	27.32	33.05	24.48	25.28	5.02
TR2B	24.90	23.00	23.38	23.05	3.22
TR3/TR4	10.51	7.03	3.94	7.23	3.97
DB1/DB3	23.88	24.98	34.92	27.72	5.37
DB4/DB5	5.99	8.03	4.63	6.44	2.74
ST1		******		18.15	3.53
ST2				11.24	3.15
GC				6.65	2.06

.

1

i

:

Table 3.3-11 Summary of CPT Layer Picks (Layer Tops and Layer Thicknesses for APSF and Northeast Expansion)

	Source	Fill	TR1	TR1A	TR2A	TR2B	TR3/4	DB1/3	DB4/5	ST*	GC
SPT N-Value	F-Area Report	23	25	25	28	36	18	33	15	47	21
(blows/foot)	APSF Data	-	33	27	34	38	19	50	21	46	49
	NECIDate	<u>IN//A</u>	311	361	37		271	Sec. St.	29.	- 48	16×39
qt/N	F-Area Report	4.9	3.7	4.8	5.2	5.5	3.1	5.1	4.1	2.8	2.7
	APSF Data	-	4.3	2.5	4.0	4.1	1.9	3.3	2.5	3.0	1.6
	NEC Data and the	N/A >	3.8	41		46		59	4.57.00	-29	416
Shear Wave Velocity	F-Area Report	978	1455	1348	1256	1254	1074	1157	1140	1353	1675
(ft/sec)	APSF Data	-	1637	1464	1284	1215	1020	1197	1231	1223	1160
	NEC Data - Contraction	an an INVA-12-	1544	1454	1257	iki(65			···· (1180 ····	1273	Construction and an and an and a second state of the
Corrected Tip Resistance	F-Area Report	112	91	120	147	201	55	172	61	131	58
(tons/foot ²)	APSF Data	-	142	68	136	154	37	166	52	137	79
	NEC Data	N/A		103	- 146	- 164	7/8	194	-67/	188	
Friction Ratio	F-Area Report	2	4	2	2	1	2	1	2	2	2
(%)	APSF Data	-	2	4	1	1	2	1	2	1	2
	NEC Data	and the second second second second second	- 31 ³ 245			S 1	20	પ્લેટ કે પ ્લેટ	2.40		22
Percent Fines	F-Area Report	25	33	30	17	19	64	14	22	29	39
(%)	APSF Data	an.	25	37	16	11	34	9	21	18	52
	NECIDala	ini/a	34)	30	- 14		36	U.I.	1011 C	. 19	33
Plasticity Index	F-Area Report	15	17	14	10	18	58	19	28	18	47
(%)	APSF Data		11	22	10	NP	19	NP	11	25	30
	NEC Data	N/A	23	20	9.5	- 12	19	- 16 i	erse shikarse	146	2764-5
Liquid Limit	F-Area Report	32	38	36	33	41	96	44	48	40	83
(%)	APSF Data	an a	30	46	33	NP	54	NP	45	49	57
	NEC Data	N/A*	48	35.00	28	24	54	2.2.410.5		- 23	421
Water Content	F-Area Report	13	15	19	17	22	51	27	39	29	32
(%)	APSF Data	-	16	20	21	24	42	27	38	30	28
	NEC.Data	N/A		. 19 7 - 197	17.2,9		34	25	36	Gene 30 A.A.	

Notes

1. Data for the APSF Investigation includes CPTs 1-17, 36, 37, and 44 and Borings FB-3 through FB-12

2. The ST layer was not subdivided for analysis

3. Data for the Northeast Expansion included CPT's 103-196 and borings FB-17 through FB-30

4. Laboratory data for a portion of the DB1/3 layer from FB-22 (samples SS50-SS53) were omitted due to a significant material change considered to be localized in the vicinity of FB-22

			······
			Аррх.
CPT No.	Top Elv	Bot Elv	Thickness
CPT No. 2	150.68	144.47	5.97
	173.28	170.65	2.63
3	170.35	166.05	3.93
6	145.10	138.46	6.28
	175.86	170.43	5.04
18	138.70	136.51	2.19
20A	150.90	148.79	2.11
	146.05	139.70	5.44
23	208.90	204.25	4.65
24	174.27	169.56	4.71
25	142.87	138.35	4.52
27	147.08	144.87	2.21
29	151.08	146.66	3.45
	181.30	175.34	5.21
32	144.31	139.78	3.50
32A	144.00	140.15	3.36
33	140.18	138.77	1.41
	174.68	170.67	2.62
38	178.74	175.41	3.03
39	207.44	205.50	1.94
46	176.43	172.44	3.99
51	177.90	172.98	4.07
103	177.60	171.21	2.88
157	215.13	211.21	3.39
	179.80	173.46	6.19
			Аррх.
SPT No.	Top Elv	Bot Elv	Thickness
FB-1	155.1	146.6	8.5
FB-4	177.8	172.1	5.70
FB-17	183.10	176.10	7.00
	157.60	151.60	6.00
FB-19	189.60	186.60	3.00
FB-20	179.00	172.90	6.10

SOFT ZONE THICKNESS CRITERIA:

 For a CPT to be labelled as a soft zone "hit" it must have a zone with a corrected tip stress of less than 15 tsf over a 2 ft thick (or greater) interval. Professional judgment may include a few zones that approach 2 ft in thickness. For a boring to be labelled as a soft zone "hit" it must have a WR, WH or N-value <= 5 over a 2 ft or greater interval.

2. About two-thirds of the CPTs have soft zone thicknesses which consist of two or more intervals having <15 tsf tip stresses. The criteria for combining these separate soft intervals into a single zone is an intervening harder layer less than 1 foot in thickness. In these instances the Top Elv, Bot Elv, and appx. zone thickness were calculated excluding the harder layer as shown in the following example:</p>

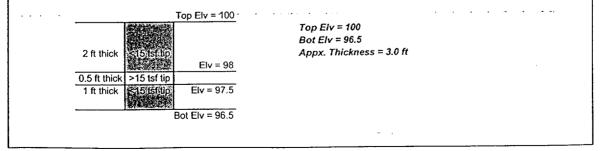


Table 3.3-3 Summary of Soft Zone Intervals

SAMPLE	ADJACENT	TOP	TOP	BOTTOM	SOFT	LAB TESTING
NUMBER	CPT	ELEV.	DEPTH	DEPTH	INTERVAL	ASSIGNMENTS
F235 CSS38	38	177.5	112	114	UPPER ST	UW, Cons, Hyd, AL, MC
F235 CSS38	38	175.5	114	116		UW, Cons, Hyd, AL, MC
F235 CSS53B	53	154.9	135	137	LOWER ST	UW, Hyd, AL, MC
F235 CSS 53	53	154.9	135	139		UW, Hyd, AL, MC
F235 CSS32	32	141.5	148	148.8		Hyd, Cons, UCC, AL
F235 CSS32	32	140.7	148.8	150	LOWER ST	
F235 CSS32	32	139.5	150	150.5	LOWER ST	Hyd

٠.

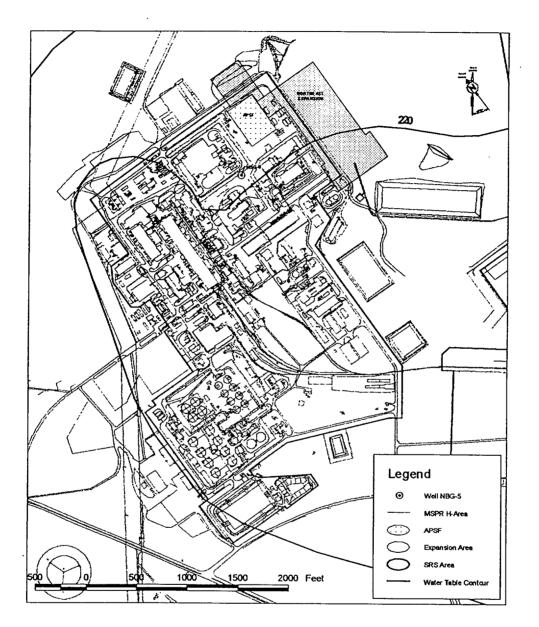
SAMPLE	Dry UW	MC	Wet UW	%Sand	%Fines	%Clay	D50	LL	PI	Class
NUMBER	lb/ft^3	%	lb/ft^3				mm	%	%	
F235 CSS38	65.2	61.56	105.3	61.8	38.2	29.5	0.14	44	20	SC
F235 CSS38	77.8	42.37	110.7	85.5	14.5	11.5	0.17	NL	NP	SM
F235 CSS53B	83	34.6	111.7	90.6	9.4	1.9	0.14	NL	NP	SP-SM
F235 CSS 53	75.1	42	106.7	90.9	9.1	1.7	0.13	NL	NP	SP-SM
F235 CSS32	97.9	25	122.4	48.3	51.7	24.2	0.07	44	24	CL
F235 CSS32				64.9	35.1	5.9	0.09			SM
F235 CSS32				62.6	37.4	6	0.08		[SM

SAMPLE	Cc	eo	SG	Pc	Po'	OCR	su
NUMBER				ksf	ksf		ksf
F235 CSS38							
F235 CSS38	0.23	1.1954	2.65	0.71	11.3	0.1	
F235 CSS53B	· · · · · · · · · · · · · · · · · · ·						
F235 CSS 53	<u> </u>		····				
F235 CSS32	0.26	0.6902	2.65	10.7	13.3	0.8	3.4
F235 CSS32					·····		
F235 CSS32							

1

Note: This data is presented solely for interpretation. Refer to Section 3.3.1.3 in the report text for more information.

. . .



. ... '

.

Figure 1.0-1 Location Map of F-Area and the Northeast Expansion Area

.

جر بد

.....

service responses to the

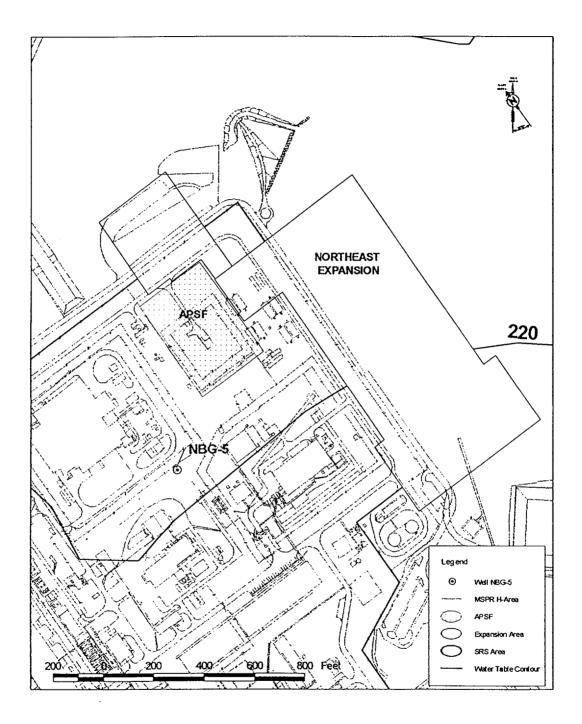
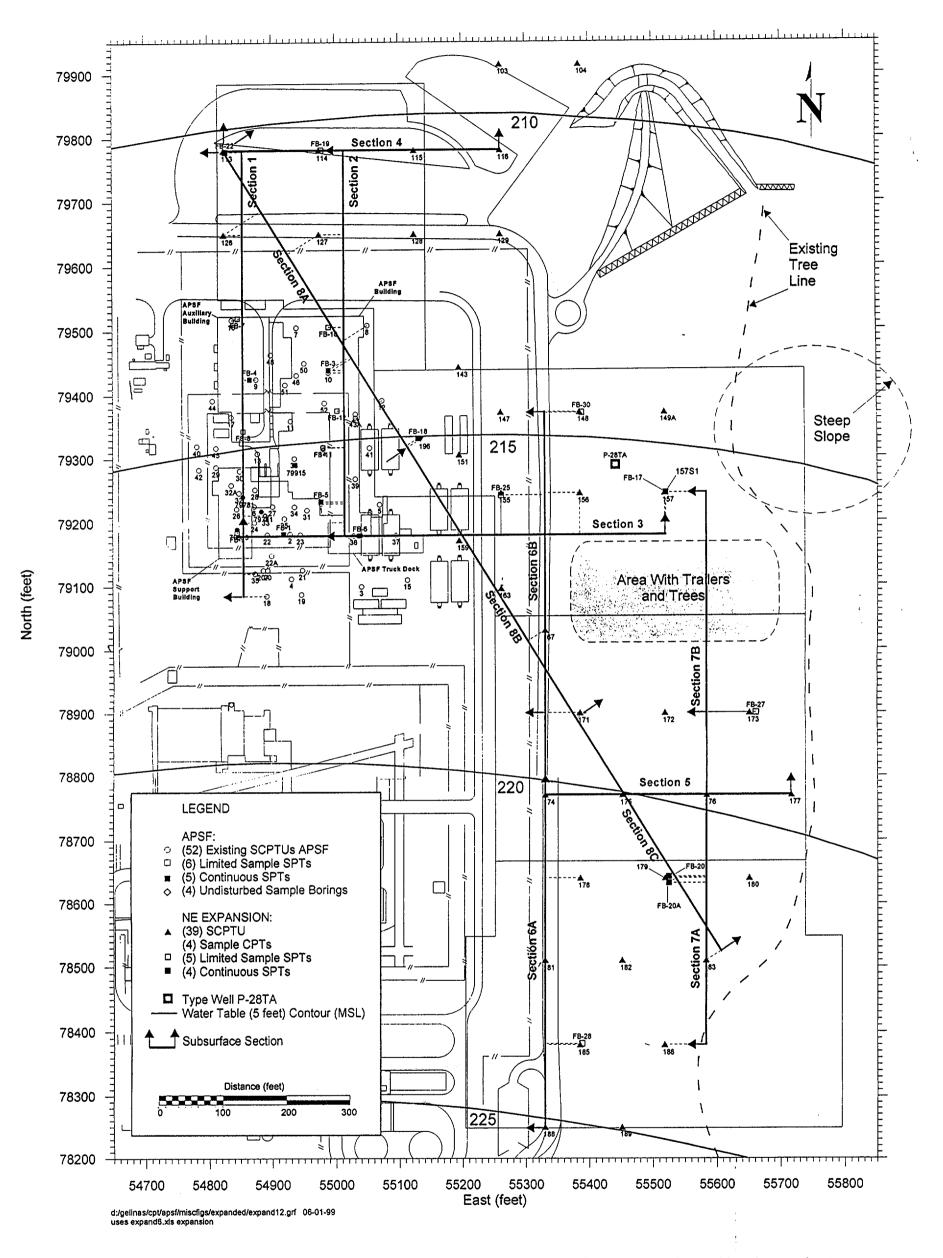


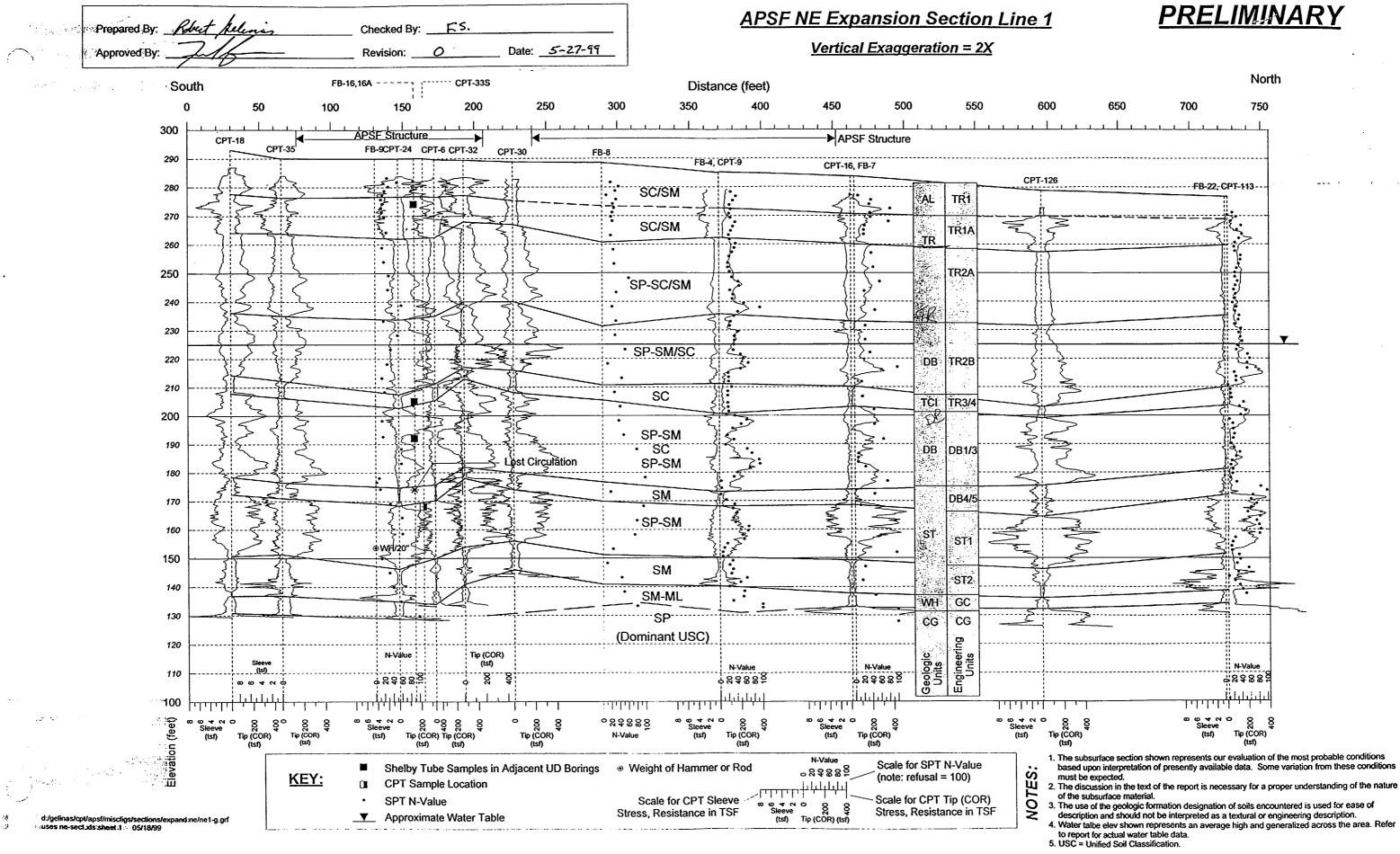
Figure 1.0-2 Location Map of the Northeast Expansion Area and APSF



(______

APSF structure/facility outline provided by project team (SRS Drawing C-CG-F-0042) and is considered approximate. F-Area facility boundaries obtained from SRS maps MSRP0884.DGN and MSRP0854.DGN.

l



11

PRELIMINARY

1. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions

2. The discussion in the text of the report is necessary for a proper understanding of the nature

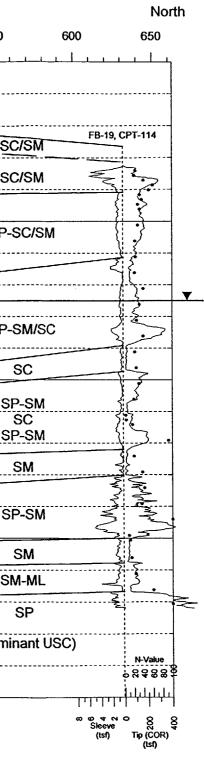
3.0-1 Figure :

Prepared By:	+ Jolina	b	Checked By:	F. S.		APSF NE Expansion Section Line						
Approved By:	1		Revision:		e: <u>5.27-99</u>			<u>Vertical</u>	l Exaggera	<u>tion = 2X</u>		
	Sout	h ^{FB-15}	• • *			Di	stance (feet)					
	0	50	100	150	200 250	0 300	350	400	450	500	550	
	⊲ _300 ⊨	; ;				<u> </u>					1	
ł	<	CPT-36, FB-6 CF	PT-1, FB-5	APSF Str FB-11, CPT-14	UCTURE FB-12							
	290				10-12	CPT-10; FB-3	FB-10					
	280 5		<u>ج</u>	5	• • •	·····		AL TI	R1 ⁺	CPT-127		
		A K		~ ~ ~		- 3 -	<u> </u>				5	
	270 -			E S				TR	1A	\$		
	260 -				•		•		23) 22)	<u> </u>	5	
		{ ! •}	}			15	•	TR		312		
	250 -		4 4		•				2A		SP	
	240	2 5	{ }	{ }	•	<u>}</u>	•			<u>}</u>		
	240 -	52:	{					-		{ }		
	230 -	3 2	315		•	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	•			515		
	F		<u>{</u>		•		•	DB TR	2B	$\overline{}$		
	220 -	5		<u>}.</u>	•				第1977日 第1987日 第1988日	}; {	SP	
	210 -		Just		•							
	-			A A A	>	3 7	•		3/4			
	200 -			<u> </u>	> • •							
	190 -	میں الحکم		2 2	•			DB DE	31/3		ξ	
	190		2	*5	•		•	DB DE		{i>		
	180 -			{{}	•		•				~	
		M L	2.2.		9 WR/16"-	5/2 - 2 - 2			34/5			
	170 -	~ ~		23	•	5115	•		3.4.4			
	160 -		55	\mathcal{A}	£		•	• • \$. \$T-;	T1	23	> ;	
		3		2.5			•				3	
	150 -				•		•	S	T2		<u>~</u>	
			2 La		•							
	140	3		3{	•	25		WH [(SC		- 5	
	130 -			~		·			CG			
				\$ 5					종리			
	120 -	N-Value	N-Value		2			jo))) 같이		<u>ک</u> (Dom	
	110			× ·		Skeeve N-Valu		ogic				
		00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	-02920- 02920- 00-00-00-00-00-00-00-00-00-00-00-00-0	₹N-Vak 20,290	80 90 90 90 90	8 6 4 N 60 N 4 8		Geologic Units Engineeri				
	100 -	┍┰┰┲┲╞┷╬┷╋╧╬╝╉╌╴		── <u>┌</u> ┲┎┲┲┲ <mark>╋</mark> ┶┲	··	┍┧╍┙╍╧╍╪┊╅╁┅┞╍╬		יוין⊂טןש	<u>is</u> [i		r-1	
	et) s	Sieeve 0, 4	- 8 8 Τiρ (COR)	60 47 0 0 0 Sleeve 0 (tsf) Tip (CC	§ 0,298	88 ° 88 Tip (COF	8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		œ	Sleeve R (tsf) Tip (COR	6	
	n (fe	(tsf) Tip (COR) (tsf)	Tip (COR) (tsf)	ຜູ້ປີ (151) Sleeve ຊ (151) Tip (CC (151)	DR) N-Value	Tip (COR (tsf)	N-Val	ue		(tsf) Tip (COR (tsf)	र)	
	Elevation (feet) ⁶	,,						N-Value	Scale for SP] . 1 .	
	Elev	KEY:	 Shelby Tube CPT Sample 	e Samples in Adjace	ant UD Borings @	Weight of Hamm	ner or Kod	28860	(note: refusal	l = 100)	1. 2. 3.	
	-		 SPT N-Valu 			Scale for CPT	Sleeve	+++++++++++++++++++++++++++++++++++++++	- Scale for CP	T Tip (COR)		
apsf/miscfigs/sections/expand.ne/ne2-f	f.grf			e Water Table	ę	Stress, Resistance	e in TSF Sleeve (tsf)	C 8 8 Tip (COR) (tsl)	Stress, Resis	stance in TSF	Ž ^{3.}	
Lxls sheet 2 05/18/99							(151)	(UOR) (ISI)			_ 4.	

, .[,]

d:/ use





and a state of the

Figure 3.0-2

. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions must be expected. The discussion in the text of the report is necessary for a proper understanding of the nature

The use of the geologic formation designation of soils encountered is used for ease of description and should not be interpreted as a textural or engineering description.
Water table elev shown represents an average high and generalized across the area. Refer to report for actual water table data.

5. USC = Unified Soil Classification.

APSF Structu	100	~	20 l 	APSFS F			00 Truck D	TR1		400 	ance (feet) 450 	500 SC-SM SC-SM SP-SC/SM	550		6
APSF Structure	ure [-22FB-1, CPT-2/	CPT-23		APSF F	Structure B-6		Truck D	ock TR1 TR1A		 159		SC-SM			6
	1-22FB-1, CPT-2	~		7.36 F	B6	CPT-37		TR1	CPT.		CPT-155, FB-25	SC-SM			
	1-22FB-1, CPT-2	~		H Marine Company of the second s		CPT-37		TR1	S MMM month		CPT-155, FB-25	SC-SM			
Martin Strand Stra Strand Strand Stra	Martin Contraction of the second seco			WW WWW WWW WWW WWW		All when when the second secon		TR1A	M Man Man			SC-SM			
	Martin Contraction of the second			WW WWW WWW WWW WWW		Mary and			Mm mm			SC-SM			
						Martin Martin			James and the second se						
						And the second s		TR2A							
	A CONTRACT OF A					A CANANA	7	TR2A				SP-SC/SM		}	
						Contraction of the second seco	7	TR2A	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		SP-SC/SM	~	}	
	A CONTRACTOR OF A CONTRACTOR A CONTRACT					And C	7			<u>S</u>		SP-SC/SM		}	
	A Contraction				· ·		₽ —		Ş	3			{	}	
				-{ -	1			-							
									ş	. <u></u>	$\{\geq$		{	2	
		717<			Į		DB	TR2B			ξ <	SP-SM/SC	ςζ	<u></u>	
	. بې			5		5)			2	3			}	5	
	>	AL AND		544			TCI	TR3/4	}						
<u></u>				3		- SK						SC		3	
5 5	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	JES -							ξ	A l	ξ 2 •		ξ.	}	
	$\langle \cdot \rangle$		·····		3	35	DB	DB1/3	Ś	 	< <u>}</u>	SP-SM	Ę	Z	104- (2 C
<u> </u>		Z Z		ا کر اک	5		DB		·····\$	2	}	SC SP-SM	}		(20)
2 A	E K	3 25				32		DB4/5		3		01-014	2	3	
				31					\sim	5	\$ 35M.		Mur	23	
				<u>.</u>			2-18-	ST1		5	3 22	SP-SM	<u> </u>		
				-20	\$ <u> </u>				2	- S		0. 0		2	
wr ک	16-4/2 8	3		<u>}</u>	⊕ WR/18"	X		ST2	}	}		SM	کر	2	
3						<u>{}}-</u>			3	~			{	3	
	1	<u> </u>		<u></u>					<u>}</u>	(SM-ML		1	
								1		5 9 6 8	·	SP	\sim		
	*						<u>-</u> 2	eerir				(Dominant US	SC)		
N-Value					N-Value		Solo	ig light			N-Value	、 {			
		i				6	Ŭ	μ	ŀ	t 0 1	i	-			
└┦┟┸╁┋┛┟┸╁	1.1.1.11	<u> </u>		┍᠇᠇᠇		1111	-11		, I.I.I.I.						
8 8			ແລະດາ Skee (ts	rrrvo eeve sf) ⊺i		Sleeve (tsf) Tip (S S COR)	Ċ	°co∵sr∩∖ Sieeve (tsf)	[⊐] 8 8 [∞] Tip (COR)	Sleeve R 4 (tsf) Tip (COR)		Sleeve (tsf)	Tip (COR)	
(tsf)	(tsf)	(isf)			(tsf)	(1	if)			(tsf)	(tsf)			(151)	1
				•	-	-	nt UD Bo	orings	⊛ Wei	ght of Hamm	ner or Rod	00008			MOTEC.
		NET:			-	n			_		ليلينار	-իդիիիի	•		
	N-Value N-V	White N-Value N-Value NV R \$ 2 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	With the -4/2 N-Value N-Value	White $4/2^{\circ}$ N-Value N-Value 222232° 32232° $32232^$	N-Value N-Value R + Value N-Value R + S + S + S + S + S + S + S + S + S +	Wind the "-4/2" Wind the "-4/2" N-Value N-Value R ¥ 8 8 2 R ¥ 8 8 2 I I I I I I I I I I I I I I I I I I I	With 16"-4/2 WRV18" N-Value N-Value R 9 8 8 R 9 8 8 R 9 8 8 R 9 8 8 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Image: Second ne/ne34/ord Image: Second ne/ne/ne/ne/ne/ne/ne/ne/ne/ne/ne/ne/ne/n	WRUB* SE ST2 WH GC CG CG Sterve Sterve Sterve <t< td=""><td>MRU13 Image: Strain of the strain of the</td><td>NValue NValue NValue NValue NValue ST2 NValue NValue NValue ST2 ST2 NValue NValue Stress, Resistance in Stress, Resistance in Stress, Resistance in</td><td>WR118* Image: Strate of the strate of th</td><td>With GC ST2 SM With GC SM SM NValue NValue SM NValue NValue SP Sig 3 8 2 SR 2 8 8 2 SM NValue Sig 2 8 8 2 Sig 2 8 8 2 NValue Sig 2 8 8 2 Sig 2 8 8 2 NValue Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2</td><td>WRUB SP-SM WRUB ST2 WRUB ST2 WRUB ST2 SM SM WRUB ST2 SM SM WRUB ST2 SM SM WRUB ST2 SM SM SM SM NValue SP NValue SP NValue SP NValue SP NValue SP SP NValue SP NValue SP SP NValue SP NValue SP SP NValue SP NValue SP SP NValue SP SP SP NValue SP SP SP SP SP NValue SP Seeve Seeve Seeve Seeve Seeve Seeve Seeve Seeve <t< td=""><td>WR/16 4/2 SP-SM WR/16 4/2 ST2 WR/16 4/2 SM WR/16 4/2 ST2 SM SM WR/16 4/2 SM WR/16 4/2 SM ST2 SM WR/16 4/2 SM SS SS <td< td=""></td<></td></t<></td></t<>	MRU13 Image: Strain of the	NValue NValue NValue NValue NValue ST2 NValue NValue NValue ST2 ST2 NValue NValue Stress, Resistance in Stress, Resistance in Stress, Resistance in	WR118* Image: Strate of the strate of th	With GC ST2 SM With GC SM SM NValue NValue SM NValue NValue SP Sig 3 8 2 SR 2 8 8 2 SM NValue Sig 2 8 8 2 Sig 2 8 8 2 NValue Sig 2 8 8 2 Sig 2 8 8 2 NValue Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2 8 8 2 Sig 2	WRUB SP-SM WRUB ST2 WRUB ST2 WRUB ST2 SM SM WRUB ST2 SM SM WRUB ST2 SM SM WRUB ST2 SM SM SM SM NValue SP NValue SP NValue SP NValue SP NValue SP SP NValue SP NValue SP SP NValue SP NValue SP SP NValue SP NValue SP SP NValue SP SP SP NValue SP SP SP SP SP NValue SP Seeve Seeve Seeve Seeve Seeve Seeve Seeve Seeve <t< td=""><td>WR/16 4/2 SP-SM WR/16 4/2 ST2 WR/16 4/2 SM WR/16 4/2 ST2 SM SM WR/16 4/2 SM WR/16 4/2 SM ST2 SM WR/16 4/2 SM SS SS <td< td=""></td<></td></t<>	WR/16 4/2 SP-SM WR/16 4/2 ST2 WR/16 4/2 SM WR/16 4/2 ST2 SM SM WR/16 4/2 SM WR/16 4/2 SM ST2 SM WR/16 4/2 SM SS SS SS SS <td< td=""></td<>

:

, í

to report for actual water table data. 5. USC = Unified Soil Classification.

PRELIMINARY

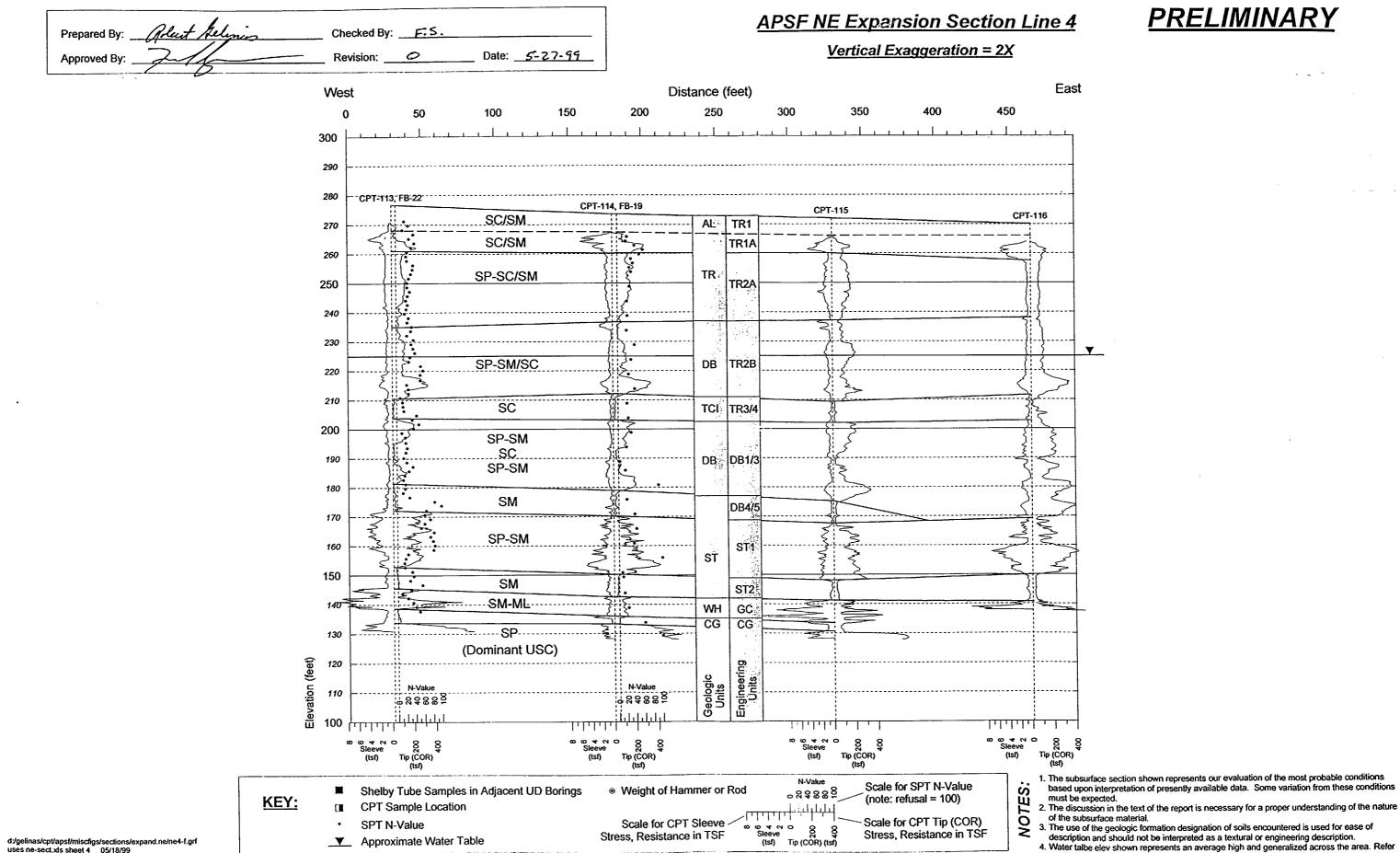
· _

East 700 750 800 850 1 J 1 CPT-157S1, CPT-157V CPT-157S CPT-157, FB-17 ----3 Subsurface Cross-section 3 ----. Y ----i ------13**-**103-111 ft depth (2 CPT samples) ft depth amples) • Soft Zone Figure 3.0-3 3/26 B WR/12-WH/3-5/3-71K---Z ~ -----------N-Value #8888<u>5</u> ₁┼╍╁╍┨┰┛┶ 111111 । 82 Tip (COR) (tst) ∞∞++ Sleeve (tsf) T © © 7 7 0 8 8 Sleeve 8 7 (tsf) Tip (COR) (tsf)

. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions must be expected.

. The discussion in the text of the report is necessary for a proper understanding of the nature

The discussion in the text of the report is necessary for a proper or necessary of a proper or necessary of

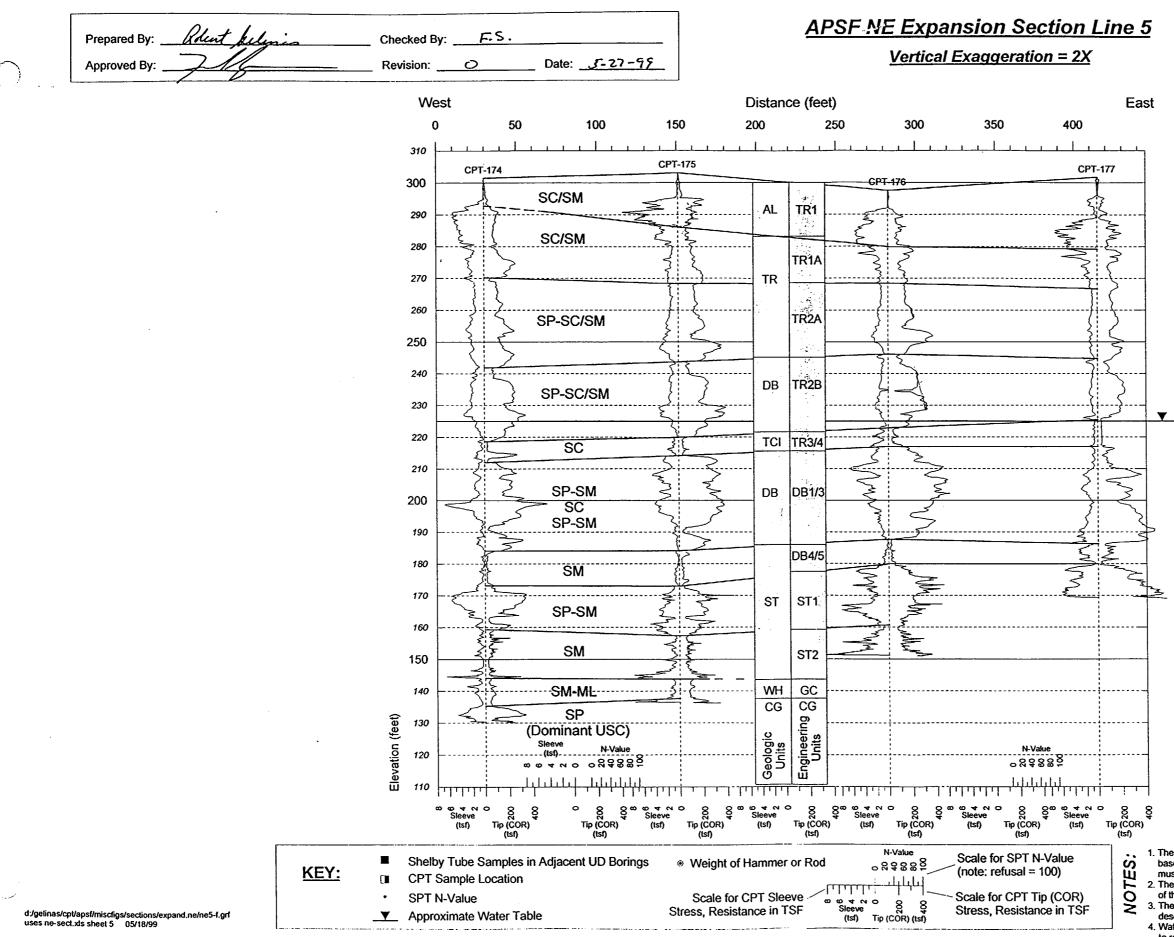


· · · ·

uses ne-sect.xls sheet 4 05/18/99

to report for actual water table data.

5. USC = Unified Soil Classification.





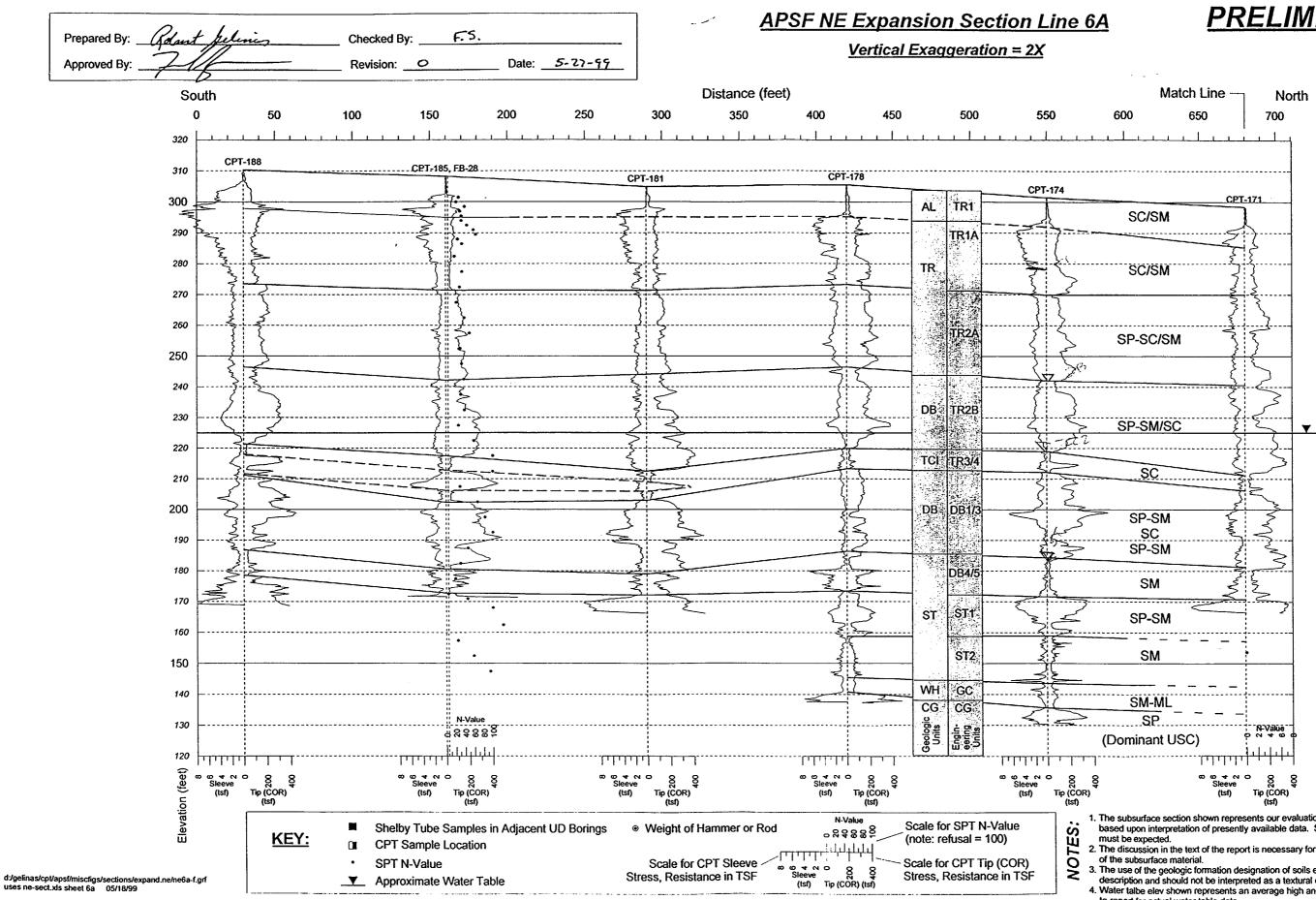
. . . .

1. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions must be expected.

2. The discussion in the text of the report is necessary for a proper understanding of the nature of the subsurface material.

 The use of the geologic formation designation of soils encountered is used for ease of description and should not be interpreted as a textural or engineering description. 4. Water talbe elev shown represents an average high and generalized across the area. Refer

to report for actual water table data.
 USC = Unified Soil Classification.



مهر . ۲



1. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions

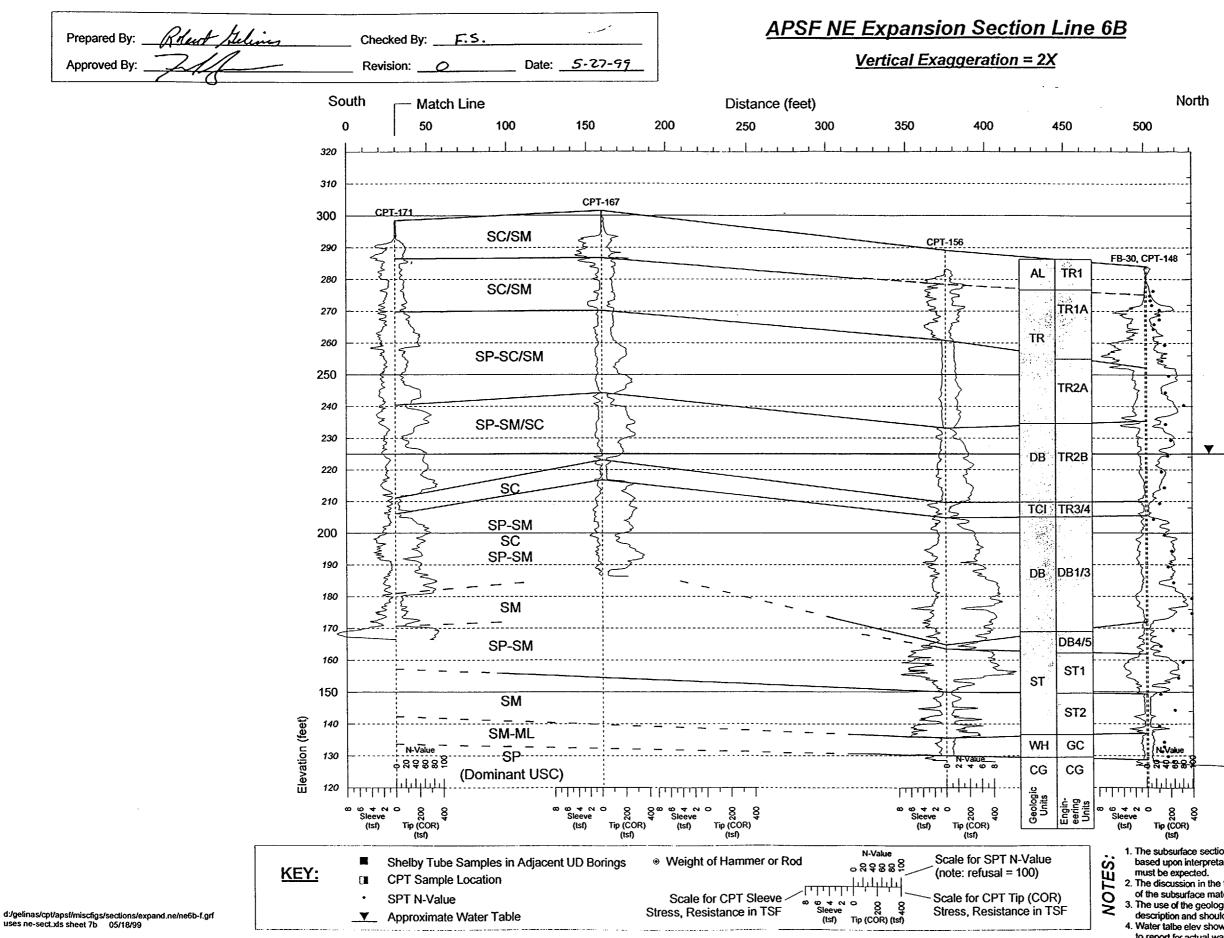
2. The discussion in the text of the report is necessary for a proper understanding of the nature

3. The use of the geologic formation designation of soils encountered is used for ease of description and should not be interpreted as a textural or engineering description.

4. Water table elev shown represents an average high and generalized across the area. Refer to report for actual water table data.

5. USC = Unified Soil Classification.

Figure 3.0-6



, . ..



, ? [~]

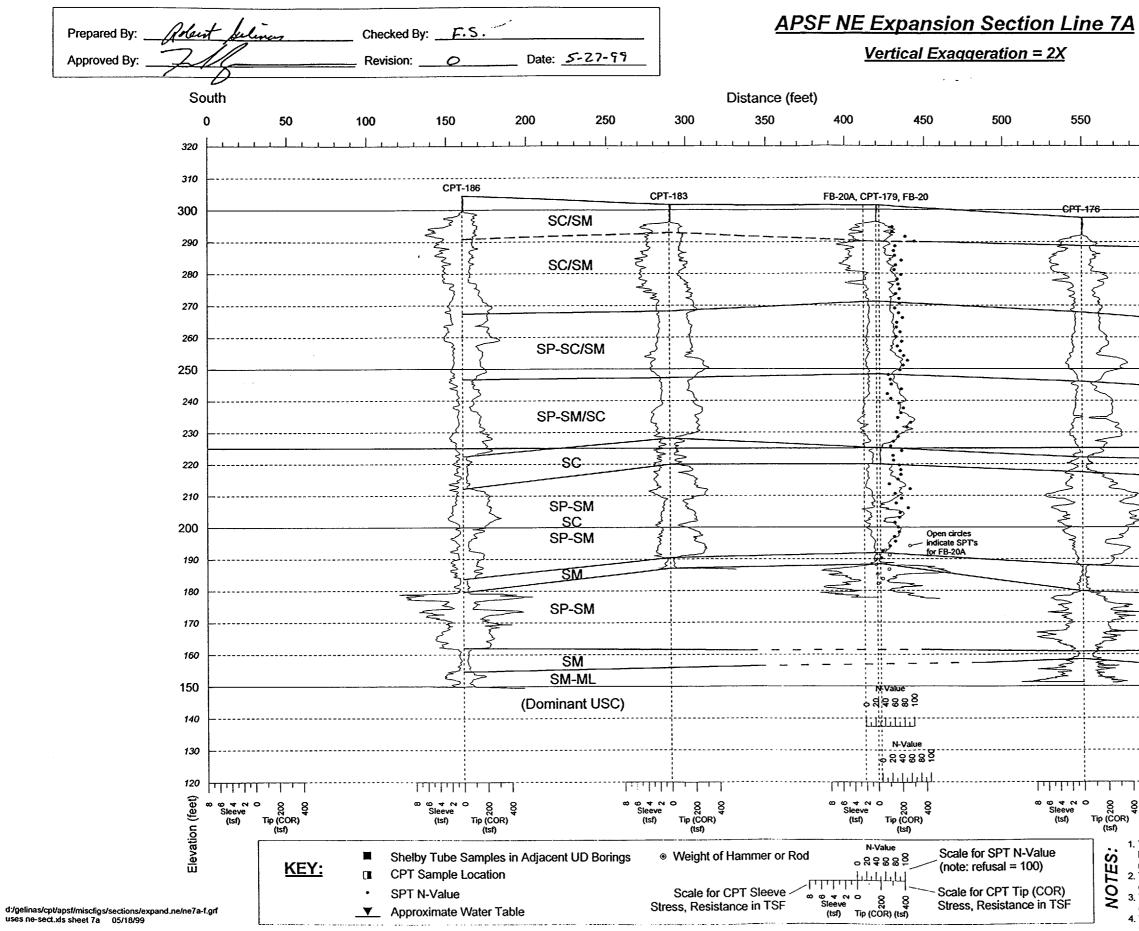


1. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions

2. The discussion in the text of the report is necessary for a proper understanding of the nature of the subsurface material.

3. The use of the geologic formation designation of soils encountered is used for ease of description and should not be interpreted as a textural or engineering description. Water table elev shown represents an average high and generalized across the area. Refer to report for actual water table data.

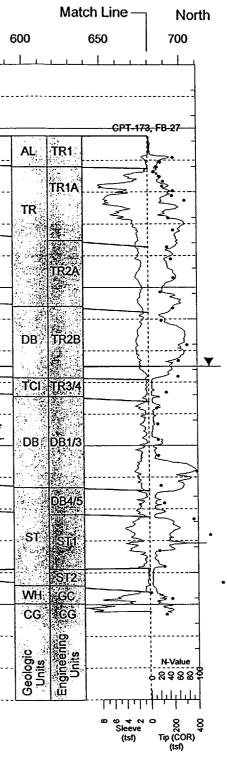
5. USC = Unified Soil Classification.



, *** · »**

PRELIMINARY

, ?



Subsurface Cross-section 7A

A

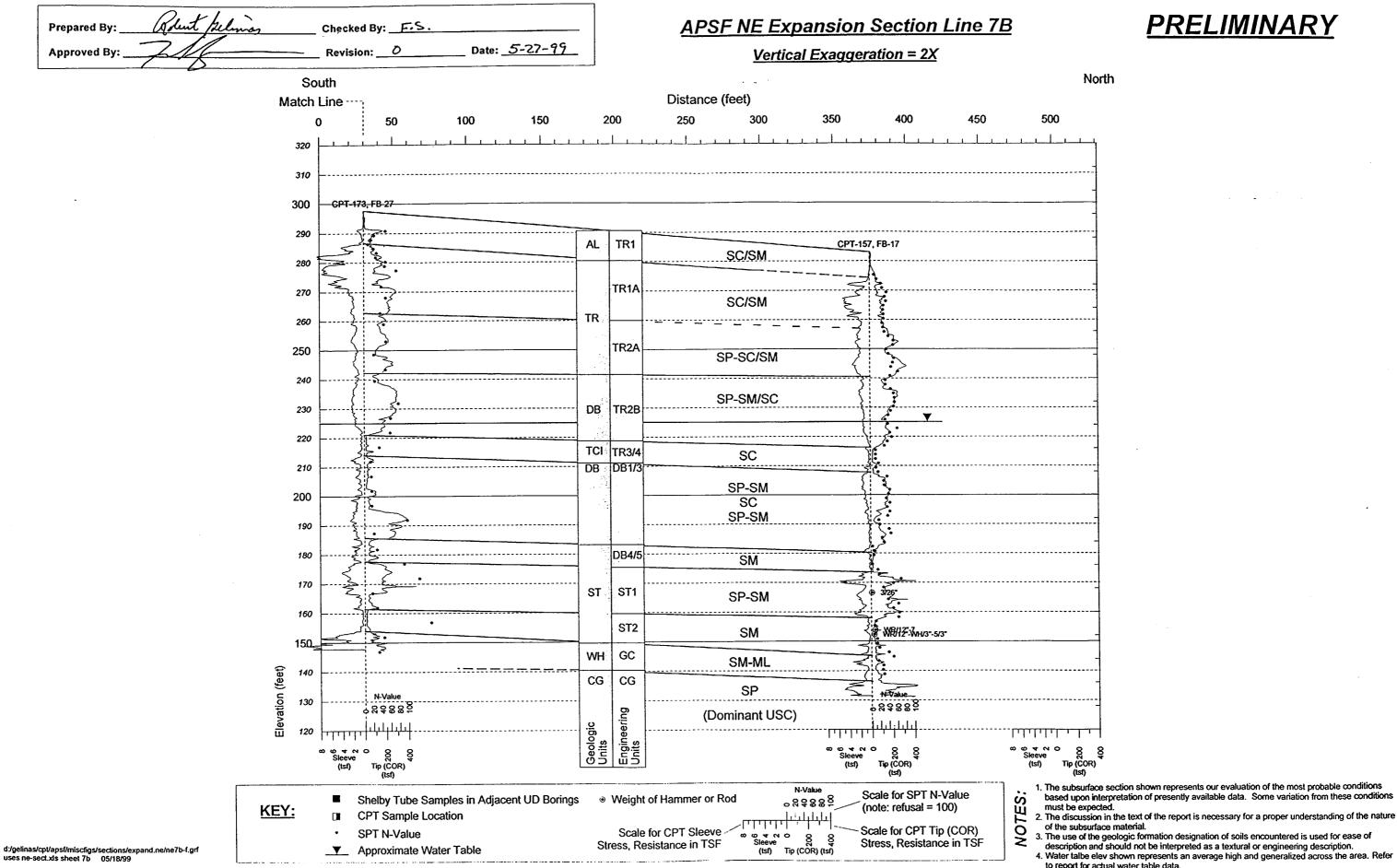
Figure 3.0-7

. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions must be expected.

2. The discussion in the text of the report is necessary for a proper understanding of the nature

 The discussion in the text of the report to incorport to . Water talbe elev shown represents an average high and generalized across the area. Refer to report for actual water table data.

5. USC = Unified Soil Classification.



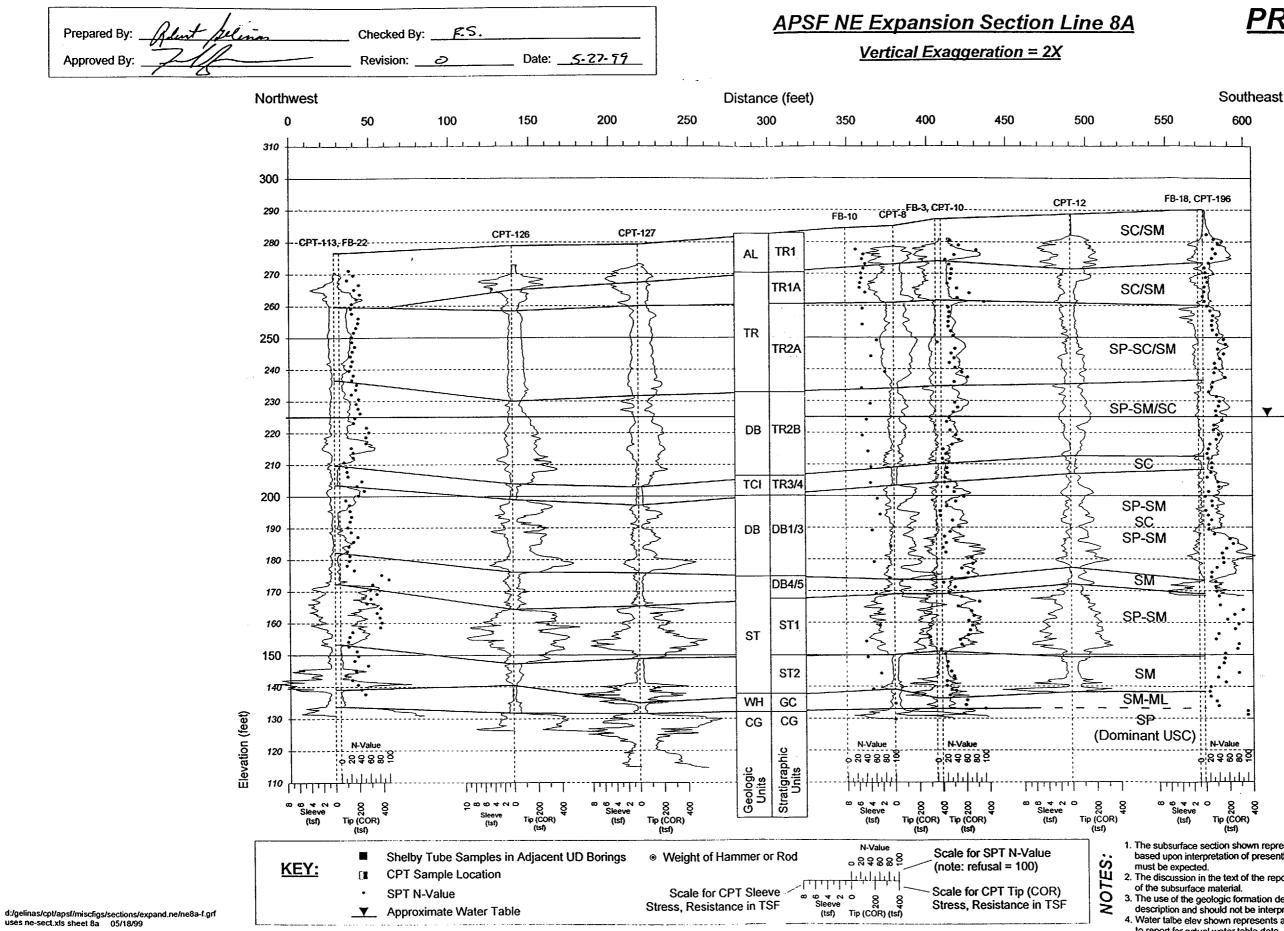


, :

based upon interpretation of presently available data. Some variation from these conditions

Water table elev shown represents an average high and generalized across the area. Refer to report for actual water table data.
 USC = Unified Soil Classification.

Figure 3.0-7



, :



1. The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions

2. The discussion in the text of the report is necessary for a proper understanding of the nature

3. The use of the geologic formation designation of soils encountered is used for ease of description and should not be interpreted as a textural or engineering description. Water talbe elev shown represents an average high and generalized across the area. Refer

to report for actual water table data.

5. USC = Unified Soil Classification.

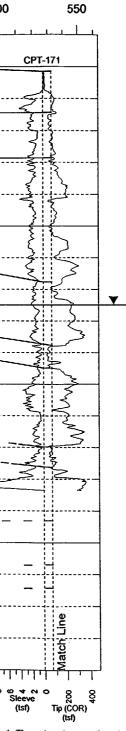
Figure 3.0-8

APSF NE Expansion Section Line 8B Prepared By: <u>Adent pelinis</u> F.S. Checked By: Vertical Exaggeration = 2X Date: 5-27-95 Approved By: Revision: Northwest Distance (feet) 100 150 200 250 300 50 350 400 450 500 0 310 1 1 CPT-167 300 CPT-159 CPT-163 CPT-196 290 SC/SM AL TR1 280 270 TR1A SC/SM 260 TR 250 TR2A SP-SC/SM 240 230 DB TR2B SP-SM/SC 220 210 TCI TR3/4 SC 200 : C SP-SM 190 DB DB1/3 SC SP-SM 180 DB4/5 170 -----SM------ST ST1 160 SP-SM 150 ST2 SM 5 140 GC SM-ML WH Elevation (feet) CG CG 130 SP 120 Geologi Units Engin-eering Units (Dominant USC) 110 ויזידידי vortano Sleeve (tsf) ∞ ຜ ຈ າ ວ Sleeve (tsf) ີ 0 0 1 ີ 8 ຊ Tip (COR) Tip (COR) 8 8 8 8 ĝ Sleeve (tsf) Tip (COR) Tip (COR) (tsf) (tsf) (tsf) (tsf) N-Value Scale for SPT N-Value Shelby Tube Samples in Adjacent UD Borings Weight of Hammer or Rod °85885 TES. (note: refusal = 100) KEY: CPT Sample Location ╷┊╍╁┰┠┱┚┚ Scale for CPT Tip (COR) Scale for CPT Sleeve SPT N-Value Sieeve 0, 0 Ñ Stress, Resistance in TSF Stress, Resistance in TSF ▲ Approximate Water Table d:/gelinas/cpt/apsf/miscfigs/se (tsf) Tip (COR) (tsf) ctions/expand.ne/ne8b-e.gr uses ne-sect xis sheet 8b 05/18/99

PRELIMINARY

Southeast

11



 The subsurface section shown represents our evaluation of the most probable conditions based upon interpretation of presently available data. Some variation from these conditions must be expected.

The discussion in the text of the report is necessary for a proper understanding of the nature of the subsurface material.

The use of the geologic formation designation of soils encountered is used for ease of description and should not be interpreted as a textural or engineering description.

Water table elev shown represents an average high and generalized across the area. Refer to report for actual water table data.

5. USC = Unified Soil Classification.

oved By:	714-			_ Revision:	0	Date:	5-27-99			<u>Vertica</u>	al Exagge	<u>ration = 2X</u>					
	,	North	west					I	Distance (feet)						Southeast		
0	50		100	150	200	250	300	350	400	450	500	550	600	650	700	750	
310	<u> </u>	I,, I,, .		CPT	175						· · · · · · · · · · · ·						1
300 -	Match Line				-1/5		CPT-179, FE	3-20, FB-20A		CPT-183							- ·
	SC/SM	AL	TR1		3		A S	4.		5							
290					Ę		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2.		A LA							
280	SC/SM		TR1A		<u>}</u>					23							- ·
270				{			·····}										-
260		TR		{	}		}	k									-
	SP-		TR2A	}	2		}				\mathcal{L}						
250 —	SC/SM			<u> </u>	3			•			·····						
240					5		{				>						-
230	00				{		{<				<u> </u>						-
220	SP- SM/SC	_ DB	TR2B	3						25	V						
220		TCI	TR3/4	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1		{	• >•		5 7							
210	SC			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			} ~			35				· · · ·			
200 -	SP-SM	םת -	DB1/3				{		Open circles indicate		2			,,	<u></u>		-
190	SC	-			\sim				- SPT's for FB-20A		>						
100	SP-SM		-		3		- F										
180	SM		DB4/5	{													
170	SP-SM	1 212	ST1	series and the series of the s	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			й									
160		ST						61 6 64 6 64 7 64 7 64 7 10 10 10 10							•••••••••••••••••••••••••••••••••••••••		
150 -	SM		ST2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	the			11 L 11 F 14 L 15 L 17 L							<u></u>		_
				<u>}</u>													
140	SM-ML			}				\$ \$ \$ 8 8 8 8 9									
130 -	(Dominan	CG	CG														
120 -	USC)	Geologic Units	eeuu														
110			Engin Units	• • • • • • • • • • • • • • • •	·												
iet)					0 0 0 0 0 0 0		5∞۵40 الالاليا	• 8 8		0 0 + N O Sieeve	1 · 1 3 8						
on (fe				Sleeve (tsf)	Tip (COR) (tsf)		Sieeve (tsf)	Tip (COR) (Lsf)		(tsf) Tip (COR) si)						
evatic				Sheib	y Tube Sample	s in Adjacent U	D Borings	Weight of Ha	ammer or Rod	0 8 8 8 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		r SPT N-Value	•••	based upon inter	pretation of presently	ents our evaluation of available data. Some	the most probable condit e variation from these cor
ū			<u>(EY:</u>		Sample Locatio		Ť	5		مەھەمە» لىلىلىلىك	(note: re	fusal = 100)	TES	must be expecte 2. The discussion in of the subsurface	n the text of the repor	t is necessary for a pro	oper understanding of the

, 1 - 1

d:/ge uses

 \bigcirc



ered is used for ease of eering description. alized across the area. Refer to report for actual water table data. 5. USC = Unified Soil Classification.

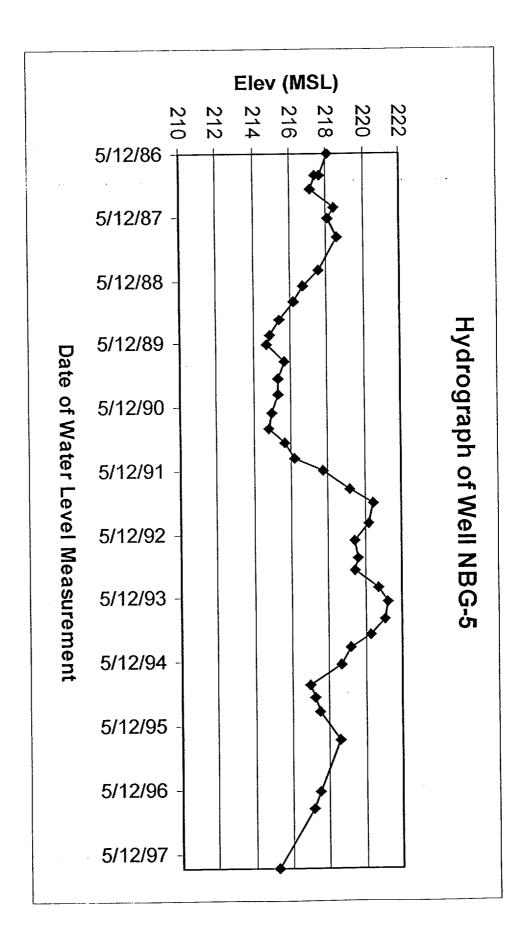


Figure 3.2-1 Hydrograph of Water Table Measurements for Well NBG-5

Northeast Characterization

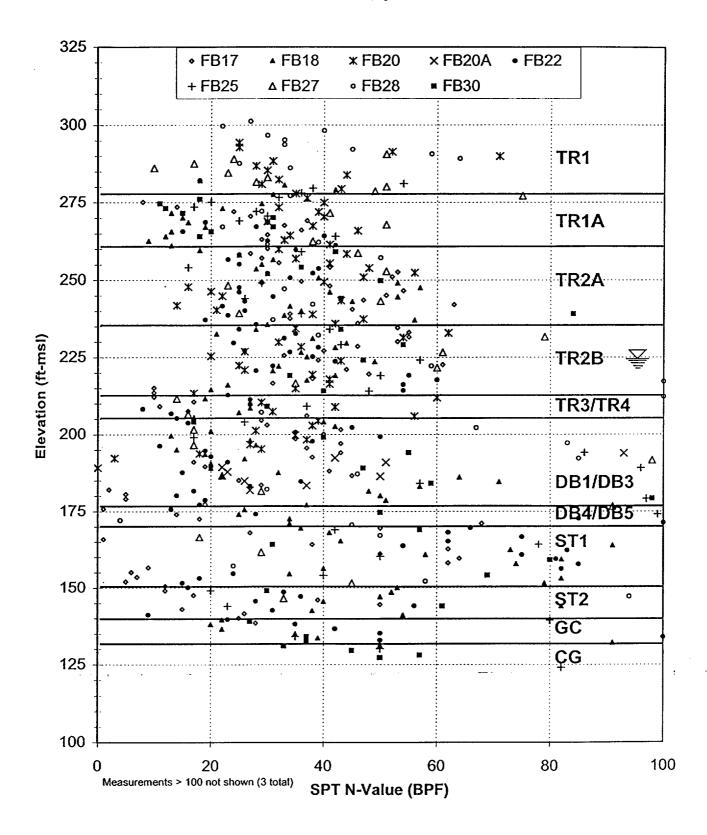
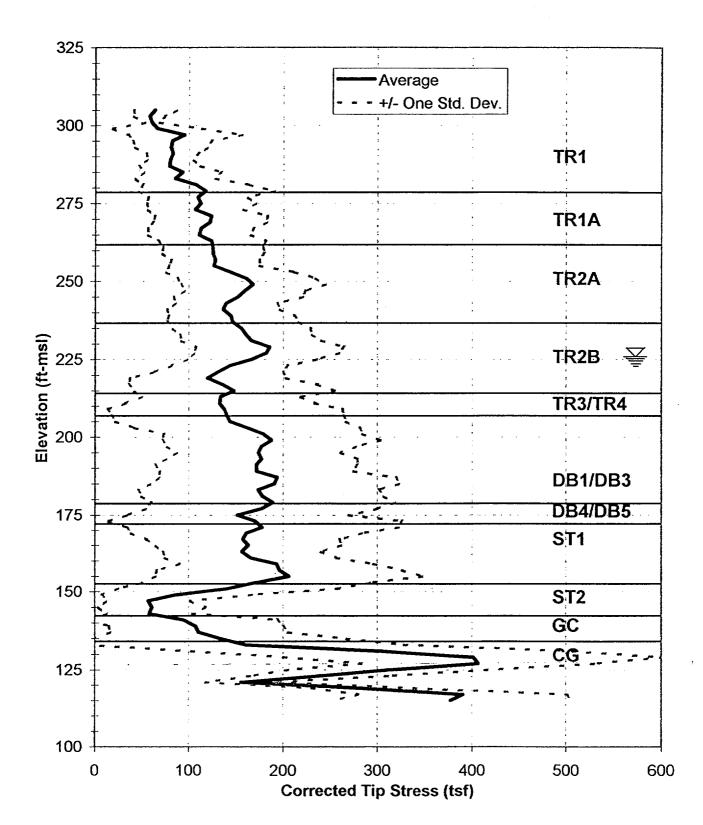


Figure 3.3-1 Range of SPT N-value Measurements



Northeast Characterization



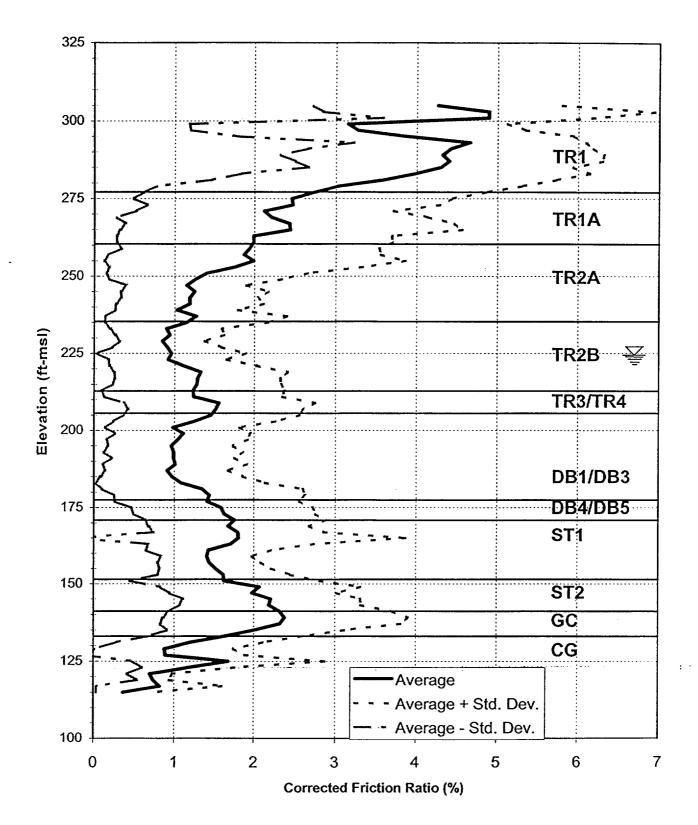


Figure 3.3-3 CPT Friction Ratio (Rf)

Northeast Characterization

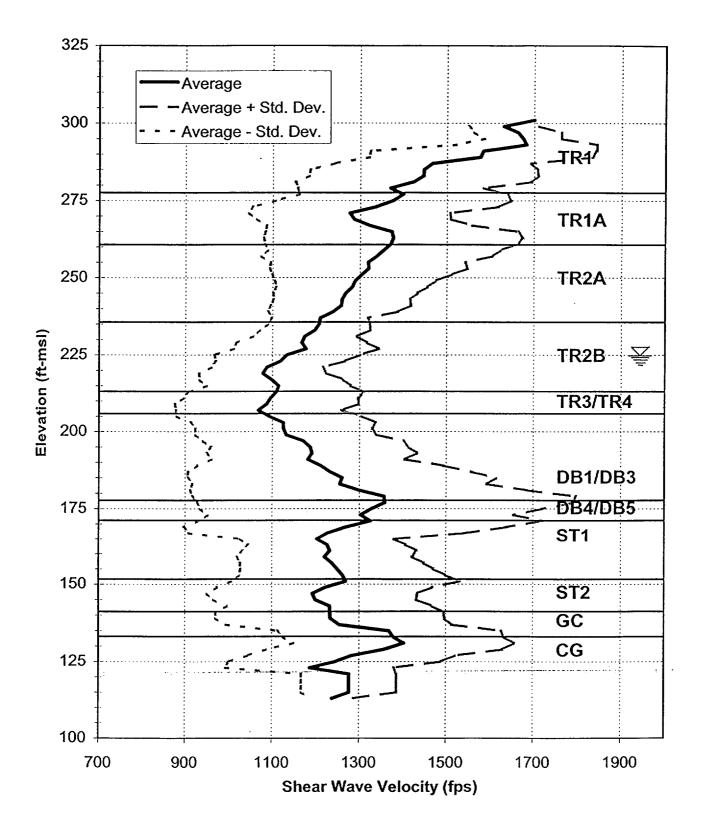
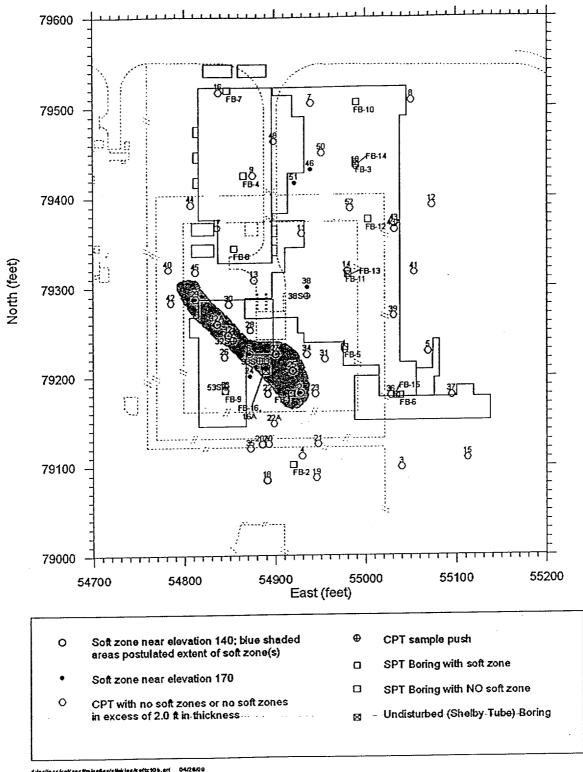


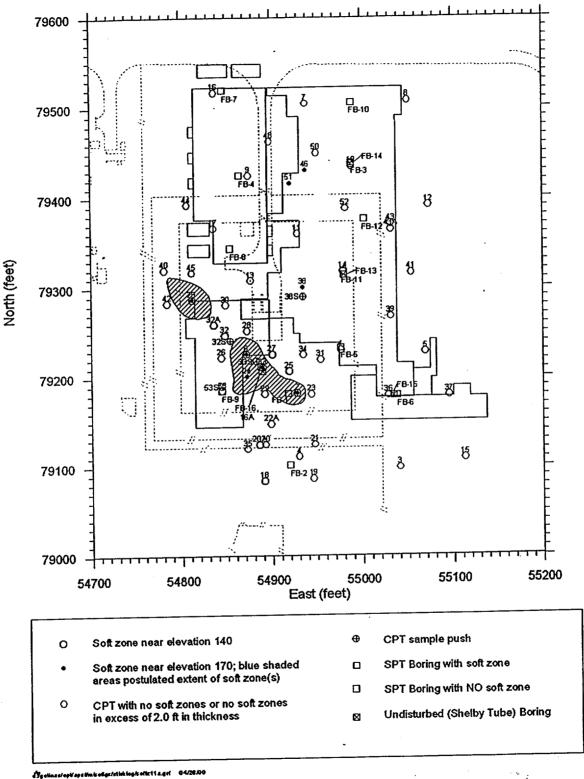
Figure 3.3-4 Average Shear Wave Velocity



d Jyelines/cpV spettmicellge/stickleg/coliz105.grl 04/28/ week location xis sheet softwart

Figure modified from WSRC (1998a) APSF Confirmatory Drilling Program Results, June, *1998, PECD-SGS-98-0115

Figure 3.3-5 Map of APSF Area and Mapped Extent of Lower Soft Zone



04/28/99 To sting the start of an and the start theats officent

Figure modified from WSRC (1998a) APSF Confirmatory Drilling Program Results, June, 1998, PECD-SGS-98-0115

Figure 3.3-6 Map of APSF Area and Mapped Extenet of Upper Soft Zone



			0			00	PROJI	ECT				JOB	NO.	SHEET	NO.	HOLE NO.
	G	EOTE		NICA					ARF	CA INVEST	IGATION		1)F 6	FB-1
SITE		-			-	1	OORDINATI	ES					ANGLE	FROM H		
BEGUN	'u R	COMPLE	ted 1	Cacility	F-Ar	ea	D	RILL M		79,182 E		SAMPLE	HAMMER V	V WEIGHT/	/ertical	TOTAL DEPTH
8-22		1	1			EEI	_			e B-57	8"/5"		140 Lbs	s/ 30"		156.5
GROUND		. DEP1	H/EL	. GROUND	WATE		GED BY:							1		
2	90.6	¥ S	\$9.0/X	221.6 69	<i>?</i> ′							F.H	. Syms			
	П															
TYPE NO.		▲ N-VA	LUE	(SPT)			ELEVATION IN FEET		လ				•	N	OTES	ON:
Fg		O WATE	R CC	NTENT	%	BLOW	L L L	R	SRAPHICS	DECODE	TION AND CL	ACCTE	TCATTC		IATER HARAC	LEVELS, TER OF
<u>e</u> g	Seh	+ ATT.	1 TM			2 B B B B B B B B B B B B B B B B B B B		표	l⊈ €	DESCITI			TOULT		RILLI	ing and
SAMP. AND	1						비민	DEPTH	ច						ABORA	
		20	40	60 80	3		290.6									
									$\langle \rangle$	Red brown quartz pebb	Clayey Sand (SC) v	vith cobb	oles and	H	Iole adv	anced using low stem
							289.1	-	1A		-			81	ugers fro	om 0.0' to
								.		Light brown	n Poorly Graded Sa fine sand, dry	nd (SP)	mostly	1		
			-											I M	fud rota	ry drilling using a 5*
								-						di fr	rag bit v rom 70.5	vas used ' to 156.5'.
								- 1						fc	or split s	were used poon from
								5-							.0' to 91. N" rods	
								5						fo sa	or split s ampling	were used poon from 91.5' to
SS						8 12	284.1	-		similar to a	bove material			1: R	56.5' Lecovery	18"/18"
1						12 20	-~	.	\square	Red brown	Clayey Sand (SC) 7 im plasticity, dense,	0% fine	sand, 30%	6		
SS						11	{			color.	bove material		-,	- 1	lecovery	18"/18"
SS 2						16 22		-	\square	onnar to u					•	
- 22						13	{	-	$\langle \rangle$	similar to a	bove material excep	t, becom	ing less	R	lecovery	18"/18"
SS 3	1					13 19		10-	$\langle \rangle$	dense, less j	plastic				,	,
SS						12	4	10	$\langle A$	similar to a	oove material			R	lecovery	12"/18"
33 4						15 17		-						^	locovery	
								-	$\langle A$	similar to al	ove material excer	t. grain s	size is		lecovery	144/104
SS 5						12 12			$\langle A$	increasing s	pove material excep lightly to include ve	ry few m	edium sar	nđ. 📘	acovery	14 / 10
						18		-		cimilar to al	pove material					1/1/101
SS 6						11 13	27(1	-	$\langle \rangle$	sinnar to a	Sove material			K	lecovery	10,718
						12	276.1_ 275.6_	15-	ÍÍ	Red brown	Silty Sand (SM) 70	% very fi	ine sand,			
SS 7		Ē				8 10		15	$\langle \rangle$	Light brown	nedium plasticity, n Clayey Sand (SC) ine sand, 25% lines	5% rour	ided coars		lecovery	12-/18-
						12		-	$\langle \rangle$	dense, sligh	tly moist.	, m caiun	n plasticity			
SS 8		•				9 15		-	$\langle \rangle$	similar to a	pove material ounded quartz pebl	bles @ 1	7 '	R	lecovery	13"/18"
						14			$\langle \rangle$							
SS 9						9 15		· · -	VЛ	 Red brown medium san 	Clayey-Sand (SC) d, 30% fines, media	-65% fin um plasti	icity, slight	/o··· R	lecovérý	12"/18"
						18			$\langle \rangle$	moist.						
SS 10		4				12	1	20-	X	similar to al	ove material excep edium sand, slightly	t grain si micaceo	ize increas	ses R gh	lecovery	12"/18"
10						19 17		~~~		dry strength	l. – – – – – – – – – – – – – – – – – – –		Ċ			
SS 11						10	1		$\langle \rangle$	similar to al	oove material			R	lecovery	15"/18"
						13 13		-	$\langle \rangle$							
SS 12		4				12			$\langle \rangle$	similar to al brown color	ove material excep	t mottle	d purple	R	lecovery	15"/18"
12						16 20		-	$\langle A$	DTOMIL COIOI	•					
SS						13	261	-	VA	similar to al	oove material			R	lecovery	14"/18"
13						14	266.1_		611	Purple Silty	Sand (SM) mostly	fine to n	nedium sa			
		T SPOON;				1				THE FAT	LOC			но	ÎLE NO. Ir	B-1
PS = S	TAT	IONARY P	ISTON	; PB = 1	ritCh	ERI				FINAI	1100				r	D-7



			00	PROJE				ET NO. HOLE NO.
	OTECHI		.0G		F	ARE	CA INVESTIGATION 2	OF 6 FB-1
	▲ N-VALUE ↔ > WATER COM + ATT. LIM3 20 40 €	NTENT %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
SS 14	A		15 9 11 13		-		nonplastic, low cohesion slightly moist, <1% mica flakes present. similar to above material	Recovery 13"/18"
SS 15			10 9 11		-		similar to above material	Recovery 10"/18"
SS 16			6 9 11	260.8_ 260.4_	- 30-		similar to above material except with wispy laminations Red brown Clayey Sand (SC) medium to low	Recovery 10"/18"
SS 17 SS			8 11 12 7	259.6_ 259.1_	3		plasticity, soft, moist. Purple Silty Sand (SM) mostly very fine sand to silt size mica, low dry strength, wispy laminations. Poorty Graded Sand (SP-SM)	Recovery 18"/18" Recovery 14"/18"
18 SS 19			7 9 6 9		-		Red brown, purple Silty Sand (SM) mostly very fine sand to silt size, laminated with up to 1/4 [*] clay layers of medium to highly plasticity, soft. similar to above material	Recovery 17"/18'
SS 20			11 9 10 11		35-		similar to above material except, becoming light brown, nonplastic, less moisture.	Recovery 14"/18"
SS 21	A		10 10 10 11		-		similar to above material	Recovery 14"/18"
SS 22	A		8 11 10	251.6	ļ		similar to above material	Recovery 13'/18"
SS 23			11 11 12	201.0	40-		Red brown Poorly Graded Sand with Clay (SP-SC) 80% fine quartz sand, 20% fines, medium plasticity to nonplastic, medium dry strength, moist. similar to above material	Recovery 12"/18"
SS 24	_ ▲		11 15 15		-		similar to above material except few wispy laminations of kaolin	Recovery 16"/18" Recovery 18"/18"
SS 25 SS 26	A		12 13 11		-		laminations of kaolin similar to above material	Recovery 13*/18*
26 SS 27	•		12 13 10 11		45-		similar to above material	Recovery 14"/18"
SS			14 11 12 15	244.1_	- - - -		Red brown Clayey Sand (SC) 70% fine sand, trace medium sand, 30% fines.	Recovery 16"/18"
SS 29	•		11 14 14		1		becoming light brown similar to above material	Recovery 12"/18"
SS 30	A		11 12 15		50 -		similar to above material	Recovery 13*/18*
SS 31			12 12 12				similar to above material	Recovery 12"/18"
$\frac{SS}{32}$ SS = SPL11	SPOON; ST =	SHELBY TUBE	10 10 12 ; SITE		_			Recovery 11"/18" HOLE NO.
PS = STATI	ONARY PISTON;	PB = PITCH	ER				FINAL LOG	FB-1



GEOTECHNICAL	IOG	PROJE				ET NO. HOLE NO.
			F		CA INVESTIGATION 3	OF 6 FB-1
H N-VALUE (SPT) → 2 H O WATER CONTENT % - 2 H O WATER CONTENT %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
SS 33	8 7 12				similar to above material except moisture content is increasing	Recovery 13"/18"
SS 34	12 10 13	233.6	-		similar to above material	Recovery 13"/18"
SS 35	12 15 20	233.0_	-		Brown red Poorly Graded Sand (SP) ~90% fine to medium sand, <10% fines, nonplastic, medium dense, low to no dry strength.	Recovery 15*/18*
SS 36 ▲	13 13 15		60-		similar to above material	Recovery 14*/18*
SS 37	16 21 23		- 00		similar to above material	Recovery 18*/18*
SS 38	11 16 19	227.8_	-		Light brown Clayey Sand (SC) medium plasticity, solt.	Recovery 17"/18" Recovery 13"/18"
SS A	10 5 6 9	226.4_ 226.1-	_		solt. Light brown Clay with sand (CH) kaolinitic, some medium sand, mostly fines highly plastic, moist	Recovery 16"/18"
33 40 ▲	11 12		65- -		Light brown Clayey Sand (SC) mostly fine to medium sand, medium plasticity, kaolinitic laminations. similar to above material	Recovery 17*/18*
41 	10 7 10 7	223.1_	-		Light brown Silty Sand (SM) 70% medium sand, 30% fines, medium plasticity to nonplastic, wet.	Recovery 15"/18"
42 	11 16 10				30% fines, medium plasticity to nonplastic, wet. similar to above material except becoming red brown.	Recovery 13"/18"
43 <u>SS</u> 44	13 17 17 23	220.1_	70		Red brown Well Graded Sand with Clay (SP-SC) mostly medium to coarse sand, medium plasticity,	Recovery 8"/18"
	23 37 21 27	218.6_	-	Ŋ	Red brown Clayey Sand (SC) ~80% fine sand, 20% fines low plasticity.	Recovery 12*/18*
▲	21 11 19		1		similar to above material	Recovery 8"/18"
<u>SS</u> ▲	29 15 14 17	•	.75		similar to above material	Recovery 8"/18"
SS 48	17 13 17 23	214.1_			Light brown Poorly Graded Sand with Clay (SP-SC) mostly fine sand, medium plasticity to nonplastic, wet.	Recovery 8"/18"
SS 49	15 20 29				similar to above material	Recovery 7"/18"
SS S0	19 22 28		80 -		similar to above material	Recovery 6"/18"
\$\$ 51	18 28 37				similar to above material	Recovery 8"/18"
SS = SPLIT SPOON; ST = SHELBY TU PS = STATIONARY PISTON; PB = PIT					FINAL LOG	HOLE NO. FB-1



	<u>~</u>)TC	~		<u> </u>		PROJ	ECT		····	JOB NO.	SHE	ET NO.	HOLE NO.
		JIE	CHI			.OG		F	ARI	EA INVESTIGATION		4	OF 6	FB-1
SAMP. TYPE AND NO. SAMPLE	0 +	N-VAL WATEF ATT.	R CON	NTENT	· ×	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLA	SSIFICATIO	м	Chara	LEVELS, CTER OF ING AND ATORY
		20 4	<u>10 E</u>	<u>8 03</u>	10 I		208.1		<u>.</u>					
SS 52				-		19 34 36				Brownish red Poorly Graded San medium sand, <5% fines, nonpla	d (SP) 95% stic, dense.		Recover	y 6*/18*
SS 53			•			9 24 21		85-		similar to above material except t (medium to coarse sand)	becoming coarse	r	Recover	y 5"/18 "
SS 54						6 6 7	205.1_ 203.9_		Ø	Yellow brown Clay (CH) highly p with silt and sand.	lastic, laminated	t	Recovery -HCl	y 14"/18"
SS 55			A			13 22 26	203.4_ 202.6_			Silty Sand (SM) Yellow brown Clay (CH) highly p with silt and sand.		1	Recovery -HCl	y 16"/18"
SS 56				•		18 30 39	202.2_		KA 	Yellow brown Clayey Sand (SC) r coarse sand Light brown Poorly Graded Sand to medium sand, dense.	•	<u>_</u>	Recovery -HCl	/ 12"/18"
SS 57					•	26 44 50		90-		similar to above material			Recovery -HCl	/ 12*/18*
SS 58		۸				8 9 19				similar to above material except w clay highly plastic, laminated, kaolin.	vith a 2" layer of		Recovery	7 6"/18" -HCI
SS 59					4	33 50/4*				similar to above material			Recovery	7 8*/10* -HCI
SS 60				۸		36 35 35		95-		similar to above material			Recovery	7"/18" -HCI
SS 61				A		25 28 34	194.6_ 193.6_	-	K	Light brownish yellow Well Grade (SW-SC) mostly well graded fine sand, with fat clay layers up to 1/4	ed Sand with Cla to coarse quartz 1" thick.	ay	Recovery -HCl	10"/18"
SS 62				•		27 37 38		-		Light brown Poorly Graded Sand quartz sand, <5% fines, dense we similar to above material	(SP) mostly find t.	e	Recovery	8*/18* -HCI
SS 63			-			34 28 32	191.6_	100-		Light brown Poorly Graded Sand mostly fine quartz sand, trace coar laminated.	with Silt (SP-SN rse quartz sand,	4)	Recovery -HCL	11"/18"
SS 64		. [.] ▲				17 23 12		-		similar to above material			Recovery -HCl	10"/18"
SS 65	•					7 6 7	188.4_	-		similar to above material Brownish yellow Clayey Sand (SC sand, 30% fine to medium sand, 3 lignite, soft to medium stiff) ~20% coarse 0% fines, 20%		Recovery -HCl	18*/18*
SS 66			▲		-	14 21 24	186.3_	.		similar to above material			Recovery -HCl	.10"/18"
SS 67			•			13 23 27		105 —		Light brown Poorly Graded Sand medium sand trace lignite. similar to above material	נסג / וונאנוץ		Recovery -HCl	10"/18"
SS 68			•		•	20 21 23		-		similar to above material			Recovery -HCl	16"/18"
SS 69		•			}	8 15		-		similar to above material			Recovery	5"/18" -HCI
SS 70		•				21 17 20		- 110 -		occasional rounded pebbles similar to above material except be graded medium to coarse sand, de	ecoming well nse, <5% fines.		Recovery	8"/18" -HCI
S = SPL	.IT S	POON;	ST = 5	SHELBY	TUBE;	18							IOLE NO.	
S = STA	TION	ARY PI	STON;	PB =	PITCHE	ER				FINAL LOG			F	B-1



		PROJE	ECT			JOB NO.	SHEET NO. HOLE NO.
GEOTECHNICAL I	_OG			ARE	A INVESTIGATION		5 OF 6 FB-1
H N-VALUE (SPT) → S H O WATER CONTENT % → S H O WATER CONTENT % → S H O WATER CONTENT %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATIO	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
	12				similar to above material		Recovery 6*/18* -HC
SS 71	13 16 11		-				
SS 72	8 3 3	177.9_	-	ŀ	Light brownish red Clayey Sand (S coarse sand, medium plasticity, sol	C) mostly fine ft.	to Recovery 6*/18* -HC
SS A	7 6 8		- 115-		similar to above material except be plastic.	coming highly	Recovery 24*/18* -HCl, sample expanded
SSS A	6 5 5				Similar to above material except b laminated with lignite and clay stri medium stiff, highly plastic.	ecoming ngers, soft to	Recovery 20"/18" -HCl, sample expanded
							overdrilled from 117.0 to 118.5'
SS 75	1/8" 4 7	171.1	-		similar to above material		Recovery 20"/18" -HCl, losing fluid stabilizing @ 20-25'
SS 76	10 23 24		120-	Ŋ	Yellowish brown Poorly graded Sa (SP-SC) 70% fine sand, 20% fines, plasticity, moist, clay wisps. similar to above material	nd with Clay 10% lignite, lo	Recovery 7"/18" -HCl
SSS A	18 23 27		-		similar to above material		Recovery 12"/18" -HCl
▲	19 21		-		similar to above material except lig decreasing and clay content increas	mite content	Recovery 10"/18" -HCl
▲	27 19 25 28		125-		similar to above material		Recovery 13"/18" -HCl
SS 80	28 34	164.6_	-	1	Light brown Poorly Graded Sand sand, trace medium to coarse sand,	(SP) 90% fine , 10% fines	Recovery 8"/18" -HCl
▲	26 17 27		-		dense, wet. similar to above material except fir decreasing to $< 1\%$	ies content	Recovery 7"/18" -HCl
	28 24 24		-		similar to above material		Recovery 8"/18" -HCI PP 1.25 TSF
▲	28 20 21		130		similar to above material except be sand	coming very fir	ne Recovery 10"/18" -HCI PP 1.00 TSF
SS 84	24 22 22				similar to above material		Recovery 10"/18" -HCI PP 1.25 TSF
SS SS 85	21 11 14		-		trace shell fragments in 1" layer, fra similar to above material	agments <1/16	
SS 86	7 WR/18"	155.1_	135 -		similar to above material		Recovery 20"/18"
86 SS 87	WR/18"		-		Light brown Clayey Sand (SC) 70% 30% fines medium plasticity. similar to above material except be plastic		Recovery 19"/18"
	WR/18*				plastic similar to above material		sample expanded -HCI PP 0.50 TSF Recovery 0"/18"
SS 88	W I(/ 15	151.9_		4	Light brown Silt with Sand (MH)so	me very fine	
SS = SPLIT SPOON; ST = SHELBY TUBE	SITE		1		mpin oronii olit mili oulid (m11)ot		HOLE NO.
PS = STATIONARY PISTON; PB = PITCH					FINAL LOG		FB-1



GEOTECHNICAL L	OG	PROJ			JOB NO.			HOLE NO.
			F	ARI	EA INVESTIGATION	6	of 6	FB-1
W N-VALUE (SPT) → V N-VALUE (SPT) → V NATER CONTENT % → V N-VALUE (SPT) → V N-VALUE	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATI		NOTES WATER CHARAU DRILL LABORI TESTI	LEVELS, CTER OF ING AND ATORY
SS 89	WR/18*		140-		sand, mostly fines, highly plastic, soft, laminated with wispy layers of very thin clay, silicified shel fragments, low dry strength, slightly moist. similar to above material		Recover -HCI PP	y 18"/18" 0.0 TSF
<u>SS</u> 90	WR/16*				similar to above material except denser and possibly slight silicification		Recovery -HCI PP 3.90 TSF	/ 18"/18" 0.0 TSF, PP (bottom)
SS 91	WR/18"		_		similar to above material		Recovery -HCI PP	/ 18*/18* 2.5 TSF
\$\$ 92	7 9 15	145.1	145-		similar to above material		Recovery -HCI PP	:
					similar to above material except becoming less plastic, less moist, and medium stiff.			20"/18" xpanded 3.5 TSF
SS 93	17 23 29	142.3_	-		similar to above material except light olive green color. becoming mottled light olive and brown, appear		Recovery -HCI PP	+ 16*/16* + 4.5 TSF
SS 94	24 34 50/4"	141.6 141.3	-		burrowed, medium plasticity, stiff. Brown Poorly Graded sand (SP) mostly fine san cemented.	a, /	Recovery sample ex -HCI PP	10"/8" spanded +4.5 TSF
SS 95	34 50/2"		150		Light olive green Silt with sand (ML) mottled, si some fine sand to pebble size, mostly fines, dry, highly plastic with water added. similar to above material. becoming Dark Green	iff	Recovery -HCI PP	18"/18" 4.0 TSF
\$\$ %	23 21 25		-					
\$\$ 97	24 43 50/4*	134.6_ 134.1_	155-		Congarec Brown Well Graded Sand (SW) mostly quartz sz < 20% fines, dense, moist.	ind, f	Recovery -HCI PP -	16"/16" 4.5 TSF
							015 10	
SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHE					FINAL LOG		IOLE NO. F	B-1

-



	OF	OTE	CU		AT 1		PROJ	ECT				JOB	NO.	SHEET	NO.	HOLE NO.
	GE	UIE	:Сп			LOG			ARI	EA INVEST	IGATION				F 6	FB-2
SITE	_	_		_		C	OORDINAT	ES					ANGLE	FROM H		
BEGUN	Pı	COMPLE	CKAGI	ng Fac	cility		ī	<u></u>	N IAKE	79,102 E	54,920	SAMPLE	HAMMER I	V VETGRT/	ertica	I TOTAL DEPTH
	1-95	9-18				EEI				e B-57	6"		N//		ince	151.0
GROUN				. GROU	ND WAT		GED BY:	141	ODII	e D-3/	0	<u>_</u>		n.		151.0
	92.2			227.2								F.H	. Syms			
	TT					<u></u>		T	Π							
μ	🖌	N-VA	LUE	(SPT	>		z.	L L	ß						OTES	0.0
SAMP. TYPE AND NO.	Щc	WATE	R CC	NTEN	т %	코누	ELEVATION IN FEET	곱	GRAPHICS					- I W	ATER	LEVELS.
						BLOW		I	۲,	DESCRIF	PTION AND CL	ASSIF	ICATIO	DN IC	HARA	CTER OF
E S S	й †	ATT.	LTL	ITI2 :	%	~0		DEPTH IN	B						ABORA	ATORY
S		~~		~~ /				B							ESTI	NG I
	<u> </u>	20	40	<u>60 (</u>	<u>80</u>		292.2	<u> </u>	И	Hand ercav	ated from surface t	0 3 0'SP	SC type	Н	lole was	advanced
									11	material wit	ated from surface to the cobbles and road	aggrega	ic.	u d	sing mu	d rotary
ľ									10					a	5" drag	bit from 0.0'
								.	ľ					171	V" rods or shelb	were used
							289.2_		1					1 52	mpling	from 0.0' to
ST 1										Brown Sand dense to dea	I (SP)95% fine sand nse.	1, 5% fin	es, mediui	R	ecovery	[,] 24"/24"
								-						ba	ased on	raphics are descriptions
	Ш							5-		cimilar to al	ove material			1		e trimmings.
ST 2									· · ·	Similar to at				ĸ	ecovery	24"/24"
								-								
	Щ						285.4_	_	$\left - \right $		· · · · · · · · · · · · · · · · · · ·	• T !-1. • L				241/241
ST 3										similar to at	ove material excep	e Light o	rown coio		ecovery	24"/24"
				ļ				-								
CTC .							283.2_	-				4 b				245/245
ST 4										similar to at	oove material excep	t Drown (20101	r.	ecovery	24"/24"
	Ч							10-								
- CT							281.3_	-	÷:	Tan Silty Sa	nd (SM)			p.		22*/12*
ST 5														sle	ough in	tube
ST	H						279.3_	-		Reddish bro	wn and brown Clay	ey Sand	(SC) 70%		ecoverv	23*/24*
6									$\langle \lambda \rangle$		um sand, 30% fines					
									\square							
ST	H							15-	$\langle \rangle$	similar to at	ove material excep	t red bro	wn	R	ccoverv	24"/24"
ST 7		-									-					. '
									$\langle \rangle$	grades to gra	ay Sandy Clay					
ST 8	H					├		-						R	ecovery	0*/21*
8															,	-
		•				<u> </u>		r -		· / ···					•	
ST 9	П							-						R	ecovery	0"/12"
9	Ц							20-								
									$\langle \rangle$							
ST 10	П							-	$\langle A$					R	ecovery	16"/24"
10									$\langle \rangle$							
			1						$\langle A$					1		
ST 11	Ħ		-				1	-		Red Brown	Clayey Sand (SC)			R	ecovery	24*/24*
11									$\langle \rangle$							
							267.8_		<u> </u>	grades into l	Light purple Silty S	and (SM))			
ss = s	PLIT	SPOON;	: ST =	SHELB	: Y TUBE	SITE				*				но	LE NO.	
		NARY P								FINAL	LOG				F	B-2



GEOTECHNICAL L	OG	PROJE			HEET NO. HOLE NO.	
	.00		F		A INVESTIGATION	2 OF 6 FB-2
H N-VALUE (SPT) → V O WATER CONTENT % → C H O WATER CONTENT %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
ST 12		265.8	-		similar to above material	Recovery 15"/23"
ST 13					grades in to reddish brown Clayey Sand (SC) similar to above material	Recovery 17.5"/24"
ST 14			- 30		similar to above material	Recovery 21"/24"
		261.2_	-		similar to above material drilled to 35.0' without sampling	
			-			
ST 15			35-		Clayey Sand (SC)	Recovery 14"/24"
		255.6_	-		Drilled to 40.0' without sampling	
			-			
ST 16		250.8_	40		Brownish red Clayey Sand (SC) Drilled to 50.0' without sampling	Recovery 17"/17"
					Drined to 50.0 without sampling	Sampling intervals determined from adjacent CPT-2
			45-		e -11	
			, , , , , , , , , , , , , , , , , , , 			
ST 17		240.7	50 -		light brown and white Clayey Sand (SC)	Recovery 11*/18*
		240.7_			Drilled to 60.0' without sampling	
SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHE		I	I;	·	FINAL LOG	HOLE NO. FB-2



GEOTECHNICAL L	.OG	PROJE		ARE	1 1	EET NO. HOLE NO. 3 OF 6 FB-2
Martin N-VALUE (SPT) → S → S → S → ATT. LIMITS % 20 40 60 80	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
ST 18		230.2_	55		Light brown Sand (SP) Drilled to 75.0' without sampling	Recovery 10°/24°
ST 19'	·	215.8_	70 75 80		Red brown Clayey Sand (SC) with coarse quartz sand Drilled to 83.0' without sampling	Recovery 17"/24"
S = SPLIT SPOON; ST = SHELBY TUBE; S = STATIONARY PISTON; PB = PITCHE				<u> </u>	FINAL LOG	HOLE NO. FB-2

•



(G	EO	ГЕС	H	VIC.	AL I	.OG	PROJ		ARI	CA INVESTIGATION	JOB NO.	SHEET 4 C	NO. DF 6	HOLE NO. FB-2	
SAMP. TYPE AND ND. SAMPLE	SHUTLE	▲ N- O WA + AT 20	TER	CON IMI	ITENT	тх	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATIO		NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING		
ST 20								207.2	-		Red brown Clayey Sand (SC)		F	Recovery	24"/24"	
								207.2_	85 - -		Drilled to 100.0' without sampling					
									90- - -							
									95							
ST 21								191.2_	100-		Red Brown Clayey Sand (SC) fine t quartz sand. Drilled to 120.0' without sampling	o medium	R	ecovery	12*/12*	
		•••								NINNIN NINN				•		
SS = SPL		T SPO	W • e	T = 9	HEI DV	TIPE	SITE		110 -				но	LE NO.		
PS = SPL							'				FINAL LOG				B-2	

·



OFOTFOUNICAL	00	PROJ	ECT	-	·······	JOB NO.	SHEE	ET NO.	HOLE NO.		
GEOTECHNICAL I	JUG	<u>_</u>	F.	ARE	A INVESTIGATION		5	OF 6	FB-2		
H N-VALUE (SPT) → N-V	BLOW	Note It S Ite S Ite Ite NI Ite Ite S Ite Ite NI Ite Ite Ite Ite							NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING		
					Light brown Poorly Graded Sand w mostly fine sand. Drilled to 145.0' without sampling	rith Clay (SP-St		Recovery	7 16°/16°		
S = SPLIT SPOON; ST = SHELBY TUBE; S = STATIONARY PISTON; PB = PITCHE					FINAL LOG		H	IOLE NO.	B-2		

,



0	G	EOTE	CHN		AL L	.OG	PROJ		ARI	EA INVESTIGATION	JOB NO.		T NO. OF 6	HOLE NO. FB-2
SAMP. TYPE AND NO. SAMPLE		▲ N-VAL ○ WATER + ATT. 20 4	R CON	ITENT	° × 4	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATIO	N	NOTES WATER CHARA DRILL LABOR TESTI	ON: LEVELS, CTER OF ING AND ATORY NG
ST 23 ST 24 ST 25							141.2	140- - - 145 - - - - - - - - - - - - - - - - - -		Light brown Silt with Sand (ML) similar to above material similar to above material except yel color. Total depth of boring 151.0 feet	low brown in		Recovery Recovery	20"/24"
S = SPI		T SPOON; S	ST = S	HE1 BY	TURF	SITE						H H H H H H H H H H H H H H H H H H H	IOLE NO.	
		T SPOON; S IONARY PIS								FINAL LOG		[B-2



G	Fſ	TE	СН		AL L	00	PRC	JECT				JOB N		SHEET N		HOLE NO.
	L\ 									APSF		A	PSF	1 OF		FB-3
SITE			4 D .CT	F			ORDINA	IES	B 7	70.420 F	54000		ANGLE	FROM HO		TAL
BEGUN	7		APS		R					79439 E	54990 HOLE SIZE	SAMPLE H			90	TOTAL DEPTH
2/16/98	- 1	2/19/	- 1			es/S. Rodg				g 1500	3 7/8 in		40 lb/			154.5
GROUND EL				GROUN	ID WATE		GED BY:		11111	51300	5 //o m	A	40 10/	<u> 50 m</u>	!	134.3
287.2	2	♀ / ¥ /										R. Gelin	as/SA	IC		
						T		T	T				<u></u>			
P. TYPI ID NO. MPLE	0 + ,	N-VALU RECOV ATT. LI 20 4	/ERY	%	80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFICA	TION	CH DR LA	iarac Rilling	LEVELS, CTER OF G AND TORY
		-	i i	1	1		201.1				<u> </u>			Ha	nd aug	er to 6 feet to
		6 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7						5.						inte use 1st	erferen	underground ces, then 4 tricone for t or so
SS I SS		1 A		1 1 1 1	Ф : ,	3-14-15 9-26-21	279.7	/_	2	medium red:	ND (SC); medium gr medium dense; damp o medium grained	rayish brown ; subangular	and poorly	Sho	oe cam	e off in hole.
2 SS		1 5 1	1 1 2	lo		23-40-44	278.2			same as abov	e; medium reddish br	own; very de	ense; moi	st		
3 SS 4		4		1	Ō	14-25-13	276.7	/10-	H	same as abov	e; with some gray zor	nes; dense				
SS 5		• •	•	3 5 5	0	6-8-11	275.2	2			e; medium brownish ay zones; medium der		ne yellow	ish		
SS 6		i 🔺	4	i T T	¦ O	11-12-15	273.7]		SANDY LEA medium red;	N CLAY (CL); with very stiff; damp; med	clayey sand ium plasticit	interbeds y; sand	.		
SS 7			1 1	 	. (10-15-17	272.2			fraction is fin	e to medium grained e; with some yellowis					
SS 8		¦ ▲	t 4 4	1	0	10-14-17	270.7	ך		same as above	e; dark red; sand frac	tion is fine g	rained			
ss 9		i 🔺	•	• • • 1		8-16-13	269.2 267.7			medium brow	ND (SC); with sandy nish red; medium de l: fine to medium grai	nse; moist; s			bacco I	Road
SS 10			' O	1 1 1		6-10-13	266.2	20-		SANDY LEA medium red; fine to medium	N CLAY (CL); with very stiff; moist; med m grained	clayey sand ium plasticit	portions; y; sand is	5		
SS 11		1 1 ·	. A		Q	10-17-26	264.7			same as abov	e; medium brownish	red; hard				
SS 12		1 1	• • •		;	10-33-36	263.2]		no recovery						
SS 13	 0	1 1 1		0	1 1 2		261.7	25		moist; subang	ND (SC); medium re gular; poorly graded; (ddish brown fine to mediu	i; dense; um graine	ed .		
	J		. .	· · 0		36-50/5in	260.8	2		same as abov		h				
SS 15			4 1 1	; ;0		11-13-12	258.7	/			e; medium yellowish					
SS 16			1 	0		9-13-14	257.2	2 30-		reddish brown	D (SM); with clay; me n; medium dense; mo o medium grained ND (SC); medium ye	ist; subangul	lar; poorl	ано У		
SS 17			1		1	11-12-14	255.7		Ø	brownish red;	; medium dense; mois o medium grained	st; subangula	ir; poorly			
SS 18 SS			• • •	0		14-13-12	254.2	2	Ø	same as abov						
33 19		1	1	i I	r T		252.7	,			-					
		1	D	<u> </u>			<i>LJL</i> . 1	<u>'</u>	12						E NO.	
SS = SPLIT S PS = STATIC						SITE				FINAI	LLOG					B-3



GEO	DTECHN	NICAI	LOG	PROJE	ст		ADCE	JOB NO. APSF		TNO.	HOLE NO.
						T	APSF	Arst	14	OF 5	FB-3
	N-VALUE (SF RECOVERY ATT. LIMITS	%	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SSIFICATION			LEVELS, CTER OF IG AND ATORY
SS	20 40 0	<u>60 80</u>	21-16-14			/	same as above; medium brownish yell	low and yellowish			
20 SS		o ¦	16-18-17	251.2_	-	KA	brown SILTY SAND (SM): medium vellowi:	sh brown: dense:			
21		1 1		249.7	-		moist; subangular; poorly graded; fine	to medium grain	ed		
SS 22	1 1 1 1 1 1		2-2/24in		-		no recovery				
	1 1 1	1 1 1 i		247.2	-						
SS 23		0	14-20-19	241.2	40		same as above; with clay; medium bro brown and some yellowish brown; we	wnish red reddish	1		
SS		4 1 4 1	18-14-17	245.7_	-	$ \downarrow $	CLAYEY SAND (SC); medium reddi				
24			244.2	-	\square	wet; subangular; poorly graded; fine to	o medium grained				
S 5		24-20-17		-	\square	same as above; medium yellowish bro with few light gray zones	wn and brownish	red			
S	≜ O [19-14-13	242.7_	45-	KA	POORLY GRADED SAND WITH SI portions are silty sand; light brown to	LT (SP-SM); som	ie			
26		12-15-24	241.2_			brown; medium dense; wet; subangula	ar; poorly graded;	/ 1			
5S 27		12-13-24	239.7	-		CLAYEY SAND (SC); with silty sand brown; dense; wet; subangular; poorly	interbeds; mediu graded; fine to	m			
S 8		22-29-24		-		Medium grained with trace lower coar POORLY GRADED SAND WITH SI	se LT (SP-SM);				
sD		¦▲ ¦	40-31-34	238.2_	-		_ medium yellowish brown; very dense; \graded: medium to lower coarse grain	wet; angular; poo	orly		
9		0		236.7	50 -		no recovery			0.0	
SS 80			18-16-21	235.2_	-		CLAYEY SAND (SC); dark red; dens poorly graded; fine to lower coarse gra		r;	Dry Brar	icn
					- 55 -						
S I	A O		12-16-22		-		SILTY SAND (SM); medium reddish subangular; poorly graded; fine to med	brown; dense; we dium grained	ıt;	Driller or interval?	verdrilled (52').
S			19-20-24	228.7_	-		same as above; medium brown; fine to				
2	. ▲'O	- 1 1 - 1	12 17 18	227.2	60 -		grained same as above; medium brown and ye	Howich brown			
S 3		· · ·	16-17-18	225.7	-		same as above, meanin brown and ye				
S 4	∎ ▲ E	0	8-15-12		-	$\overline{\mathcal{N}}$	CLAYEY SAND (SC); medium yello light gray zones; medium dense; mois	wish brown with t; subangular; poo	orty		
S		, , , , ,	0 10-10-11	224.2_	-	\square	graded; very fine to fine grained same as above; wet; fine to medium g				
5	4 4 4 4	+ · ·		222.7_	•	14				Driller d	idn't clean o
	i ia i L A E	, O	- 15-12-16		65 -		same as above; medium brown; very f	ine to fine grainer		and took	spoon over
6S		• T	13-12-10	220.0			Salle as above, nicululi brown, very i		4	(13-16-1 count.	2) bad blow
SS 17	e 🔺	17-17-23		-		SILTY SAND (SM); medium brown; subangular; poorly graded; fine to me	dense; wet; dium grained				
s		20-22-24	218.5_	-		CLAYEY SAND (SC); medium reddi	ish brown; dense;	{			
8	A 0	26-19-13	217.0_	70-	A	wet; angular; well graded; fine to coar same as above	se graineu				
SS 19		20-17-13	216.0_ 215.5_	-	4	SILTY SAND (SM); light brown to m	edium brown; de	nse;			
SS 🔺	4 ! 1 :	5-6-7			$\overline{/}$	\wet: subangular: poorly graded; fine to CLAYEY SAND (SC); medium yello	o medium grained wish brown; medi	ium			
SS S		1 1 1 1	9-10-9	214.0_ 213.2_		H	dense; wet; subangular; poorly graded	; fine to medium	/		
4I 🔺	1 i 1 i	· · ·		213.2_ 212.5_	-		same as above; medium brown; moist graded; fine to upper coarse grained	; angular; well			
	ON; ST = SHE								1	HOLE NO	- FB-3
= STATIONA	RY PISTON; PI	B = PITCHE	R				FINAL LOG			I	<u> </u>



G	SEC	DTE	сні	NIC	AL L	.0G	PROJE	CT		1 1	EET NO. HOLE NO. OF 5 FB-3
SAMP. TYPE AND NO. SAMPLE	0 I + /	N-VALU RECOV ATT. LI	/ERY MITS	%	80	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
SS 42 SS 43		1	↓ ↓ ↓			8-7-5 8-6-8	211.0_ 209.5_			same as above; wet; subangular; poorly graded; fine to med grained same as above; med yellowish brown; fine to lower med grained same as above; fine to medium grained with some fine to	
SS 44 SS)	▲ - ▲	1 1 1 1	1 F F		9-11-10 6-9-13	208.0_ 207.6-	-		coarse grained layers no recovery same as above: fine to medium grained	Core catcher is good.
45 SS 46			; ; ; ; ; ; ;	1	0	3-9-8	206.9- 206.5- 205.0_	- 80 - -		SANDY LEAN CLAY (CL); It yellowish brown with some dk gray patches; very stiff; moist; med plasticity; sand variation is fine to med grained same as 79.2-79.6; two jars SANDY LEAN CLAY (CL); med yellowish brown; very	Bottom Tan Clay
SS 47 SS 48	-			8 4 1 1		3-5-11 4-6-16	203.5_	•		stiff; moist; med plasticity; sand fraction is tine to upper med grained SILTY SAND (SM); med yellowish brown; med dense; wet; subangular; poorly graded; fine to med grained POORLY GRADED SAND WITH SILT (SP-SM); light	
SS 49 SS)		0		- - - - - - - - - - - - - - - - - - -	10-13-23 19-24-32	202.0_ 200.5_	85 — - -		brown; medium dense; wet; subangular; poorly graded; <u>fine to upper medium grained</u> SILTY SAND (SM); light brown; dense; wet; subangular; poorly graded; fine to medium grained no recovery	Catcher is good.
50 SS 51			1 2 4 1 1 1		0	19-22-17	199.0_ 197.5_	-		POORLY GRADED SAND WITH SILT (SP-SM); light brown; dense; wet; subangular; poorly graded; fine to medium grained	Driller overdrilled
SS 52 SS 53		1 2 2 1	1 + - -	1 : : 1 }	0	2-3-3	196.0_	90 		SILTY SAND (SM); portions with clay; medium yellowish brown; medium dense; wet; subangular; poorly graded; fine to medium grained CLAYEY SAND (SC); medium yellowish brown; loose; wet; subangular; poorly graded; fine to medium grained	interval? (52')
SS 54 SS	•			0		4-2-5 9-12-20	194.5_ 193.0_	- - 95 —		same as above SILTY SAND (SM); portions are poorly graded sand with silt; medium brown; dense; wet; subangular; poorly graded;	-
55 SS 56)	1		1 1 1	8 6 7 7	9-21-26	191.5_	 -		fine to medium grained	Catcher is good.
SS 57 SS			1 1 1 1 4	1 1 1 1 1	Ф 	15-13-14 2-6-9	189.4_ 187.9_	- - 100		SILTY SAND (SM); light brown to medium brown; medium dense; wet; subangular; poorly graded; fine to medium grained CLAYEY SAND (SC); some portions are silty sand; medium brown; medium dense; wet; subangular; poorly	
58 SS 59	4		: : : :	8 9 9 8	0	6-7-12	186.4_ 184.4	-		poorly graded; fine to medium grained POORLY GRADED SAND WITH CLAY (SP-SC); some silty sand layers; med brown; med dense; wet; subangular; poorly graded; fine to lower cse grading down to fine to	-
SS 60 SS 61		1 1 1 1) - - - - - -	1		6-3-9 4-7-11	184.4	- - 105 -		med CLAYEY SAND (SC); med yellowish brown; med dense; wet; subangular; poorly graded: fine to med grained same as above; some thin poorly graded sand with clay layers; medium brown	
SS 62)	1 1 1 1		•		13-31-41	181.4_ 179.9_			no recovery	Catcher is good.
SS 63 SS 64		1 1 1 1 1 1		φ		14-30-44 17-22-29	177.9_	- - 110-		POORLY GRADED SAND WITH SILT (SP-SM); medium brown; very dense; wet; subangular; poorly graded; fine to medium grained same as above; with some silty sand and poorly graded sand with clay interbeds; light brown	Driller didn't clean out and took spoon over
SS 65 SS			t : : : :		 1	18-32-32	176.4_ 174.9_	-		same as above; light brown to medium brown; angular; medium grained] previous interval 65.7-67.2 ft. (13-16-12) bad blow count.
53 66 SS 67	> ▲	 		1 1 1	1 1 1	4-5-8	173.4_	-		poorly graded sand with silt layers; light brown to medium brown; medium dense; wet; angular; poorly graded; fine to lower coarse grained no recovery	Santee? Changed to metal
S = SPLIT S = STAT						SITE				FINAL LOG	HOLE NO. FB-3



	GE	0	TE	CHN		AL L	.0G	PROJE	СТ		APSF	JOB NO. APSF		et no. Of 5	HOLE NO. FB-3
SAMP. TYPE AND NO.		⊃R ⊦A	ECO\ TT. LI	JE (SP /ERY 9 MITS 9	%	80	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	FICATION		NOTES WATER CHARA DRILLIN LABOR/ TESTIN	LEVELS, CTER OF IG AND ATORY
SS 68 SS		1		1 1 1	1	0	8-14-23	171.9 ⁻ 170.4_	-		CLAYEY SAND (SC); light grayish bro brown; dense; moist; subangular; poorly grained; distinctive thin laminations same as above; medium yellowish brow	graded; fine	sh	catcher.	
69 SS		1	. (¦ ⊅ ▲	1	r 1 1	14-21-29	168.9_	-	$\langle \rangle$	gray; medium dense; fine to medium grass same as above; with shell fragments; de	ained	r;		
70 SS 71	0	: : :	1 1 1	• •	r • •		15-40-48	167.4_	120-	θ	well graded; fine to coarse grained same as above; medium yellowish brow brown; very dense; subangular; poorly g	n and reddish raded; very fine	to		
SS 72	0	: ; ;	: 		1 1 1 1	6 6 5 6	18-24-19	165.9_	-	4	fine grained SILTY SAND (SM); trace fine shell fra brownish yellow and light yellowish gra	gments; medium y; dense; wet;		Metal ca	tcher is good.
SS 73					22-32-39	164.4_ 162.9_	-		subangular: poorly graded; very fine to same as above; medium yellowish brow grained; trace upper medium	n; very dense; fi	ne				
SS 74					25-35-41	1 161.4			same as above; fine grained						
SS 75 SS								159.9_	-		no recovery POORLY GRADED SAND WITH SIL	r (SP-SM)		has two t	ange catcher eeth missing.
33 76 SS					23-30-38	158.4_	-		medium yellowish brown; very dense; w poorly graded; fine to medium grained SILTY SAND (SM): portions are poorly	et; subangular; graded sand wi	th				
77 SS 78		:	0		⊥▲	† : :	17-33-31	156.9_ 130 155.4_	130-		silt; medium yellowish brown; very den <u>poorly graded</u> ; fine to lower medium gra same as above; with thin orangish brown interbed; light gray; very fine to fine gra	n clayey sand	lar;		
78 SS 79		1		a	1 1 1	4 - #	19-21-26		-		same as above; few very thin light gray medium yellowish brown; dense; very fi	clay laminations;	;		
SS 80 SS		1					14-29-21 6-3-4	153.9_ 152.4_	- - 135-		same as above; with light gray limestom some clayey sand interbeds; fine to lowe limestone fragments to 0.5 inch diamete same as above; trace turritella shells; loc	r coarse grained	;		
33 81 SS 82				• • • •	1 1 1	т - - - -	6-6-10	150.9_ 149.4	-		fine grained CLAYEY SAND (SC); medium yellowi dense; wet; subangular; poorly graded; y grained	sh brown; mediu	ım		
SS 83		1	L	4 • •	8 1 1 1	· · ·	5-9-12		-	\overline{Z}	same as above; with turritella shells; ligi and yellowish gray; moist	nt yellowish brow	vn		
SS 84				:	•		7-9-11	147.0_ 145.5_	140-		same as above; trace shell and limestone medium yellowish brown and light gray	e fragments;			
SS 85		, , ,	•	. (: ¢	C C	8-12-16	144.0_	-	Ø	same as above same as above; with sandy lean clay inte				
SS 86 SS		, 4	: ; •	:	· ·	. (910-8-11	142.5_	-	A	angular; fine to lower coarse grained SANDY SILT (MH); medium yellowish	brown; very stil	ff;	Warley F	Lill .
87 SS	þ	4			- - - -		2-7-12	141.0_	-		wet; low plasticity; sand fraction is very no recovery	fine to fine grain	ned	Plastic or	ange catcher
88 SS 89				3-18-20	139.5_	-	$\left - \right $	no recovery			New cate several te				
SS 90 SS				13-8-17	138.0_ 136.5_	- 150-		SANDY LEAN CLAY (CL); silicified r dark yellowish brown and yellowish gra medium plasticity; sand fraction is very no recovery	v: verv stiff: moi	st:	off. New cate				
91 SS	- O <u>17-20</u>				17-20-38	135.0_			CLAYEY SAND (SC) medium reddist	brown and gray	vish		eth missing.		
92 SS 	SS 40-50/3ii					40-50/3in	133.6 133.5 132.7-	-		brown; very dense; moist; angular; poor lower coarse grained same as above; dark grayish green; suba umedium grained		, 	Congare	•	
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE PS = STATIONARY PISTON; PB = PITCHER							SITE	134.1		I	FINAL LOG		-1	HOLE NO.	B-3



GEOTECHNICAL LO	PROJE	ECT			SHEET NO. HOLE NO.
GEOTECHNICAL L			APSF	APSF	5 OF 5 FB-3
H O RECOVERY % d O RECOVERY %	BLOW COUNT ELEVATION IN FEET	DEPTH IN FT GRAPHICS	DESCRIPTION AND CLASS	SIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
20 40 60 80			same as above; with lean clay and silty	sand interbeds	Hole abandoned with
			same as above; with lean clay and silty (highly variable); medium reddish brov and dark grayish green; wet; angular, fi crained Total depth of boring 154.5 feet.	sand interbeds m, dark grayish re ne to lower coarse	Hole abandoned with with grout mix per 3QS.
SS = SPLIT SPOON; ST = SHELBY TUBE;	SITE				HOLE NO.
			FINAL LOG		FB-3
PS = STATIONARY PISTON; PB = PITCHER	1		LUAT TAA		1.0-5



	0		OTE	сні			06	PRC	JECT						NO.	SHEET		HOLE NO.
SITE									TES			APSF			APSF			FB-4
SILE				APSI	ជ			JONDINA	1120		N	79425 E	54865				90	
BEGUN	1		COMPLE				n_ _		DRILL				HOLE SIZE	SAMPLE	HAMMER	WEIGHT		TOTAL DEPTH
2/27	7/9	8	3/4/9	8		Grave	s/S. Rodg	ers		Fail	ing	g 1500	3 7/8 in		140 lb/	30 in		152.4
GROUI	_		DEPT		GROUN	WATE	R LOG	GED BY:										
2	85	.1	¥ / ¥ /											R. Gel	inas/SA	IC		
SAMP. TYPE AND NO.	SAMPLE		N-VALU RECOV ATT. LI	/ERY MITS	% %	30	BLOW COUNT	S82 ELEVATION IN FEET	CEDTH IN ET		GRAPHICS	DESC	RIPTION AND CL	ASSIFIC	CATION	N C D L		LEVELS, CTER OF G AND TORY
	Η		<u>20 4</u>	10 1	<u>60 8</u> '	<u>,</u>		205.	<u> </u>		\neg					H	land aug	er to 6 feet to
SS 1 SS 2 SS 3 SS					0	0	10-14-14 10-20-20 9-13-20 6-12-13	277.0 276. 274.0	6_ 1_	5-1-1-1-5-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1		dense; wet; so grained: lost : SANDY LEA medium plast same as abov	ND (SC); medium ro shoe in hole N CLAY (CL); med ticity; sand fraction is re	ded; fine t ium red; h fine to me	o medium ard; moist; edium graine		nterferen	down hole.
4			1 1	1 1		1	0.12.00	273.	1	Ĩ								
SS 5			▲	1 1 1	0	: : :	9-13-15	275.		ľ		CLAYEY SA yellowish bro	ND (SC); medium b wn; medium dense; r o medium grained	rownish re noist; suba	d and angular; poo	orly T	obacco I	Road
SS 6			▲ 		; 0	, 1 1	7-11-13			ł		same as abov	e; medium red					
SS 7				1 1 1	1	0	8-13-14	270.] '	5-4	$\langle \rangle$	same as abov	e; medium brownish	red; fine g	rained			
SS 8		0	▲	ł.	1 1 1	1 1 1	18-19-19	268.0		ł	β	same as abov	e; dense; wet; fine to	lower coa	rse grained			
SS				1 1 1	¦ O	1 1 1	2-14-19	267.	1_	ł	A	CLAYEY SA	ND WITH GRAVEI	(SC); me	dium reddis	sh se		
9 SS 10				1 1 1 1		0	3-12-16	265.0 264.	2	:0-		SANDY LEA maroon, yello medium plas	AN CLAY (CL); med owish brown, and tan ticity: sand fraction ye	ium reddis very stiff	h brown, moist; fine grained			
SS 11				1		;	6-9-14	262.0	6_	ļ		medium red, very stiff; mo	T (ML); with some cl maroon, medium gra bist; low plasticity; sar	y, and gra	yish yellow;			
SS 12				1 1	0	1	11-13-12	261.	1	ľ	Δ	light vellowis	AND (SC); medium y sh gray blebs; medium	n dense; w	rown with et, subangul	/ lar:		
SS 13 SS				1- .1	0	5 4 3	13-18-21	259.	6_ 2	:5-4		same as abov	d: fine to medium gra re; portions silty; dens	se; moist			• •	
14				: 1		ů		258.	1	Į								
SS 15			. –	1 1 1	1	۱.	10-16-15	256.	6	ł		same as abov	/e					
SS 16				1 1 1 1	- - -	1 1 1 1	8-10-14	255.	,	10	\mathbb{Z}	same as abov brown; medi	/e; medium yellowish um dense	brown an	d reddish			
SS 17				1 1 1	0	1 1 1	8-11-10			ł		same as abov	/e; medium reddish b	rown				
SS 18			E ▲ T	1 1 1	0	, , , ,	8-10-11	252.	8_		Ŋ		e; medium yellowish n and light gray zone		th some			
SS				ļo	 	: : :	11-11-14	251.	3_		β		e; medium reddish b					
19 SS = S	PL	TSP	OON; ST	= SHF		BE;				Y	Ζλ		· · · · · · · · · · · · · · · · · · ·			— н	OLE NO.	
1			ARY PIST									FINA	L LOG				F	'B-4



GEO	DTE	CHN		AL L	.OG	PROJE	ст		APSF JOB NO. S	HEET NO. 2 OF 4	HOLE NO. FB-4
SAMPLE + 0	N-VALU RECOV ATT. LI	ERY MITS	% %		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	CHAR DRILL	R LEVELS, ACTER OF ING AND RATORY
	<u>20 4</u>		<u>စ္ </u> ပ	30		249.8-		ZZ			······································
SS 20		י י י	Ŷ	1 1	9-14-16	247.8_	-	$\langle \rangle$	same as above; some portions are silty; medium yellowish brown; wet		
S	1 1	¦≜O	1	: 1 1	10-22-23		-		SILTY SAND (SM); medium reddish brown; dense; wet; subangular; poorly graded; fine to medium grained		
s	1	A	e 1	1 1	16-22-25	246.3_	-		same as above; few clayey portions; and streaks of light gray		
2 S		1 1	0	1 1	15-15-11	244.8_	40		CLAYEY SAND (SC); medium yellowish brown and tan	 	
3 S			1	0	12-16-17	243.3_	-	H	streaks; medium dense; wet; subangular; poorly graded; fine to medium grained same as above; portions silty; medium reddish brown;	_	
4		1 1	; (\$	12-15-16	241.8_	-	A	dense same as above		
S 5	1 4	0		1 1		240.3_	-	\square			
S 6	1 1	:			13-23-35	238.8_	45 -		POORLY GRADED SAND WITH CLAY (SP-SC); dark red; very dense; wet; subangular; poorly graded; fine to medium grained		
S 7	1 	0	1	. ▲	27-46-50	237.3	-		medium grained POORLY GRADED SAND (SP) trace clay; medium reddish brown; very dense; wet; subangular; poorly graded; fine to medium grained		
S 8	1		1	: :	20-22-22		-	И	POORLY GRADED SAND WITH CLAY (SP-SC); medium brown with reddish brown zones; dense; wet;		
S 9		þ	1		13-19-16	235.8_	- 50-	10	subangular, poorly graded; fine to upper medium grained same as above; medium brown to light brown		
			0	1	10-13-14	234.3_	-		CLAYEY SAND (SC); medium brown; medium dense;	Dry Br	anch
S 0		2	0	•		232.3	-		wet; subangular; poorly graded; fine to medium grained		anch
S 1				4 4	10-13-12	230.8	-		same as above; with a few sandy clay layers; some light gray blebs		
s		A O		, , ,	13-19-24	250.0	55-		same as above; with two thin grayish brown layers; dense		
2 S		. (O	1	16-16-20	228.8_	-	4	POORLY GRADED SAND (SP); trace clay; medium	_	
3 S		0		•	14-16-20	227.3_	-		brown; dense; wet; subangular; poorly graded; fine to upper medium grained POORLY GRADED SAND WITH CLAY (SP-SC);		
4		5		i I I	15-17-18	225.8_	-	Ц	medium grayish brown; dense; wet; subangular; poorly graded; fine to lower coarse grained POORLY GRADED SAND (SP); trace silt; medium	_	
S S	:	-	1 1	:	13-17-18	224.3_	60 —		brown; medium dense; wet; subangular; poorly graded; fine to medium grained		
S 6			φ	•	12-15-18		-		SILTY SAND (SM); medium brown; dense; wet; subangular; poorly graded; fine to medium grained	-1	
S	0		2 4 2	:	14-24-26	222.3_	-		CLAYEY SAND (SC); trace fine gravel; medium brown; dense; wet; subangular; well graded; fine to coarse grained	-	
7 S	: ; ;		• . •	,	31-22-34	220.8_	-	[4	POORLY GRADED SAND WITH SILT (SP-SM):		
8 S	• - •	0		3 - -	34-33-35	219.3_	65		medium yellowish brown; very dense; wet; subangular; poorly graded; fine to medium grained trace coarse same as above; one thin lean clay interbed		
9	1 5 1	T 4	1 1 1	• : :		217.8_	-	Ш			
S 0	: 0	· 🔺	: ; ;	í 5 1	28-31-19	216.1	-	\square	CLAYEY SAND (SC); medium yellowish brown; dense; wet; subrounded; well graded; fine to coarse grained		
S 1	≱	1 1	0	2 1	8-10-11	215.8-	- 70 –	Ø	POORLY GRADED SAND WITH CLAY (SP-SC); medium yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained	Л	
S	i i	1 , ,	• •	: - O	8-8-14	214.3_	-	\square	CLAYEY SAND (SC); with interbeds of poorly graded sand with clay; medium yellowish brown; medium dense;	Ĺ,	
2 S	*	, 1 1	0	, , ,	8-9-13	212.8_	-		wet; subangular; poorly graded; fine to medium grained same as above; with sandy clay interbeds LEAN CLAY WITH SAND (CL); a few clayey sand] - / Top Ta	n Clay
3	:	1 1 t	1 1	1 1 1	<u> </u>	211.3_	-		interbeds; med yellowish brown; very stiff; moist; med plasticity; sand is fine to med grained		
S CDUIT SDC			1 1	1	8-14-15 SITE				LEAN CLAY (CL); trace sand; medium yellowish gray and	HOLE N	0.
= SPLIT SPC = STATIONA									FINAL LOG		FB-4



C	GEOTE	CHN		AL L	OG	PROJE	ECT		APSF	JOB NO. APSF	í	et no. Of 4	HOLE NO. FB-4
SAMP. TYPE AND NO. SAMPLE		VERY 9	%		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	<u></u>		NOTES WATER	ON: LEVELS, CTER OF G AND NTORY
44 SS 45 SS 46		<u>40 6</u> 0		80	7-8-12	209.4_ 207.9_ 206.4_			yellowish brown; very stiff; moist; medi fraction is very fine grained same as above; abundant black Mn? sta grained no recovery	•		Bottom T Catcher I broken.	an Clay has one tooth
SS 47 SS 48		- - - - - - - - - -	0		5-8-12 6-11-10	203.8_ 202.3_	80-		CLAYEY SAND (SC); medium yellow dense; wet; subangular; poorly graded; 1 grained; trace coarse grains same as above; moist; very fine to fine g	fine to medium grained			
SS 49 50 SS 51	L	0			5-7-15 12-19-17 15-28-36	200.8_ 199.3_	85 -		same as above; light gray, tan, and yello fine to medium grained; black Mn? stair same as above; very light yellowish gree orange mottles; dense POORLY GRADED SAND WITH CL/ brown and reddish brown; very dense; w	ning en with medium AY (SP-SC); light vet; subangular;			
SS 52 SS 53	•	0	• • • • • •		22-27-24	197.8_ 196.3_ 194.8_	- 90-	N N N N	poorly graded: medium grained: trace he same as above with very light brown ba material same as above; some zones are borderlin dense	nd of cleaner, fine	er		
SS 54 SS 55 SS		· · · · · · · · · · · · · · · · · · ·			7-7-12	192.4_ 190.9_	- - 95-		CLAYEY SAND (SC); medium yellowi grayish brown; medium dense; wet; sub: graded: fine to medium grained POORLY GRADED SAND (SP); trace dense; wet; angular; poorly graded; med grained CLAYEY SAND (SC); light yellowish I dense; wet; subangular; poorly graded; f	angular; poorly silt; light brown; lium to coarse			
56 SS 57 SS 58	o				15-26-39	189.1_ 187.6_ 186.8_ 186.1_	-		POORLY GRADED SAND (SP); trace very dense; wet; subangular; poorly grac coarse grained; tip of spoon as above bu same as above CLAYEY SAND (SC); light yellowish I wet; subangular; poorly graded; fine to r	silt; light brown; ded; medium to at clayey brown: yery dense			
SS 59 SS 60 SS		0			21-48-45 18-44-51 20-35-36	184.5_ 183.8_ 182.3_	- 100		POORLY GRADED SAND (SP); trace very dense; wet; subangular; poorly grac coarse grained CLAYEY SAND (SC); medium brown; subangular; poorly graded; fine to mediu POORLY GRADED SAND (SP); trace very dense; wet; subangular; poorly grac	ded; medium to very dense; wet; um grained silt; light brown;	/		
61 SS 62 SS 63	-		· · · · · · · · · · · · · · ·		16-18-24 17-20-14	180.8_ 179.3_ 177.8_	- 105 -		coarse grading down to lower medium same as above; trace silt and gravel; me lower coarse grained same as above; trace clay; light brown to dense; medium to lower coarse grained POORLY GRADED SAND WITH SIL brown to medium brown; dense; wet; su graded; fine to lower coarse grained	o medium brown; T (SP-SM); light abangular; poorly	;	: ·	
SS 64 SS 65		: ; ; ; ;	1 1 1 1 1 1		1-2-3	176.3_ 174.5_ 173.8_	- 110-		CLAYEY SAND (SC); medium yellowi and dark gray; very loose; wet; subangu fine to lower coarse grained; Mn? staini same as above; loose SANDY FAT CLAY (CH); light brown black: Gray most with placticity; sand	lar; poorly graded ng ish gray, tan, and	1; 	Santee	
SS 66 SS		- - - - - - - - - - - - - - - - - - -	, , , , , ,		1-2-1/9in 7-7-9	172.1_ 171.5_	-		black; firm; moist; high plasticity; sand medium grained; Mn? staining same as above; jar #1; soft CLAYEY SAND (SC); light grayish bro yellowish brown; very loose; wet; suban graded; fine to medium grained	own, tan, and			
	IT SPOON; ST				SITE				FINAL LOG			HOLE NO.	<u>B-4</u>



	GEC	DTE	CHN	NIC A	AL L	.0G	PROJ	ECT		APSF JOB NO. APSF APSF	SHEET	ΓΝΟ. OF 4	HOLE NO. FB-4
SAMP. TYPE AND NO. SAMBLE	SAMPLE	N-VALU REÇOV ATT. LI	/ERY 9 MITS 9	% %	20	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION			LEVELS, CTER OF G AND TORY
67 SS 68 SS 69			<u>iu c</u> i i i	1 1 1		0 5-14-21 6-14-17	169.7- 168.2_ 167.1_			same as above; medium yellowish brown and yellowish gray: medium dense same as above; dense same as above; fine to lower coarse grained			
SS 70 SS 71)			1	1 1 1 1 1 1	11-19-21 16-16-16	166.7- 165.2_ 163.8_	120-		POORLY GRADED SAND WITH SLLT (SP-SM); medium yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained CLAYEY SAND (SC); trace shell material; medium yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained; black Mn? staining SILTY SAND (SM); med yellowish brown; dense; wet;			
SS 72 SS 73	0		0		5 []]]	13-18-19 27-34-34	163.4- 161.9_		N	SILTY SAIND (SM); med yellowish brown; dense; wet; Subangular; poorly graded; fine grained CLAYEY SAND (SC); med yellowish brown; dense; wet subangular; poorly graded; fine to med grained trace lower SILTY SAND (SM); med yellowish brown; dense; wet; subangular; poorly graded; v. fine to fine grained; trace			
SS 74 SS 75	0	1 1 1 1 1 4 4 4	1 1		1 1 1	21-32-34 19-30-23	160.4_ 158.9_ 157.4_	125 - - -		Mn? staining same as above; It vellowish brown: very dense same as above; thin It gray lean clay laminations; med vellowish brown same as above; fine to lower medium grained	- <u>/</u>		
SS 76 SS 77				0	4 8 4 4 4 5	8-8-10	157.4_ 155.9_ 154.4_	- - 130-		POORLY GRADED SAND WITH SILT (SP-SM); med brownish yellow with orange mottles; very dense; wet; subangular; poorly graded; fine to med grained; trace heavies same as above; It brownish white with med orange laminae; med dense; fine grained			
SS 78 SS 79			• 4 5 5 4 •	0	· · · · · · · · · · · · · · · · · · ·	8-7-4	152.9_	-		POORLY GRADED SAND WITH CLAY (SP-SC); It brownish white with It orangish brown zones; med dense; wet; subangular; poorly graded; fine grained; trace heavie and mica same as above; med yellowish brown with very It brown wisps; loose		at 130 fee heck OK	et depth
SS 80 SS 81			4 7	' (: : :	:	6-2-5 R/6in-11-19	149.9	135 -		CLAYEY SAND (SC); med yellowish brown; loose; wet; subangular; poorly graded; fine grained; trace heavies and mica same as above; slightly higher clay content and It green wisps; med dense; black wisps (Mn?); turritella fragments	5		
SS 82 SS 83			• • • •	•	; (7-10-13 11-13-16 4-9-18	146.9_ 145.4_	-		same as above; med reddish brown with It green wisps an dk reddish orange mottles same as above; with zones of poorly graded sand with cla med yellowish brown; dense; fine to med grained	<u>у;</u> А	at 138 fee heck OK	et depth
SS 84 SS 85		1 			0	9-35-28	143.9_ 142.4_	140 - -		same as above; med dense; fine grained; black mottles (Mn?); turritella casts same as above; very dense			11
SS 86 SS 87 ·	0			!	: ; ; ; ;	13-24-24	140.9_ 139.4_	- -145		FAT CLAY WITH SAND (CH); medium brownish yellow hard; wet; high plasticity; sand is fine grained; trace mica; trace heavies; shoe lost downhole same as above; very stiff; (material may be sloughed)	w; v :	Varley Hi	11
SS 88 SS 89	0			; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		7-50/4in 11-21-34	138.1_ 135.9_	-		same as above; very hard; refusal caused by a silicified nodule lodged in the shoe LEAN CLAY (CL); trace sand; with interlaminated sand; very light gray with orange mottles; hard; wet; medium plasticity; sand is fine grained; mottles are clayey sand	0	t 146 de ff adjuste	pth check ed to 146.2.
SS 90 SS 91			۵	 	8 8 8 1 1 1 1 1	9-13-18 31-50/4in	134.4_ 133.6_	150-	Z	Diasticity sand is the graned. moties are clayey sand no recovery; shoe lost downhole CLAYEY SAND (SC); with gravel; very dark grayish green; very dense; wet; subangular; well graded; fine to coarse grained: "green clay"			
- <u>SS</u> 92		2 1 1 1 1 1 1 1 1 1 1		2 1 1 1 1 1 1		-50/2in-	132.7_	-		no recovery Total depth of boring 152.4 feet.	g	rout mix	doned with per 3Q5.
SS = SPL S = STA						SITE				FINAL LOG	н		<u>B-4</u>



	20	:0	TE	പ		AL L	00	PRO	JECT				JOB I		SHEET		HOLE NO.
	36	0					-				APSF		A	PSF	<u>1</u> o		FB-5
SITE				4 DC1	P			ORDINA	IES	NI	70722 F	54077		ANGLE	FROMHO		IAL
BEGUN				APSI	r Drille	R					79233 E	HOLE SIZE	SAMPLE I	IAMMER V	WEIGHT/	90	TOTAL DEPTH
2/12/	98		/20/				es/A. Jacks	on	Fa	ilin	g 1500	3 7/8 in	1	40 lb/ 3	30 in		158.8
GROUND	_		DEPT		GROUN	ID WATE		GED BY:			5	0 //0 III					100.0
290).5		₽ / ¥ /										N. Kid	d/SAI	С		
				~					T								
SAMP. TYPE AND NO. SAMPIF	1			JE (S /ERY			BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIEIC		W	OTES (ATER	ON: LEVELS, CTER OF
SAMP		+ A1	T. LI	MITS	%		д <u>о</u>		DEPTI	GRAI	2200				D		G AND
		20		10	60	80		290.5									
		: : : : : : : : : : : : : : : : : : :		f a 1 1 4	1 1 1 1 1 1	1 2 7 4 1 7 4									ch	and aug leck for terferen	er to 6 feet to underground ces.
			0	4 9 2 2	: : :	1 1 1 1			5-								
SS 1			0	:	•	•	4-8-13				medium dens	ADED SAND (SP) ti e; dry; subangular; po	race clay; li orly graded	ght brown ; fine to	ц		
SS		1		≜ o	, , ,	1	12-18-27	283.0	╡.	77	medium_grain CLAYEY SA	ND (SC): medium br	ownish red	and light			
2 SS 3		1	•	: 	0		8-14-17	281.5]		brown; dense medium grain POORLY GF	; damp; subangular; p ned: black mottles (orr ADED SAND WITH	oorly grade ganic mater CLAY (SP es: dense: d	d; fine to <u>ial?)</u> P-SC); lamp;			
SS 4		:			0	•	12-17-22	280.0] -		CLAYEY SA and light brow	with light brown mottl worly graded; fine to r ND (SC); light yellow wn; dense; damp; suba	vish brown	light vello	ow, d;		
SS		•		. ▲	i o	1	16-28-26	278.5		\mathcal{D}		m grained e; medium red, light y	ellow, and	white; ver	у		
5 SS 6		1 1 1	•	1 1 1 1	0	• • •	10-13-17	277.0		Ø	dense same as abov	e; medium red; mediu	m dense; m	noist			
SS 7		i 1 1	*	* 1 1	0	F 4 1	12-16-15	275.5		\mathcal{D}	same as abov	e; damp		<u></u>			
SS 8		4		0		: : :	8-9-10	274.0 272.5			yellow zones;	WITH SAND (CL); ; very stiff; damp; med m grained	lium plastic	ity; sand i	s		
SS 9		14 1 1	•	, F ,	O	0	6-10-14	271.0			same as abov gravel	e, coarse fraction is fin			ie		
SS 10 SS		;		•	d O	1 - 1 1	7-10-8	269.5	20-			N CLAY (CL); medi					
11 SS 12	4	A		0	• • •	1	4-5-5	268.0			grained CLAYEY SA	m plasticity; sand frac ND (SC); medium re- worly graded; fine to r	d; loose; da	mp;	Т	obacco	Road
SS					1 1	0	4-7-9	266.5		\mathcal{A}		e; medium dense; with					
13_ 				•	•	, Ġ	7-10-11	⁻ 265.0	25-	4	grains SILTY SANI) (SM); medium red v	vith white a	nd yellow	<u></u>		
14 SS 15				 	i 1 1	0	8-9-12	263.5	-		subangular: r	arse purple mottles; m poorly graded; fine gra e; trace mica; no mott	ined	e, uamp;			
SS 16				1 1 1	: 4 1	0	8-9-11	262.0] .		and yellow; v	ace sand; medium red ery stiff; damp; mediu			je,		
SS 17		4 1 1 1		1 1		0	7-12-16	260.5 259.0	- 30-		fraction is fin same as abov	e grained e; low plasticity					
SS 18			•	- - - -	; 0 ; 0		7-11-12	257.5] .		red; med den med grained:	ND (SC); silty in places se; moist; subangular; top of the interval is s	poorly grad	ded; fine to	•		
SS 19					0	1 1 1	8-9-9	256.0	. 	R	vellowish bro	RADED SAND WITH own and reddish brown poorly graded; fine to r	n: med dens	e: damp:	u 		
SS = SPL	IT S	POO	N; ST	= SHE	LBY TU	BE;	SITE			<u> </u>					нс	LE NO.	•
PS = STA		NAR	PIST	ON; P	B = PIT	CHER					<u>FINA</u>	L LOG				<u> </u>	B-5



Ģ	GEOTE	CHNICAL	LOG	PROJE	ECT		APSF	OB NO. APSF	1	T NO. OF 5	HOLE NO. FB-5
SAMP. TYPE AND NO. SAMPLE	▲ N-VALU O RECOV + ATT. LI	YERY % MITS %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSI	FICATION			LEVELS, CTER OF G AND TORY
SS	20 4	0 60 80	8-10-11	264.6			same as above; light red, yellow, orange a	and white; mois	st	.	
20 SS	*		8-11-11	254.5_	-		same as above	<u> </u>			
21 SS 22	A	0	13-13-12	253.0_	-	Y	same as above; but clayey in places and n sand fraction	nore fine graine	ed		
SS	.▲		10-10-13	251.5_	-	H	same as above; clayey in places				
23 SS 24		φ	7-10-11	250.0_	40		same as above; clayey in places; trace mic	a			
SS 25	*	¢	11-10-11	248.5_		ľ	same as above; fine to medium grained				
SS 26		0	9-10-11	247.0_ 245.5_	-		same as above				
SS 27	A A		9-12-12	245.5	45	Ø	same as above				
SS 28 SS			12-16-21	242.5_	-		CLAYEY SAND (SC); medium red, yeld with white mottles; dense; wet; subangula fine to medium grained POORLY GRADED SAND WITH CLAY	r; poorly grade	d;		
35 29 SS		0	12-13-15	241.0_	- 50 —		medium red and yellow with white mottle subangular: poorly graded; fine to medium CLAYEY SAND (SC): medium red brow	s; dense; wet; n grained vnish vellow, a	nd		
30 SS		0	13-17-18	239.5_	-	\mathcal{A}	white; medium dense; wet; subangular; po to medium grained same as above; with white wisps; dense	oorly graded; fi	ne		
31 SS 32		• 0	17-20-21	238.0_	-		POORLY GRADED SAND WITH CLA medium brownish yellow with dark brown	n wisps and wh	ite		
SS 33		▲ 0	17-20-24	236.5_ 235.0_	- 55 -	1	wisps; dense; wet; subangular; poorly gra- medium grained same as above; medium red with brownis				
SS 34			16-22-30	233.5		8	same as above; medium red and reddish y dense; few flattened quartz pebbles			D	-1
SS 35 SS		0	20-19-22	232.0_	_	V	POORLY GRADED SAND (SP) trace cla yellow with red and orange zones and wh wet: subangular: poorly graded; fine to m POORLY GRADED SAND WITH CLA	ite wisps; dense edium grained	e;	Dry Bran	cn
36 SS	▲ ¦	φ	9-9-9	230.5_	60 -	Ŋ	medium red with brownish yellow zones; <u>subangular</u> ; poorly graded: medium grain CLAYEY SAND (SC); medium brownish yellow with dark brown wisps and white v	dense; wet; ed i yellow and			
37 SS 38		φ	8-11-14	229.0_	-	\mathcal{I}	dense; wet; subangular; poorly graded; fir grained same as above; less clayey in places; med	e to medium			
SS 39		0	8-16-15	227.5_ 226.0_	-	Ø	yellow with light brown zones POORLY GRADED SAND WITH CLAY in places; medium yellowish brown with dense; wet; subangular; poorly graded; fir	white wisps;	/ey		
SS 40	-		15-22-29	220.0	65. - -	I	grained same as above; medium reddish yellow; v Mn? pellets	ery dense; blac			
SS 41 SS	1		19-24-30 22-30-31	223.0_	-		POORLY GRADED SAND (SP) trace clip places; medium reddish yellow; very dens subangular; poorly graded; medium grain occasional coarse grains	e; wet;			
42 SS 43			24-28-31	221.5_	-	R	same as above, brownish yellow POORLY GRADED SAND WITH CLAY medium red; very dense; wet; subangular;	(SP-SC);			
43 SS 44	1 1 2		20-21-22	220.0_	70 -	H	medium grained with occasional coarse g same as above; dense; fine to medium gra	rains			
SS 45	1		18-17-26	218.5_ 217.0_	-		CLAYEY SAND (SC); med red with mer bands of sand trace clay; dense; wet; suba graded; fine to med grained	l brownish yell ngular; poorly	ow		
SS 46			19-21-19	217.0_	-		POORLY GRADED SAND (SP) trace cl brownish yellow, and it red; dense; wet; s	ay; It brown, It ubangular; poo	orly		. <u>-</u>
	•	= SHELBY TUBE; ON; PB = PITCHER	SITE				FINAL LOG			HOLE NO.	B-5



-

	GEOTECHNI		06	PROJ	СТ		······································	JOB NO.			HOLE NO.
	JEOTECHNI						APSF	APSF	3	OF 5	FB-5
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60	80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND TORY
SS 47	20 40 00		17-29-32			Ī	graded: fine to med grained POORLY GRADED SAND WITH CLA	AY (SP-SC); mea			ell out of the the ground.
SS		0	18-20-22	214.0_	-	H	reddish brown, It brown, and brownish ; wet: subangular: poorly graded; fine to r WELL GRADED SAND (SW) trace cla	med grained	_/		•
48 SS	▲ 0	1	12-13-15	212.5_	-		reddish brown; dense; wet; subrounded; to coarse grained	well graded; find	/		
49 SS	A (D I	10-11-12	211.0_	- 80 —		same as above; med dense POORLY GRADED SAND (SP) trace of	clay; It brown fev	w It		
50 SS	↓ φ	1 1 1	10-10-10	209.5_	- 00		brownish yellow zones; med dense; wet poorly graded; fine to med grained and top of interval; fine to cse grained at bot	sitly more clay at	г		
51 SS		lo	2-1-2	208.0_	-	И	black Mn? pellets POORLY GRADED SAND WITH CLA (SP-SC); It brown with It yellowish brown	AY AND GRAV	- //		
52 SS			5-7-10	206.5_	-		dense; wet; subrounded; well graded; fin gravel size: some zones less clayey; blac SILTY SAND (SM); it yellowish brown	:k Mn? pellets ; very loose; wet;		Top Tan	Clay
53 SS		÷	7-8-10	205.0_	85-		subangular; poorly graded; fine grained LEAN CLAY (CL) trace sand; it brown orange sand stringers; very stiff; wet; mo	ish vellow with	_/	•	·
54 SS			6-8-9	203.5_	-		interlaminated orange fine sand same as above; sand stringers are dk bro pellets				
55 SS		- ф	7-12-17	202.0_	-		same as above; with sand and interbedd sand is fine to coarse grained: black Mn POORLY GRADED SAND (SP) trace	? pellets clay; It brown; m	ed	Bottom T	an Clay
56 SS		1	21-27-30	200.5_	90-		dense; wet; subangular; poorly graded; i same as above; very dense	tine to med grain	ed		
57 SS			38-50/5in	199.0_ 198.1_	-		same as above; with a band of clayey sa	nd			
58 SS		0	50-50/4in	196.7	-		same as above; very It brown; trace hear	vy minerals			
			27-38-35	170.7	- 95 —		same as above; with a zone of poorly gr	aded sand with cl	lay		
60 SS	0		22-33-35	194.5_	_	R	POORLY GRADED SAND WITH CLA with very It brown zone at top; very den	Y (SP-SC); It re	ed lar:		
61 SS	0 ▲	1 1 1	20-22-34	193.0_	-	H	poorly graded: fine to med grained same as above; clayey in places; med red		- 1		
62 SS		ů,	25-28-37	191.5_	-	B	same as above; med red grades into It be bottom of interval	rown zone at			
63 SS	O	A,	39-36-41	190.0_	100-	И	POORLY GRADED SAND (SP) trace of with a lt red band; very dense; wet; suba	clay; med brown			
64 SS		i C	7-11-17	188.5_	-		graded: med grained CLAYEY SAND (SC), some zones less yellowish brown with white wisps; med	clayey; It			
65 SS 66		D	21-24-33	187.0_	-	H	subangular; fine to coarse grained POORLY GRADED SAND WITH CL/ brownish yellow; very dense; wet; subar	AY (SP-SC); It			
66 SS ⁷ 67			8-18-33	185.5_	- 105	-4	graded: fine to med grained: black Mn? POORLY GRADED SAND (SP) trace of dense; wet; subangular; poorly graded; f	wisps clay: It brown: ve	ed;	•	
SS 68	0		27-43-50	184.0_	-		black Mn? pellets same as above; without black pellets				
58 SS 69	0	Å	34-40-40	182.5_	_		same as above; with occasional coarse g	grains; trace heav	ries		
SS 70	0	i a	28-41-42	181.0_			same as above				
SS 71	0		33-42-50	179.5_	-		same as above; with sporadic clay pods	<u></u> ,,,			
SS 72		ф -	18-18-18	178.0_	-	R	POORLY GRADED SAND WITH CLA brownish yellow clay stringers; It brown	AY (SP-SC), and and it yellow:	lt		
SS			12-34-42	176.5_	-	X	dense; wet: subangular: poorly graded CLAYEY SAND (SC), with less clayey		in		
	IT SPOON; ST = SHELBY TIONARY PISTON; PB =		SITE			<u>x : / 1</u>	FINAL LOG			HOLE NO.	B-5
13-31A					·						



Ģ	GEOTECHNIC	AL LOG	PROJE	ECT		APSF	JOB NO. APSF	1	et no. of 5	HOLE NO. FB-5
SAMP. TYPE AND NO. SAMPLE	+ ATT. LIMITS %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	IFICATION			LEVELS, CTER OF G AND TORY
73 SS		30 19-19-17	175.0-		K/	sand zone at top of interval; It brown, It is and red; very dense; wet; subangular; po	prownish yellow orly graded; fine	, сю Г		
55 74 SS 75		4-21-31	173.5_ 173.0_ 172.8	-		med grained: few It yellow clay balls POORLY GRADED SAND WITH CLA and trace clay zones; med yellowish brow with It yellow clay wisns; dense; wet: sul	Y (SP-SC), clay vn and lt brown pangular: poorly	/ey	Santee	
SS	0	25-44-37	172.0-	_		graded; fine to med grained; black Mn? r same as above; very dense SANDY FAT CLAY (CH); dk brown; ha	nottles			
76 SS		0 7-12-22	170.5_	120-	И	plasticity POORLY GRADED SAND (SP) trace c	lay; It brown; ve			
77 SS 78		0 14-24-40	169.0_	-	2	dense: wet: subangular; poorly graded; fi same as above; occasional coarse sand POORLY GRADED SAND WITH CLA yellowish brown with It yellow clay lamin	Y (SP-SC); mec nae; dense; wet;	/_		
SS 79	0	19-49-50/41		_		subangular; poorly graded; fine to med g lter colored and med grained at bottom o SILTY SAND (SM); It brown and It yelle	<u>f interval</u> owish brown wi	ī.		
SS 80	Φ	21-33-48	166.2_ 164.5_	125-		white wisps; very dense; wet; subangular <u>line grained; black Mn? wisps</u> POORLY GRADED SAND (SP) trace c becoming orange brown near the bottom	; poorly graded; lay; very It brow of interval; very			
SS 81		24-44-50	163.0_	-		dense; wet; subangular; poorly graded; fi clay content increases sltly with depth same as above: trace silt: It brown and it	ne to med grain	ed;		
SS 82		40-35-39	161.5	-		with it yellow clay laminae; some zones of silt same as above; trace clay; fine to med gr	contain sltly mo	re		
SS 83	Φ	12-40-50		130-		same as above; occasional clay stringers; heavies	fine grained; tra	ace		
SS 84	0	28-33-50	160.0_ 158.5_	-		same as above; trace silt: occasional blac same as above; with It brown and white of yellow clay laminae; trace mica; top 0.2 d sand; borderline with silt	clayey bands and ft is clean It brow	f lt wn		
SS 85		47-48-45	157.0	-		same as above; no white zone and no bro	own sand			
SS 86	0	31-38-50		-		same as above; It brown clean sand at ve	ry top of interva	1		
SS 87		26-29-28 0 8-3-7	155.5_ 154.0_	135-		POORLY GRADED SAND WITH SILT yellowish brown with It brown zones; ver subangular; poorly graded; fine to med g	rv dense: wet:	n? _		
SS 88 SS		1/3in-1/6in-2/	9in 152.5_	-		<u>pellets: trace mica</u> CLAYEY SAND (SC), becomes less cla of interval; med yellowish brown with It mottles; loose; wet; subangular; poorly g	greenish brown	om /		
89 SS 90	4 2 4 5 5 5 8 4 4	W R /9in-6/3in		- 140-		In the second se	ack Mn? pellets ed dense			
SS 91		0 7-13-15	149.5_	-		same as above; white wisps				
SS 92		0 4-11-13	148.0_ 146.5_	-		same as above; with It greenish gray lamincreases with depth	inae; clay conter	nt		
SS 93		⁽¹⁾ 7-10-12	[40.5_ [45.0_	- 145		same as above				
SS 94		5-8-8	143.0_	-	Ø	POORLY GRADED SAND WITH CLA brown with med yellow clay balls; med d subangular: poorly graded; fine to med g CLAYEY SAND (SC); med brownish ye	lense; wet; rained	VD.	2/18/98 •	vater level is
SS 95		WR/8in-11-1	8 142.0_	_	A	loose; wet; subangular; poorly graded; fin heavy minerals same as above; interbedded clay with sam	ne grained; trace	;	@ 75-78	bls.
SS 96		7-10-14	。 140.5_	- 150		brown; med dense; fine to med grained				
SS 97			139.0	-		same as above; zones of interbedded It be clay and sandy fat clay				
SS 98 SS		WR/6in-10-1	4 137.5_	-		SANDY FAT CLAY (CH); med brownis greenish yellow mottles; very stiff; wet; H sand fraction is fine grained: trace heavy same as above; with interlaminated oran	nigh plasticity; minerals		Warley H	
55 99	i transformation transformation transformation		136.0_	-	Ø	reddish brown with lt greenish gray lamin fraction is fine to coarse grained	nations; hard; sa	ınd		
	T SPOON: ST = SHELBY TUE TIONARY PISTON: PB = PITC	. 1	L1	L	<u>k / 1</u>	FINAL LOG			HOLE NO.	B-5



		PROJ	ECT	·····	JOB NO.	SHE	ET NO.	HOLE NO.
(GEOTECHNICAL LO		11-	APSF	APSF	5	OF 5	FB-5
SAMP. TYPE AND NO. SAMPLE		BLOW COUNT ELEVATION IN FEET	DEPTH IN FT	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND NTORY
SS 100 SS 101 SS 102	A O	2-15-23 i6-17-19 134.5 133.8 133.0 131.9 131.7		CLAYEY SAND (SC), interlaminated brownish yellow with It greenish gray la wet; subangular; poorly graded; fine to part of interval has thicker clay laminae POORLY GRADED SAND WITH CL. brown; dense; wet; subangular; poorly g grained with occasional coarse SANDY FAT CLAY (CH); med reddis greenish gray clay laminae; hard; wet; h line to coarse grained same as above; very hard CLAYEY SAND (SC); med greenish b orange; very dense; wet; subrounded; p to coarse grained (probable congaree). 1 Total depth of boring 158.8 feet.	AY (SP-SC); It graded; fine to me h yellow with It high plasticity (Cl	ed H);	Congaree Hole aba grout mix	ndoned with c per 3Q5.
	T SPOON; ST = SHELBY TUBE; TIONARY PISTON; PB = PITCHER	SITE		FINAL LOG			HOLE NO.	<u>B-5</u>



6	ΞE	OTE	CH	NIC	AL L	.OG	PROJE	ECT		APSF			3 NO. APSF			HOLE NO. FB-6
SITE							OORDINATI	ES		AFSF				FROM HC		
			APS							79179 E					90	
BEGUN		COMPLE	. 1								HOLE SIZE	SAMPLE	HAMMER		FALL	TOTAL DEPTH
2/2/9		2/11/		Grav		lackson &	E. Plush GED BY:	Fa	iling	g 1500	3 7/8 in		140 lb/	30 in		158.3
GROUND		↓ ↓ ↓ ↓		GROON	DVVATE		GED BT:					N. Ki	idd/SAIC	r		
	<u>.,</u>	¥ /		<u> </u>					T			11. 16		<u> </u>		
SAMP. TYPE AND NO. SAMPLE	1	N-VALU RECOV ATT. LI	/ERY	% %	80	BLOW COUNT	291.7 291.7	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFI	CATION	W CI DI LA	HARA(RILLIN	LEVELS, CTER OF G AND ATORY
	ł —	1			!									Ha	and aug	ger to 6 feet to inderground
SS 1 SS 2 SS SS 3 SS 4 SS 5 SS 6 SS 7 SS 8 SS 10 SS 11 SS 12 SS 13 SS 14			· · · · · · · · · · · · · · · · · · ·		0	12-14-12 9-15-16 12-15-18 9-14-11 13-11-12 7-7-10 6-13-18 6-9-10 6-7-8 6-20-21 5-8-10 5-8-10 5-8-10 5-7-9 6-6-6 5-10-12 8-14-11	282.2_ 280.7_ 279.2_ 277.7_ 276.2_ 274.7_ 273.2_ 271.7_ 270.2_ 268.7_ 265.7_ 265.7_ 264.2_ 262.7_	5- - - - - - - - - - - - - - - - - - -		medium dens medium grain same as abov damp same as abov same as abov same as abov same as abov same as abov SANDY LEA damp; low pl grained no recovery LEAN CLAY red; very stiff gravelly clay medium grain CLAYEY SA subangular. p same as abov grain size SILT WITH S medium gray sand fraction same as abov same as abov	e; dark red with light e; medium red with light e; no mottles; mediur e asticity; sand fraction ((CL) trace sand and ; moist; medium plas (<0.1 foot thick); san red (<0.1 foot thick);	borly grad brown m ight yellow n dense yellowish is fine to trace grav ticity; thir d fraction ed; medium medium piff; dry; lo mica	ed; fine to ottles; dense; w mottles w mottles red; very sti medium layer of is fine to m dense; mo gray with w plasticity; le lean clay ellow with	int Dr fet ; iff; rel To	terferen	ut from 6 to 8
15 SS 16 SS	-		1 1 1 1 1	0	 	10-10-12 8-11-11	261.2_ 259.7_	30-		white mottles graded; fine t thick) at top of same as abov	'e	st; subang lug of yell	gular; poorly ow clay (<0.	.1'		
55 17 SS 18			0		 	10-32-25	258.2_ 256.7	-			e; with light red zone	es; very de	nse			
SS = SPLI	T SP	оон: st	= She	LBY TU	BE;	SITE								но	DLE NO. T	Ъ-6
PS = STA	TION	ARY PIST	ON; P	8 = PIT(CHER					FINA	LLOG				<u> </u>	D-0



Junc 20 B C Coverser % C C C Coverser % C C C C C C C C C C C C C C C C C C C	(GEOTECHNICAL L	.0G	PROJE	СТ	<u></u>	APSF	JOB NO. APSF	SHEET	NO. DF 5	HOLE NO. FB-6
20 40 60 80 1.39 same as above; medium red, medium dense 28 A O 1215:12 233.1 Provide Ly CRADED SAND WITH CLAY (SF-SC); medium red, medium brownich yellow ellow enditions from the medium provide yellow. 28 A O 1215:12 233.1 Provide Ly CRADED SAND WITH CLAY (SF-SC); medium red, medium dense 281 A O 1215:12 233.1 Provide Ly CRADED SAND WITH SLT (SF-SC); hight end sine tabove; fight low makes; modium set above; fight low makes; modium set above; fight red sine fight low makes; modium set above; fight red sine fight low makes; modium set above; fight red sine fight low makes; modium set above; fight red sine fight low makes; modium set above; fight red sine fight low makes; modium set above; fight red sine fight low makes; modium set above; fight red sine fight low makes; some modium set and some fight low makes; modium set above; fight red sine fight low makes; some modium set and some; fight low makes; some modium set above; fight red and some; fight low makes; some modium set and some; fight low makes; fight medium set above; fight red and some; fight low makes; fight medium set above; fight red and some; fight low makes; fight medium set above; fight red and some; fight	AMP. TYPE AND NO. SAMPLE	O RECOVERY %	BLOW COUNT	ELEVATION IN FEET	EPTH IN FT	GRAPHICS .				NOTES WATER CHARA DRILLIN ABOR	ON: LEVELS, CTER OF IG AND ATORY
SS A O 13-3 SS A O 123-57 255.2 FORE Y GRADED SAND WITH CLAY (SF-SC); Inclum req with white and mean whome shower the pellow means and whow means and whow means and whow means and	S I	20 40 60 80			0				-	FESTIN	G
SS A O [215:52] 253.7. POORLY GRADED SAND WITH CLAY (SPSC). SS A O [217:23] 253.7. POORLY GRADED SAND WITH CLAY (SPSC). [gada red, dense: model method particle SS A O [121:53] 252.2. 40 POORLY GRADED SAND WITH CLAY (SPSC). [gada red, dense: model. SS A O [121:53] 250.7. POORLY GRADED SAND WITH CLAY (SPSC). [gada red, dense.	SS 19		1-3-9	255.2	-	\square	same as above; medium red; medium de	nse			
SS C (217.30) S2.2. 40 Use to modium gating SS C (217.7.3) 222.2. 40 Hold Charles Chard Charles Charles Charles Charles Charles Charles C			12-15-12		-	Ø	medium red with white and medium bro	whish vellow			
SS 40 IC 17:720 40 POORLY GRADED SAND WITH SLT (55:75), light red and singular poorly graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading downwald be light your graded, fine to red grading down graded, fine to red g			12-17-20]	-	8	\fine to medium grained	ar; poorly graded	" <u> </u>		
SS A Q 121517 2507.1 Incluing Particles, Do CAND WITH CLAY (SPSC); Hight red grading forwards in graded, fing: to making mained stame as above; Hight each with yellow (desc; moisi) SS A Q 121517 249.2. 45 SS A Q 121517 249.2. 45 SS A Q 111517 244.7. 131616 131617 SS A Q 111517 244.7. 131616 243.2. 131616 SS A Q 131616 243.2. 131616 243.2. 131616 SS A Q 1316176 243.2. 1316176 1316176 243.2. 1316176 SS A Q 1316176 243.2. 1316176 1316176 1316176 1316176 <td< td=""><td></td><td>, t I</td><td>12-17-20</td><td>_</td><td>40</td><td></td><td>red; dense; moist; subangular; poorly gra</td><td>ided; fine to</td><td></td><td></td><td></td></td<>		, t I	12-17-20	_	40		red; dense; moist; subangular; poorly gra	ided; fine to			
24 0 101311 249.2 111317 249.2 111317 249.2 111317 249.2 111317 249.2 111317 249.2 111317 249.2 111317 249.2 111317 249.2 111317 244.7 111317 244.7 111317 244.7 111317 244.7 111317 244.7 111317 244.7 111317 244.7 111317 244.7 111317 244.7 111117 244.7 111117 244.7 111117 244.7 111117 244.7 111117 244.7 111117 244.7 111117 244.7 111117 244.7 111117 243.2 111117 243.2 111117 243.2 111117 243.2 111117 243.2 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 111117 1111111117 11111111117 11111117	SS		12-15-19	250.7_	-	8	red grading downward to light vellow; d	ense; moist;	ıt 🗌		
SS A O 12:15:16 247.7 45 same as above; light brown sign; medium dense; some motile and some light brown with white and dark brown motile and some light brown with white and some light brown with white and dark brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with white and dark brown motile and some light brown with whith and and brown with whit	SS		10-13-13	249.2_	-	8	subangular: poorly graded: fine to mediu	im grained			
26 262,2 40 same is above; fight yellow with white and dark boom mocease with light boom is light boom is light boom and the bottom of the interval; becomes due and boom is light boom and the bottom of the interval; becomes due and boom is light boom and the bottom of the interval; becomes due and boom is light boom and the bottom of the interval; becomes due and boom is light boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom of the interval; becomes due and boom and the bottom is defined. 35 0 15:15:20 23:1.2 60 CLAYEY SAND (SC); modium reliand; black More palate: modium grained; and the bottom is defined. Dry Branch 35 0 15:15:20 23:2.2 23:1.2 60 CLAYEY SAND (SC); modium reliand; defined; and defined; medium grained; medium grained; and the same as above; light readia bottom and red; subrounded; medium grained; medium grained; fight boro	SS		12-15-16	247.7_	-	8	same as above; light brownish yellow wi	th red zones; der	nse		
SS A O 11:10:10 244.7. 2005 Star wet: 2005 Star wet: 27 A O 13:16:16 243.2. 243.2. 243.2. 244.7. 243.2. 28 A O 12:13:18 241.7. 50 50 50 50 50 50 50 50 50 51 50 51 50 51 50 51 50 51 <td>SS</td> <td>Δ Φ</td> <td>11-13-17</td> <td>246.2_</td> <td>45-</td> <td>H</td> <td>same as above; light yellow with white a mottles and some light brown wisps; me</td> <td>nd dark brown dium dense; som</td> <td>ne</td> <td></td> <td></td>	SS	Δ Φ	11-13-17	246.2_	45-	H	same as above; light yellow with white a mottles and some light brown wisps; me	nd dark brown dium dense; som	ne		
SS A Q 13-16-16 243.2 CLAYEY SAND (SC); light red with an orange band; dense; wet; subangular; poorly graded; fire to medium SS A Q 12-13-18 241.7 50 Same as above; light red with an orange; band; dense; wet; subangular; poorly graded; fire to medium SS A Q 12-13-18 240.2 same as above; light red and orange; very dense; wet; medium grained same as above; light red and orange; very dense; wet; medium grained SS A Q 12-13-18 240.2 same as above; light red and orange; very dense; wet; medium grained poorly grade, fire to medium grained SS A Q 15-26-24 233.7 same as above; light red with an orange band; dense Dry Branch SS A Q 75-12 232.7 same as above; light red with an orange; a tubangular; poorly graded; fire to medium grained, a tubangular; p	SS		11-19-19	244.7_	-	8	zones are wet same as above: becomes clavey sand at t	he bottom of the			
SS A G 12:13-18 241.7. 50 same as above; noist 29 A G 13:18-18 240.2. same as above; light red 30 O A 21:28-38 can be as above; light red 31 O A 223.7.1 same as above; light red medium grained. 32 O A 223.7.1 235.7. same as above; light red pedium grained. back Mn2 peliets 33 A O 15:20:24 232.7. can be as above; light red pedium grained. back Mn2 peliets Dry Branch 35 A O 15:13:20 232.7. cLAYEY SAND (SC); medium yellow; medium dense; wet; subangular; poorty graded; fine to medium grained; a thin; mostly medium grained; and thin; mostly medium gr	SS		13-16-16	243.2_	-	\mathcal{I}	CLAYEY SAND (SC); light red with an	orange band;			
SS 0 15-18-18 240.2 same as above; light red SS 21-28-38 238.7 same as above; light red modium grained SS 21-28-38 237.2 same as above; light red modium grained SS 0 A 28-37-31 237.2 same as above; light red poorty graded: medium grained. Dawn, yeel or seven; wet; subangular; poorty graded; fine to modium grained; a thin, mostly medium yellow; wet or subangular; poorty graded; fine to modium grained; a thin, mostly medium grained; a thin, mostly	SS		12-13-18	241.7_	50-	\mathcal{D}	grained				
SS 31 31 32 32 32 33 32 33 33 34 34 35 35 35 37 36 36 35 36 36 35 37 37 37 37 37 37 37 37 37 37 37 37 37	SS		15-18-18	240.2_	1	\mathcal{A}	same as above; light red				
237.2 237.2 237.2 237.2 235.7 medium redish yellow, very dense, wet; subangular; Dry Branch 33 0 15-20-24 235.7 235.7 same as above; light brown; dense Dry Branch 33 0 15-15-20 234.2 same as above; medium yellow; stated: maching the to medium grained; a thin, mostly medium grained	SS	0 🔺	21-28-38	238.7_	_	\mathcal{A}	same as above; light red and orange; ver	y dense; wet;			
SS A O 15-26-24 235.7. coordy graded: medium grained: black Mn2 pellets Dry Branch SS SS A O 15-15-20 234.2. same as above; light brown; dense Dry Branch SS SS O 7-9-12 232.7. cLAYEY SAND (SC); medium yellow; medium dense; wet; subangular, poorly graded; fine to medium grained; at insore clayey than the rest. wet; subangular, poorly graded; fine to medium grained; at insore clayey than the rest. SS A O 12-16-30 229.7. same as above; medium brown and brownish yellow SS A O 12-23-33 228.2. same as above; medium brown and brownish red; very dense SS A O 19-23-33 228.2. same as above; medium brown and brownish red; very dense; wet; subangular; poorly graded; fine to medium grained SS A O 19-26-34 223.7. 65 same as above; medium brown and brownish red; very dense; wet; subangular; poorly graded fine to medium grained SS A O 19-26-34 223.7. 60 POORLY GRADED SAND WITH SLT (SP-SM); light reddish brown with yellow and white wips; very dense; subangular; poorly graded; fine to medium grained SS A O 12-21-24 220.7. 70 POORLY GRADED SAND WITH SLT (SP-SM); light pol(A) GRADED SAN	SS	0	28-37-31	237.2_	55-	4	POORLY GRADED SAND WITH CLA	Y (SP-SC);			
SS 34 35 \bigcirc	SS	▲ O	15-20-24	235.7_	-	8	poorly graded; medium grained; black M	in? pellets	I	Ory Brai	nch
SS 33 35 36 36 36 36 36 37 37 37 37 37 37 37 37 37 37 37 37 37	SS		15-15-20	234.2_	-	H	same as above; medium yellowish brown	n			
SS 0 16-10-12 231.2 Construction thin, mostly medium grained, zone is more clayey than the rest. same as above; medium brownish yellow SS 37 0 12-16-30 229.7 same as above; medium brown and brownish yellow SS 37 0 19-25-35 228.2 same as above; medium brown and brownish red; very dense 38 0 23-28-29 226.7 65 same as above; light reddish brown and red; subrounded; medium grained 39 0 36-41-50 225.2 same as above; redium brown and red; subrounded; medium grained 38 0 19-26-34 223.7 POORLY GRADED SAND WITH SILT (SP-SM); light reddish brown and red; very dense; wet; subangular, poorly graded. fine to medium grained 38 0 17-19-20 220.7 POORLY GRADED SAND WITH SILT (SP-SM); light reddish brown with yellow and white wisps; very dense; wet; subangular, poorly graded. fine to medium grained 38 0 13-17-17 219.2 70 POORLY GRADED SAND WITH SILT (SP-SM); light reddish brown; trace heavy minerals 38 0 13-17-17 219.2 70 POORLY GRADED SAND WITH SILT (SP-SM); light reddish brown; trace heavy minerals 38 0 11-13-18 217.7 P	SS		7-9-12	232.7_	_	H	CLAYEY SAND (SC); medium yellow;	medium dense;			
SS 37 \bigcirc 229.7 same as above; dense37 38 \bigcirc $12-16-30$ 228.2 same as above; medium brown and brownish red; very dense38 39 \bigcirc $19-23-35$ 228.2 same as above; medium brown and brownish red; very dense38 39 39 \bigcirc $23-28-29$ 225.2 same as above; light reddish brown and red; subrounded; medium grained35 40 \bigcirc $23-28-29$ 225.2 \odot same as above; light reddish brown and red; very dense; wet; subangular; poorly graded: fine to medium grained35 41 41 41 \bigcirc $19-26-34$ 222.2 $?00$ $POORLY GRADED SAND WITH CLAY (SP-SC); lightreddish brown with lejlow and white wisps; very dense;wet; subangular; poorly graded; fine to medium grained3542\bigcirc17-19-20220.7?00POORLY GRADED SAND WITH CLAY (SP-SC); lightreddish brown with light brown zones; dense; wet;subangular; poorly graded; fine to medium grained354143\bigcirc12-21-24220.7?00POORLY GRADED SAND WITH CLAY (SP-SC); lightyellowish brown; dense; wet; subangular; poorly graded;fine to medium grained354455\bigcirc13-17-17219.2?10-21-24?10-21-243544\bigcirc11-13-18217.7POORLY GRADED SAND WITH SILT (SP-SM); light3544\bigcirc11-13-18217.7POORLY GRADED SAND WITH SILT (SP-SM); light3544\bigcirc11-13-18217.7POORLY GRADED SAND WITH SILT (SP-SM); light3544\bigcirc<$			16-10-12	231.2_	60	\mathcal{A}	thin, mostly medium grained, zone is mo	ore clayey than th	he		
SS 38 AO 19-25-35 228.2 same as above; medium brown and brownish red; very dense SS 39 0 23-28-29 226.7 65 same as above; medium brown and brown and red; subrounded; medium grained SS 36-41-50 225.2 65 same as above; Tight reddish brown and red; very dense; wet; subangular; poorly graded; fine to medium grained SS AO 19-26-34 223.7 POORLY GRADED SAND WITH CLAY (SP-SC); light reddish brown with yellow and white wisps; very dense; wet; subangular; poorly graded; fine to medium grained SS AO 19-26-34 222.2 70 POORLY GRADED SAND WITH SILT (SP-SM); light redish brown with yellow and white wisps; very dense; wet; subangular; poorly graded; fine to medium grained SS AO 12-21-24 220.7 70 POORLY GRADED SAND WITH CLAY (SP-SC); light yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained SS AO 13-17-17 219.2 70 POORLY GRADED SAND WITH CLAY (SP-SC); light yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained SS AO 13-17-17 219.2 Fine to medium grained same as above; light brown; trace heavy minerals SS AO 11-13-18 217.7 POORLY GRADED SAND WITH S		▲ O	12-16-30	229.7_	_	\mathcal{A}		v			
38 A O 23-28-29 226.7. 65 same as above; Tight reddish brown and red; subrounded; medium grained 39 O 36-41-50 225.2. POORLY GRADED SAND WITH CLAY (SP-SC); light reddish brown and red; subangular; poorly graded; fine to medium grained 40 9 19-26-34 223.7. POORLY GRADED SAND WITH CLAY (SP-SC); light reddish brown and red; subangular; poorly graded; fine to medium grained 5S 40 19-26-34 222.2. POORLY GRADED SAND WITH SILT (SP-SM); light reddish brown with yellow and white wisps; very dense; wet; subangular; poorly graded; fine to medium grained 41 A O 17-19-20 220.7. POORLY GRADED SAND (SP) trace silt; medium grained SS A O 12-21-24 220.7. 70 POORLY GRADED SAND WITH CLAY (SP-SC); light reddish brown; trace silt; medium grained SS A O 12-21-24 220.7. 70 POORLY GRADED SAND WITH CLAY (SP-SC); light subangular; poorly graded; fine to medium grained SS A O 13-17-17 219.2. POORLY GRADED SAND WITH SILT (SP-SM); light SS A O 11-13-18 217.7. POORLY GRADED SAND WITH SILT (SP-SM); light SS A O 13-17-17 219.2. Site POORLY GRADED SAND WITH SILT (SP		≜ O	19-25-35	228.2_	-	A		vnish red; very			
39 Image: Signature of the system of the	38		23-28-29	226.7	65	A	same as above, light reddish brown and	red; subrounded;	;	•• • •	. .
40 IP-26-34 223.7. reddish brown and red; very dense; wet; subangular; poorly 41 IP-26-34 222.2. POORLY GRADED SAND WITH SILT (SP-SM); light 5S IP-26-34 222.2. 70 POORLY GRADED SAND WITH SILT (SP-SM); light 42 IP-21-24 220.7. POORLY GRADED SAND (SP) trace sitt, medium grained 5S IP-21-24 220.7. POORLY GRADED SAND (SP) trace sitt, medium grained 5S IP-21-24 220.7. POORLY GRADED SAND (SP) trace sitt, medium grained 5S IP-21-24 219.2. POORLY GRADED SAND WITH CLAY (SP-SC), light 5S IP-21-24 219.2. Same as above; light brown; trace heavy minerals 5S IP-21-24 217.7. POORLY GRADED SAND WITH SILT (SP-SM); light SS IP-21-24 Same as above; light brown; trace heavy minerals HOLE NO. SS IP-21-24 SITE HOLE NO.	39		36-41-50	225.2_	_	4	POORLY GRADED SAND WITH CLA	Y (SP-SC); ligh	u,		
41 Image: Constraint of the constraint	40	Åo	19-26-34	223.7_	-	1	graded: fine to medium grained POORLY GRADED SAND WITH SILT	(SP-SM); light			
42 A O 12-21-24 220.7 yellowish brown with light brown zones; dense; wet; subangular; poorly graded; fine to medium grained SS A O 12-21-24 219.2 POORLY GRADED SAND WITH CLAY (SP-SC); light yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained SS A O 13-17-17 219.2 Same as above; light brown; trace heavy minerals SS A O 11-13-18 217.7 POORLY GRADED SAND WITH SILT (SP-SM); light SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	41		17-19-20	222.2_	70 -		reddish brown with yellow and white wi wet: subangular: poorly graded; fine to r POORLY GRADED SAND (SP) trace s	sps; very dense; nedium grained silt; medium	1		
43 A O 13-17-17 219.2 yellowish brown; dense; wet; subangular; poorly graded; fine to medium grained SS A O 13-17-17 217.7 same as above; light brown; trace heavy minerals SS SS II-13-18 217.7 POORLY GRADED SAND WITH SILT (SP-SM); light SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	42	▲ O		220.7_	-07		yellowish brown with light brown zones subangular; poorly graded; fine to mediu POORLY GRADED SAND WITH CLA	; dense; wet; <u>im grained</u> Y (SP-SC); ligh	nt		
44 O 11-13-18 217.7_ POORLY GRADED SAND WITH SILT (SP-SM); light SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	43			219.2_	_	8	yellowish brown; dense; wet; subangulas fine to medium grained	r; poorly graded;	;		
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	44			217.7_	-	1					
PS = STATIONARY PISTON; PB = PITCHER FINAL LOG FB-0	SS = SPL						FINAL LOG				



C	GEC	DTE	ЕСН	NIC	AL L	OG	PROJ	ECT		APSF	JOB NO. APSF		ET NO. OF 5	HOLE NO. FB-6
				······				l						
AND NO.	0	RECO	LUE (S DVERY LIMITS	%		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF IG AND ATORY
45		20	40	60	<u>80</u>		216.2-			yellowish brown; dense; wet; subangula	ir; poorly graded	:	<u> </u>	
45 SS 46					0	13-15-16	210.2-	-		Same as above				
S 7		l.	1 1 1	¦0 ¦	1	10-11-12	213.2	-		POORLY GRADED SAND (SP) trace brown; medium dense; wet; subangular fine to medium grained	; poorly graded;			
S 8		1		1 1 1	0	9-7-8	211.7_	-	\square	CLAYEY SAND (SC); med brownish y band at bottom and black band in middl	le of interval; me	ed of		
S 9	•	1 1 1	:	1	· (2-2-6	210.2_	80-		dense; wet; subangular; poorly graded; black band and black pellets are Mn?; 0 yellow sandy clay near middle of intery same as above; with interbedded clay; le	al			
S D		▲	1	1	¢ -	5-7-14	208.7	-		SILTY SAND (SM); with interbedded I with dk reddish brown bands; clay is mu brown; med dense; wet; subangular; por	ean clay; It brow ed yellow and v.	lt		
S I				1	0	8-12-16	207.2_	-		Med grained LEAN CLAY (CL); few sand stringers; yellow with black and dark reddish brow	light brownish		Top Tan	Clay
S 2		₩ 1 1				7-10-12	205.7	85-		damp: medium plasticity: sand fraction same as above; sandy, with interbedded moist: sand fraction is fine to very coars	is fine grained silt and sand;			
S 3		▲ ¦	•	1 1 1		4-8-13	204.2	-		same as above			Bottom '	Fan Clay
S 4		▲	1 : :	1 1 1	÷.	6-11-19	202.7_	-		CLAYEY SAND (SC); light brown wit brown and black mottles; medium dense poorly graded; fine to medium grained;	e: wet: subangula	ar:		
S 5				8 3 1	ф !	7-8-16	201.2	90-		as above same as above; with interbedded sand, o	clay, and silty sar	nd		
5		ι (ι ι		: ; ,) ; }	12-20-25	199.7	-	B	POORLY GRADED SAND WITH CL/ brown; dense; wet; subangular; poorly g medium grained	graded; fine to			
S 7		, 1 ,	 	¢ ,	! !	11-16-24	198.2_	-	8	same as above; silty in places; light and yellow	medium browni	sh		
S 8)	1 1 1	L.		T 1 F	18-25-18	196.7_	- 95		no recovery				
S 9				• O		10-15-17	195.2_	- 95		CLAYEY SAND (SC); with silty zones interlaminated clays; medium brown wi yellow zones and thin black wisps; dens poorly graded: fine to medium grained;	th light brownish	h ar;		
S 0		: ; ;	▲ :	1 *	;	13-18-17	193.7_	-		POORLY GRADED SAND WITH CL/ sand in places; light brownish yellow; d subangular; poorly graded; fine to medi	AY (SP-SC); clay	yey		
S L S		•	•	•	0	9-6-7	192.2_	-	Å	same as above; light brown with white v CLAYEY SAND (SC); It yellowish bro	wisps			
2 S				•		8-11-13	190.7_	100-	$\langle \rangle$	with It yellow zones and white wisps; m subangular: poorly graded; fine to med same as above; with bands of sandy clay	ed dense; wet; grained			
3 S			а • •	: :	0	13-15-17	189.2_	-	K	coarse grained POORLY GRADED SAND WITH CLA zones of clayey sand; light brown with l	AY (SP-SC); wit	h		
4 S		4 1 4)	22-30-40	187.7_		ß	white wisps; dense; wet; subangular; po medium grained same as above; very dense; trace coarse	orly graded; fine	^{: 10}		
5 S 6					1 1	25-25-24	186.2_	105	H	WELL GRADED SAND WITH CLAY brown; dense; wet; subangular; well gra	(SW-SC); light aded; fine to			• •
5 S 7		• • •	○ ▲	4 1 4		16-19-26	184.7_	-		medium grained with some coarse sand <u>Mn? pellets</u> same as above; with light yellow and w	and gravel; blac		-	
, S 8			D ¦▲	1 1 1	: 1 1	29-25-19	183.2_	-		R clayey same as above; light brown; subrounded grained with some fine gravel			-	
s S 9			1 1 1	i C) i 1 1	14-12-17	181.7_	110-		POORLY GRADED SAND WITH CL. vellowish and It brown with black and 1	t yellow clay			
S 0		; ; ;		 -	Ŷ	23-24-24	180.2_	-		stringers; med dense; wet; subangular; j to med grained with trace cse and fine g are Mn?	gravel; black wis	ne ps		
S I		1		: :		10-18-15	178.7_	-		same as above; with dark brown mottle heavy minerals CLAYEY SAND (SC); with sandy clay	zones: very ligh			
	IT SPC		T = SHE		JBE;		177.2_			brown with light orange and purple wis	ps; dense; wet;	ſ	HOLE NO	
			STON; F							FINAL LOG				<u>-B-6</u>



<u> </u>	GEC	DTE	CHN		AL L	OG	PROJ		······	APSF	APSF	4	ET NO. OF 5	HOLE NO. FB-6
AND NO.		N-VALU RECOV ATT. LII	ERY 9	%		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	FICATION			LEVELS, CTER OF IG AND ATORY
SS		20 4	<u>0 6</u>	50	80	3-5-12				subangular; well graded; fine to upper co	arse grained wi	th /	Santee	
72 SS 73				 	0	6-10-9	175.7_ 175.4 [_] 174.5_			trace gravel SANDY LEAN CLAY (CL); with interb It green, and It purple; very stiff; wet; low Vine to medium grained.	edded silt; It gra v plasticity; sand	iy,		
SS 74		• • •		≜	φ ¦	5-21-45	174.2~ 172.7_	-	Ø	same as above POORLY GRADED SAND WITH CLA brown with it brown mottles: med dense:	Y (SP-SC); med wet: subangula			
SS 75				10 1 1	1	14-19-15	171.2	120-	0	poorly graded; fine to med grained same as above; med to coarse grained tra same as above; grading to orange and ye	ce gravel llow: very dense	- 11 1		
IS 76				р '	- - - -	5-10-22	169.7	-	\square	same as above; it brown few dark brown	wisps; dense; w	/ith		
S 7		1 			1 1 1	15-29-33	168.2	-	8	CLAYEY SAND (SC); med brownish ye subangular; poorly graded; fine to med g coarse sand and fine gravel	rained, trace			
S 8		4 		• • •		20-24-24	166.7_	- 125 -	8	POORLY GRADED SAND WITH CLA yellowish red with It brown mottles; very subangular, poorly graded; fine grained	Y (SP-SC); med dense; wet;	<u>'</u>		
S 9 S		1 1 1 1 1		י י י ▲	t 1	12-21-36 -21-5075.5i	165.2_	-	\square	same as above; med reddish yellow; dens CLAYEY SAND (SC); some places are : greenish yellow with med reddish yellow dense: wet; subangular; poorly graded; fi	speckles; very			
0 S	>	F 1		1 1 1 4		30-27-28	163.7_	-		dense; wet; subangular; poorly graded; fi POORLY GRADED SAND (SP); with c It greenish brown, It brown, and It yellow subangular; poorly graded; fine grained;	: verv dense: we	et: I	Catcher t	eeth broker
1 S 2		•		1 - - -	Ă,	22-36-42	162.2_	- 130-	R	Vine to med grained no recovery POORLY GRADED SAND WITH CLA brownish yellow; very dense; wet; subang	Y (SP-SC); mec	/ 1	011.	
2 S 3	C	4 1 1 1		ь Б. Г.	1 1 1	23-23-36	160.7_	-	1	graded: fine grained: trace heavies no recovery	, p		Catcher t off.	eeth broker
S 4		t : t :	04		1	25-27-31	159.2_ 157.7_	-	B	same as above; with white bands and ora	nge wisps			
S 5		1 1 1 1	0		1 1 . 1	22-33-38	156.2_	- 135 -	8	same as above; It brownish yellow with It	brown zones			
S 6					, ; ;	20-27-37	155.0_ 154.7-	-		same as above; trace mica	ined			
S 7 S						26-24-32	153.5_ 153.2 ⁻	-		same as above; It yellowish brown with li orange wisps: fine grained; trace mica an same as above: It brown: fine to med grain	t brown zones a d heavy minera ined	nd Is		
8 S			 	E 8 1 1		7-9-6	151.7_	- 140-	8	same as above; med yellowish brown; me grained; black Mn? mottles same as above	ed dense, the			
9 S		1 1 1	•	1 1 1		4-5-6	150.2_	-		CLAYEY SAND (SC); med yellowish bi wisps; med dense; wet; subangular; poor	rown with It gre	en		
0 S 1	•		1 1 1	1 1 1	; (4-6-6	148.7_ 148.0_	-		property grand dense, we, soonigara, poor POORLY GRADED SAND (SP) trace si dense; wet; subangular: poorly graded; fi CLAYEY SAND (SC); med yellowish bu	It: It brown: me	d ed		
s 2	.			1 1 1	; (WR/1.8in	147.2_	145 -		CLAYEY SAND (SC); med yellowish bu interlaminated It green wisps; med dense <u>poorly graded: fine grained: black Mn? p</u> same as above; some zones of clay with s	own with ; wet; subangula ellets	ar;		
S 3		 	 	 	(4-5-9	145.7_ 145.0_ 144.2_	-		same as above; some zones of clay with s several silicified turritella casts same as above; medium dense; no shells same as above; med brown; abundant she		-7		
S 4			5 1 1	1 1 1	1	R/4in-2-10-	144.2_ 143.1_ 142.7-	-		silicified casts same as above; few clay pods; dense	ided orange san	/ d:	Warley H	till
S 5		1 1 1	1 1 1	 	1	42-42-46	141.2	150-	Ű	hard; wet; high plasticity; sand fraction is	with green mottl fine grained; turritella	les;	÷	
S 6 S	,	1 1 1	4 4 1	.▲	1	0-27-50/4i 18-30-34	139.9_			fragments present: silicified chips same as above; it brownish yellow and ye green zones: very hard; sand fraction fine same as above; interbedded it green silt;	ellowish red wit grained	h h		
3 7 S				1 1 1	1	6-16-24	138.2_	-		to med grained with some coarse same as above; with interlaminated sand; red, greenish brown, and brown with ora	med vellowish	- 1		
8		1 1 1	I.			<u> </u>	136.7			turritella fragments				
= SPU	T SPC	ON; ST	= SHEL ON; PB	BY TU		SITE	_			FINAL LOG			HOLE NO.	B-6



		PROJEC	ст	<u></u>	JOB NO.	SHEET NO. HOLE NO.
G	EOTECHNICAL LO	G		APSF	APSF	5 OF 5 FB-6
		BLOW COUNT ELEVATION IN FEET	DEPTH IN FT GRAPHICS	DESCRIPTION AND CLASS	SIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
SS 99 55 100 85 101	O 20-3	0-50/4in 		same as above; hard same as above; sandy; very hard; sand f coarse grained WELL GRADED SAND WITH CLAY sand in places; it brown; very dense; we graded: fine to coarse grained; congares no recovery; congaree? Total depth of boring 158.3 feet.		Hole abandoned with grout mix per 3Q5.
	I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I					
		•••		· • • •		
	POON: ST = SHELBY TUBE: NARY PISTON: PB = PITCHER	SITE		FINAL LOG		HOLE NO. FB-6



GEOTECHNICAL LOG APSF APSF APSF FORMER (MOM FORMONIAL MADE FROM FORMONIAL MADE FROM FORMONIAL MADE FROM FORMONIAL MADE FROM FORMONIAL MADE FROM FORMATION MADE FROM FORMATION M		C		TECU			00	PRO.	IECT				JOB I		SHEET N	0.	HOLE NO.
APSI N 79520 E 54847 90 222/98 222398 Cravez5. Rodgers Failing 1500 3 7/8 in 140 Ib/ 30 in 156.0 2000 222398 Cravez5. Rodgers Failing 1500 3 7/8 in 140 Ib/ 30 in 156.0 283.8 \$ Convertion Coductors R. Celinas/SAIC R. Celinas/SAIC 283.8 \$ Image: Coductor Coductors Total Mice 2000 Biol R. Celinas/SAIC 283.8 \$ Image: Coductors Total Mice 2000 Biol R. Celinas/SAIC 283.8 \$ Image: Coductors Total Mice 2000 Biol R. Celinas/SAIC 283.8 \$ Image: Coductors Total Mice 2000 Biol R. Celinas/SAIC 29 40 50 Example Coductors R. Celinas/SAIC R. Celinas/SAIC 39 Image: Coductors Total Mice 2000 Biol S. Coductors R. Celinas/SAIC R. Celinas/SAIC 30 Image: Coductors Total Mice 2000 Biol S. Coductors R. Celinas/SAIC R. Celinas/SAIC 316 20 Image: Coductors <td></td> <td><u> </u></td> <td>ישל</td> <td>JIECH</td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td> <td>APSF</td> <td></td> <td> A</td> <td>-</td> <td></td> <td></td> <td></td>		<u> </u>	ישל	JIECH		<u> </u>					APSF		A	-			
BEGUN COMPLETED FORLIER Formers/R hogen (Factore L) Portule reprint (C) Portule reprint (C) Portule (C) <	SITE						cc	ORDINA	TES					ANGLE			TAL
222.098 Craves5. Rodgers Failing 1500 3.78 in 140 lb/ 30 in 156.0 GROUND GL DEPTHEL. GOOLND WATER LOGGED BY: R. Gelinas/SAIC R. Gelinas/SAIC 23.8 4 NVALUE (SPT) B S B B NTES CONE MATER LEVELS, MATER LEVELS, MATER LEVELS, B B B B NTES CONE MATER LEVELS, MATER LEVELS, B NTES CONE MATER LEVELS, MATER LEVELS, B NTES CONE														<u> </u>			
CENCURE L. DEPTIVEL OPCOUND WATER LOGGED BY: 283.8 283.8 2 A N-VALUE (SPT) C R. Gelinas/SAIC W A W A S C					DRILLER			1								ALL	
283.8 2 1 R. Gelinas/SAIC W A. N-VALUE (SPT) O. RECOVERY % S S DESCRIPTION AND CLASSIFICATION NOTES ON: WATER LEVELS, Charles and S 20 40 50 23.8 S DESCRIPTION AND CLASSIFICATION Notes on: WATER LEVELS, Charles and S 30 20 40 50 23.8 C DESCRIPTION AND CLASSIFICATION Hard auger to 6 feet to check for undergroung interference. 316 20 40 50 50 23.8 C CLAYEY SAND (SC); medium meddlift brown, loose; motis: blankaguit; pootly grader, fine to medium grained sone accounty Shoe lost down hole. 316 316 27.8.8 0 1119116 SANDY LEAN CLAY (CL), medium meddlift brown, loose; motis: blankaguit; pootly grader, fine to medium grained sone accounty Shoe lost down hole. 317 27.8.8 10 27.8.8 10 SANDY LEAN CLAY (CL), medium meddlift brown, loose; motis: blankaguit; pootly grader, fine to medium grained sone accounty Shoe lost down hole. 33 4 0 1713717 26.8.8 15 Sandy Lean CLAY (CL), medium meddlift brown, loose; mare a blow; winden weddwit, protonc, medium eddlift brown and grame						Grave	es/S. Rodg		Fa	ilin	g 1500	3 7/8 in	1	.40 lb/	<u>30 in</u>		156.0
H A N-VALUE (SPT) A NOTES ON: WATER LEER OF DRULING AND LASS #100 NOTES ON WATER LEER OF DRULING AND LASS #100 NOTES ON WATER LEER OF DRULING AND LASS #100 NOTES ON WATER LEER OF DRULING AND LASS #100 NOTES WATER LEER OF DRULING AND LASS #100 NOTES WATER LEER OF DRULING AND LASS #100 NOTES WATER LEER OF DRULING AND LASS #100 <	1				. GROUNI	D WATE	R LOG	GED BY:									
E E	2	83	.8	<u> </u>									R. Gelii	as/SA			
20 40 60 80 304 283.8 Had auger to 6 fet to the check for undergroung interferences. 35 5			▲	N-VALUE (S	SPT)			7	 -						NC	TES	
20 40 60 80 304 283.8 Had auger to 6 fet to the check for undergroung interferences. 35 5	₹ Z D	PLE.	0	RECOVER	r %		2F	ATIO EET		HICS	DESC		ASSIFIC		WA	TER	LEVELS,
20 40 60 80 304 283.8 Had auger to 6 fet to the check for undergroung interferences. 35 5	M NO	SAN	+	ATT. LIMITS	S %		S B	ЩĨ	Ld	RA	0200						
39 3044n 4 39 3044n 5 31 2227 35 31623 2 276.3 35 31623 2 276.3 35 31623 2 276.3 35 31623 2 276.3 35 31623 2 276.3 35 31623 2 276.3 35 31623 2 276.3 36 3244.4 37 276.3 38 31516.19 39 31316.23 36 31316.23 37 31623 38 31316.23 39 31316.23 38 31316.23 39 3142.2013 30 3152.210 311 3152.210 311 30 311 30 311 30 311 30 311 30 311 30 312 30 313 30 314 30 315 30 32 30	5							Ξ	۳ ۲	0							
39 304in				20 40 .	60 <u>6</u>	30		283.8									
SS A Q 22-7 SS A Q 22-7 SS A Q 11-13-16 SS A Q 14-20-18 SS A Q 14-20-18 SS A Q 11-13-11 SS A Q 11-13-11 SS A Q 10-11-13-12 SS				1 1		1	- 50/4in-								Hau	nd aug	er to 6 feet to
SS A Q 22.7 276.3 To accovery Shoe lost down hole. SS 316-23 274.8 277.3 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery To	39				1	1			· ·						inte	rferen	ces.
SS A Q 22.7 276.3 To accovery Shoe lost down hole. SS 316-23 274.8 277.3 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery To					1	1			-	$\left \right $							
SS A Q 22.7 276.3 To accovery Shoe lost down hole. SS 316-23 274.8 277.3 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery To				1 I 1 I	1	1			.								
SS A Q 22.7 276.3 To accovery Shoe lost down hole. SS 316-23 274.8 277.3 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery To				1 1	1	1			-								
SS A Q 22.7 276.3 To accovery Shoe lost down hole. SS 316-23 274.8 277.3 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery Shoe lost down hole. Shoe lost down hole. SS A O T1-157.15 274.8 To accovery To				1 i	1	1			5-								
Image: Signed state in the image of the				1 i t 1	1	¦.,											
SS 0 37623 276.3 no recovery Shoe lost down hole. SS 0 17.19.2 274.8 no recovery Shoe lost down hole. SS 0 2943-41 273.3 10 Shoe lost down hole. Tobacco Road SS 0 13.18.19 271.8. 271.8. Tobacco Road Tobacco Road SS 0 14.20.18 270.3. Same as above, regime and brown and		Ì		1 I I	1	, (,	2-2-7		.	\square	CLAYEY SA	ND (SC); medium re	ddish brow	n; loose; um graine	:d		
2 SANDY LEAN CLAY (CL), medium reddish brown and yellowish brown, hard, damp, medium plasticity, sand Tobacco Road 35 0 1119-16 274.8, SANDY LEAN CLAY (CL), medium reddish brown and yellowish brown and trownish gray, dense, medium reddish brown and brownish gray, dense, most, subangular, poorly graded, text fine to lower medium grained Tobacco Road 55 0 17.19-20 265.8, SILTY SAND (SM), medium reddish brown and gray, fine to medium grained 58 0 17.19-20 256.3, SILTY SAND (SM), writh clay, light yellowish brown and light gray, dense, most, subangular, poorly graded, fine to medium grained 58 0 17.19-20 256.3, SILTY SAND (SM), writh clay, light yellowish brown and light gray, dense, most, subangular, poorly graded, fine to medium grained 58 0 18.24-20 256.3, SILTY SAND (SM), writh clay, light yellowish brown and light gray, dense, most, subangular, poorly graded, fine to medium grained 58 0 18.24-20)	1	1	1 1	-3-12-02	276.3		14						a loct	down hole
SS A O TI-19-16 274.8. SANDY LEAN CLAY (CL), medium reddish brown and yellowish brown; medium plasticity, sand Tobacco Road SS A 29-43-41 271.3. 10- CLAYEY SAND (SC), medium reddish brown and providen reddish brown and brownish red, wer, dense, medium reddish brown and brownish gray; dense, medium reddish brown and brownish gray; dense, medium reddish brown and pellowish brown. Tobacco Road SS A O TI-19-16 270.3. same as above; with and yellowish brown. Tobacco Road SS A O TI-19-17 265.8. same as above; with and yellowish brown and grained same as above; portions are sandy silt, micacous SS A O TI-19-20 265.8. SANDY LEAN CLAY (CLAY, medium reddish brown and ight gray, dense; mosit; subangular; poorty graded; fine to lower medium grained SS A O TI-19-20 256.3. SANDY LEAN CLAY (CLAY, Michay, light yellowish brown and light gray, dense; mosit; subangular; poorty graded; fine to made and medium grained SS O TI-19-20 251.3. 30- SANDY LEAN (SM); with clay; light				1 1	1	1	3-10-23		-		no recovery				SIC	e iosi	uowii noie.
SS 0 29:43:41 27:33. 10 Instance is no moduling trained. Tobacco Road SS 0 13:18:19 27:18. 27:18. Instance is above, medium redish brown and brownish red; very dense; wer, since and use is above, medium redish brown and brown and brownish gray; dense, moist, fine to upper medium grained Tobacco Road SS 0 14:20:18 27:03. Same as above; weri, dense, moist, fine to upper medium redish brown and brownish gray; dense, moist, fine to upper medium grained Same as above; weri, dense, moist, fine to upper medium redish brown and brown; medium dense; moist, subangular, poorly graded, (see y fine to lower medium fine) Tobacco Road SS 0 13:12:10 265.8 ISI,TY SAND (SM); medium brown; medium dense; moist, subangular, poorly graded, (see y fine to lower medium fine) SS 0 13:12:10 265.8 ISI,TY SAND (SM); medium brown; medium dense; moist, subangular; poorly graded, fine to lower medium fine) SS 0 13:12:10 265.8 20 Sint Y SAND (SM); with clay; light yellowish brown and gray; dense; moist; subangular; poorly graded; fine to medium fine) SS 0 17:19:20 256.3 20 Sint Y SAND (SM); with clay; light yellowish brown and gray; dense; moist; subangular; poorly graded; fine to medium dense; moist; subangular; poorly graded; fine to medium fine) SS 0 18:24:20 251.3 30 30 SS				. ▲!	-	¦O	11-19-16	274.8			SANDY LEA	N CLAY (CL): medi	um reddish	brown and	d		
SS 0 13-13-11 25-43-41 25-43-41 25-43-41 Tobacco Road SS 0 13-13-19 271.8 same as above; medium reddish brown and brownish gray; dense; moist, fine to indum grained Tobacco Road SS 0 14-20-18 270.3 same as above; with sandy clay portions; medium reddish brown and brownish gray; dense; moist, fine to indum grained same as above; with sandy clay portions; medium dense; moist, subangular; poorly graded, very fine to upper medium grained SS 0 17-19-20 267.3 SILTY SAND (SM); medium brown; medium dense; moist, subangular; poorly graded, very fine to lower SS 0 13-12-10 265.8 SILTY SAND (SM); medium brown; medium dense; moist, subangular; poorly graded, very fine to lower SS 0 13-12-10 264.3 20 SANDY LEAN CLAY (CL); medium reddish brown and gray; hown; very fine grained SS 0 17-19-20 25-					i	i I		272.1	10-		yellowish bro	wn; hard; damp; med	ium plastic	ty; sand			
SS O 13-18-19 271.8 same as above; medium reddish brown and brownish gray; dense; moist, fine to medium grained SS O 14-20-18 268.8 15 SS 37-40-40 268.8 15 SS O 11-13-11 267.3 SS O 11-13-11 267.3 SS O 11-13-11 267.3 SS O 11-12-10 264.3 SS O 10-11-11 262.8 SS O 17-19-20 256.3 SS O 17-19-20 256.3 SS O 18-24-20 25- SS O 18-24-20 25- SS O 18-24-20 251.3 SS Same as above; with clayey sand interbeds Had driller pull spoon and clean oil wash(cave material back down to 31 feet. SS SS O 18-24-20 251.3 SS Same as above; with clayey sand interbeds	SS			Ô		i a –	29-43-41	273.3	1.	VA	CLAYEY SA	ND (SC); medium bi	ownish red	very dens	se; Tot	oacco l	Road
SS 0 13-18-19 270.3 same as above; motily sandy clay portions; medium reddish brown SS 0 14-20-18 270.3 same as above; with sandy clay portions; medium reddish brown SS 37-40-40 267.3 same as above; weith sandy clay portions; medium reddish brown SS 0 11-13-11 267.3 same as above; weith sandy clay portions; medium dense; motif, subangular; poorly graded; very fine to lower SS 0 11-12-10 265.8 SANDY LEAN CLAY (CL); medium reddish brown and grayish brown, very stiff, moist; low plasticity; sand SS 0 10-11-11 262.8 20 SANDY LEAN CLAY (CL); medium reddish brown and grayish brown end ing rained SS 0 17-19-20 256.3 20 SANDY LEAN CLAY (CL); medium reddish brown and ing rained SS 11 25- 25- 25- 25- SS 11 256.3 25- 25- 25- SS 11 251.3 30- 25- 14-12-12-12 SS 251.3 251.3 30- 30- 14-12-12-12 SS 251.3 251.3 30- 30- 14-12-12-12	4							271.8		$\langle \rangle$	grained						
SS 0 14:20-18 270.3_ same as above; with sandy clay portions; medium reddish brown and yellowish brown SS 0 37:40-40 268.8_ 15 same as above; with sandy clay portions; medium reddish SS 0 11:13:11 267.3_ same as above; very dense; wei; fine to upper medium SS 0 11:13:11 267.3_ Sill TY SAND (SM); medium brown; medium dense; medium grained SS 0 13:12:10 264.3_ 20 Sill TY SAND (SM); medium reddish brown and grained SS 0 10:11:11 262.8_ 20 Sill TY SAND (SM); with clay; light yellowish brown and light gray; dense; moist; subangular; poorly graded; fine to medium grained SS 0 17:19:20 256.3_ 30- SS 13:24:20 251.3_ 30- 13:24:20 SS 12 0 18:24:20 251.3_ 30- SS 12 18:24:20 251.3_ 30- 14:20:14 gray; dense; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS 12 18:24:20 251.3_ 10 18:24:20 116:21:11 SS				Ύ́		į	13-18-19] '	\mathbb{Z}	same as abov	e; medium reddish br	own and bread	ownish gra	ay;		
SS 0 17-19-20 268.8. 15 Same as above; very dense; weit; fine to upper medium grained SS 0 11-13-11 267.3. SILTY SAND (SM); medium brown; medium dense; moist; subangular; poorly graded; very fine to lower SS 0 13-12-10 264.3. 20-20 SANDY LEAN CLAY (CL); medium reddish brown and grained SS 0 10-11-11 264.3. 20-20 SANDY LEAN CLAY (CL); medium reddish brown and grained SS 0 10-11-11 262.8. 20-20 SILTY SAND (SM); with clay; light yellowish brown and grained SS 0 17-19-20 264.3. 20-20 SILTY SAND (SM); with clay; light yellowish brown and grained SS 0 17-19-20 264.3. 20-20 SILTY SAND (SM); with clay; light yellowish brown and light gray; dense; moist; subangular; poorly graded; fine to medium grained SS 10 17-19-20 256.3. 30- SS 30- 18-24-20 251.3. 30- SS 251.3. 30- 18-24-20 251.3. Same as above; with clayey sand interbeds Had driller pull spoon and clean out wast/cave material back down to 31 feet. SS SST 0						Э	14 30 18	270.3		H		_		um reddis	b		
SS 0 37-40-40 10 same as above; very dense; wet; fine to upper medium grained SS 0 11-13-11 267.3. SILTY SAND (SM); medium brown; medium dense; moist; subangular; poorty graded; very fine to lower SS 0 13-12-10 265.8. SILTY SAND (SM); medium brown; medium dense; moist; subangular; poorty graded; very fine to lower 9 264.3. 20 SANDY LEAN CLAY (CL); medium reddish brown and grayish brown; very stiff, moist, low plasticity; sand 10 10 10 262.8. 20 SS 20 25 25 25 SS 10 17-19-20 256.3. 25 11 256.3. 25 30 30 SS 12 251.3. 30 30 SS 251.3. 30 30 30 SS 251.3. 30 30 30 30 SS 251.3. 30 30 30 40 40 SS 251.3. 30 30 30 40 40 40 SS 50.00 18-24-20 251.3. 50				t i	1	1	14-20-18	260.0	-	\square	brown and ye	llowish brown	nons, mea	uni readis			
7 267.3 grained grained SS 0 11-13-11 265.8 SILTY SAND (SM); medium brown; medium dense; medium reduint mediat; subangular; poorly graded; very fine to lower SS 0 13-12-10 265.8 SANDY LEAN CLAY (CL); medium reduish brown and grayith brown; very stiff, moist; low plasticity; sand SS 10 10-11-11 262.8 20 SANDY LEAN CLAY (CL); medium reduish brown and grayith brown; very stiff, moist; low plasticity; sand SS 10 17-19-20 25 - - SS 11 256.3 25 - - SS 11 256.3 - - - SS 12 0 17-19-20 256.3 - - SS 12 25 - - - - - SS 12 25.3 - - - - - - SS 12 -<	SS		С		1 4	Á.	37-40-40	268.8	15-	\checkmark	same as abov	e; very dense; wet; fir	to upper a	nedium			
SS Image: SS <	7				1 0	: 1		267.3	-	\square	•						
SS 9 0 13-12-10 265.8 ame as above; portions are sandy silt; micaceous SS 10 0 10-11-11 264.3 20 SANDY LEAN CLAY (CL); medium redisish brown and grayish brown; very stiff; moist; low plasticity; sand SS 10 10-11-11 262.8 20 SANDY LEAN CLAY (CL); medium redisish brown and grayish brown; very stiff; moist; low plasticity; sand SS 11 10 17-19-20 256.3 25 - SS 11 0 17-19-20 256.3 30- - SS 12 0 18-24-20 251.3 30- - SS 12 0 18-24-20 251.3 - - SS 12 0 18-24-20 251.3 - - SS 12 0 18-24-20 251.3 - - - SS 12 0 18-24-20 251.3 - - - - SS 12 0 18-24-20 251.3 - - - - - SS 12 0 18-24-20 251.3 - - - - - - -					10	1 1	11-13-11] -								
39 30 10 <td< td=""><td></td><td></td><td></td><td></td><td>0</td><td>1</td><td>12 12 10</td><td>265.8<u>.</u></td><td>. </td><td></td><td>medium arai</td><td>hed</td><td>•</td><td></td><td></td><td></td><td></td></td<>					0	1	12 12 10	265.8 <u>.</u>	.		medium arai	hed	•				
SS 10 10-11-11 20-11 SANDY LEAN CLAY (CL): medium reddish brown and grayish brown; very sin; moist; firm ist; subangular; poorly graded; firm to medium grained SS 11 25 SS 17-19-20 256.3 SS 11 256.3 SS 30- SS 18-24-20 SS 251.3 SS 251.3 SS 18-24-20 SS 251.3 SS 18-24-20 SS 10 SS				t i	+	1	13-12-10		.		Same as abov	e, portions are saidy	sin, micace	545			
10 262.8 262.8 grayish brown, very stiff, most; low plasticity; sand fraction is very fine grained SS 11 25 25 25 SS 11 256.3 25 25 SS 17.19-20 256.3 30 11 SS 18-24-20 251.3 30 18-24-20 SS 251.3 Same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	SS			*	φ	1 1	10-11-11	264.3	1		SANDY LEA	N CLAY (CL); medi	um reddish	brown and	d		
SS 11 0 17-19-20 25 SS 11 25 - - SS 11 256.3 25 - SS 12 0 18-24-20 30 - SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.				1 1	6 1	1		262.8		$\langle \rangle \rangle$	grayish brown fraction is ver	n; very stiff; moist; lo ry fine grained	w plasticity;	sand			
SS 11 0 17-19-20 256.3 SILTY SAND (SM); with clay; light yellowish brown and light gray; dense; moist; subangular; poorly graded; fine to medium grained SS 12 0 18-24-20 30- Same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.		Π		1 : :	1	1		20210	1.			,					
SS 11 0 17-19-20 256.3 SILTY SAND (SM); with clay; light yellowish brown and light gray; dense; moist; subangular; poorly graded; fine to medium grained SS 12 0 18-24-20 30- Same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.					:	1			•								
SS 11 0 17-19-20 256.3 SILTY SAND (SM); with clay; light yellowish brown and light gray; dense; moist; subangular; poorly graded; fine to medium grained SS 12 0 18-24-20 30- Same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.				• • : •	1	1			-								
SS 11 0 17-19-20 256.3 SILTY SAND (SM); with clay; light yellowish brown and light gray; dense; moist; subangular; poorly graded; fine to medium grained SS 12 0 18-24-20 30- Same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.					i I	1			- 1								
353 11 <t< td=""><td> .</td><td></td><td></td><td></td><td>l r</td><td>1</td><td></td><td></td><td>25-</td><td> </td><td>•</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	.				l r	1			25-		•						
353 11 <t< td=""><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></t<>					1				-								1
SS 12 256.3 Image: medium grained 30- 30- 12 18-24-20 12 18-24-20 251.3 1 SS = SPLIT SPOON; ST = SHELBY TUBE; SITE				1	÷		17-19-20		1		SILTY SANI light gray; de	D (SM); with clay; lig nse; moist; subangula	nt yellowish r; poorly gr	aded; fine	to		
SS 12 Is-24-20 same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.		┦						256.3	-		medium grain	neđ					
SS 12 Is-24-20 same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.					1	1			-								
SS 12 Is-24-20 same as above; with clayey sand interbeds Had driller pull spoon and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.					, ,		.		•								
SS 12 Intersection									30-								
12 and clean out wash/cave material back down to 31 feet. SS = SPLIT SPOON; ST = SHELBY TUBE; SITE	66	Ļ			i o	1	18-24-20		-	$\left - \right $	same as abov	e: with clavey sand in	terbeds	<u>.</u>		d drille	er pull spoon
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.				1 I 1 I	1			261 2	.		Junio 45 4001	e, energy build in			and	l clean	out
SS = SPLIT SPOUN; SI = SHELBT TUBE,		ħ		n t F I	1	1	<u> </u>	251.3	1.	┝┷┥							
SS = SPLIT SPOUN; SI = SHELBT TUBE,				1 I 1 I	I I												
SS = SPLIT SPOUN; SI = SHELBT TUBE,				1 1 1 1	1	1 1			']							
	SS = S		T SPO	DON: ST = SH	ELBY TUE	<u>,</u> 3E;	SITE		·	نـــــ		<u>. </u>			HOL		
				•							FINA	L LOG				F	B-7



GEOTECH	NICAL LOG	PROJE	CT		APSF	JOB NO. APSF	SHEET NO	- 1	HOLE NO. FB-7
W .VALUE (S O RECOVERY dWY G WY S S H ATT. LIMITS	COUNT BLOW S & S	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS		NO WA CH/ DRI LAB	TES C TER I ARAC LLINC	DN: LEVELS, TER OF 3 AND TORY
	<u>60</u> 80 50-34-25	246.3_			same as above; portions with clay; me orangish brown, and light brownish g	edium brown, ray; very dense	inter was	t two t vals in hed/ca erial.	plow count n ived
SS 0	2-3-20	243.0_	40		same as above; with clay; medium de	nse; wet.			
SS 15	22-21-27	236.3_	45 -		POORLY GRADED SAND WITH C medium brown; dense; wet; subangula fine to medium grained	LAY (SP-SC); ar; poorly graded;			
SS 16	0 9-11-14	230.8_			SILTY SAND (SM); with clay; mediu light gray; medium dense; moist; suba graded; fine to upper medium grained	ım reddish brown ar ıngular; poorly		Branc	h?
SS 17	9-12-13	225.9_	55-	R	POORLY GRADED SAND WITH C medium brown; medium dense; wet; s graded; fine to medium grained	LAY (SP-SC); subangular; poorly			
SS 18	13-18-18	221.4_	- 60 		CLAYEY SAND (SC); medium brow subangular; poorly graded; fine to me	n; dense; moist; dium grained			
SS 19	, 103 39-50-53/3i	216.3_	65 -	N	POORLY GRADED SAND WITH C brown to medium brown; very dense; poorly graded; fine to medium grained	LAY (SP-SC); light wet; subangular; 1			
SS 20	0 2-8-8	211.2_	70		same as above; medium yellowish bro	wn; medium dense			
S = SPLIT SPOON; ST = SHE S = STATIONARY PISTON; PI			I		FINAL LOG		HOLE		B-7



(GEO	TEC	HN		LOG	PROJE	ЕСТ		APSF	JOB NO. APSF	1	TNO. OF 5	HOLE NO. FB-7
SAMP. TYPE AND NO.		I-VALU ECOVI TT. LIN	e (SP Ery 9 <i>I</i> its 9	יד) %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	<u> </u>		NOTES WATER	ON: LEVELS, CTER OF IG AND ATORY
SS 21			<u> </u>		5-10-8	206.0_	-	Π	ELASTIC SILT WITH SAND (MH); m brown; very stiff; moist; low plasticity; fine to fine grained	edium yellowish sand fraction is v	very	Tan Clay	Interval
SS 22			▲ 〈		8-19-26	201.4_	- 80 		CLAYEY SAND (SC); grading down to sand with clay; medium brown with a for dense; wet; subangular; poorly graded; grained; trace coarse sand	o poorly graded w black Mn zon fine to medium	es;		
SS 23	0		•		40-28-18	196.3_	85 - -		POORLY GRADED SAND WITH SIL brown; dense; wet; subangular; poorly g medium grained	T (SP-SM); light graded; fine to			
SS 24					21-34-33	191.0_	90 - - -		same as above; very dense				
SS 25 SS 26 SS 27 SS 28				0		186.0_ 184.5_ 183.0_ 181.3_	95 - - - 100 - -		CLAYEY SAND (SC); medium brown loose; wet; angular; poorly graded; fine grained same as above; medium yellowish brow light grayish brown; subangular; fine to same as above; trace black charcoal fra yellowish brown; angular; fine to lower same as above; grading to poorly gradee bottom of interval; medium dense; suba medium grained	n, dark brown, a medium grained gments; medium coarse grained d sand with silt al	nd		
SS 29		· · · · · · · · · · · · · · · · · · ·)		20-35-41	176.3_			POORLY GRADED SAND (SP) trace to poorly graded sand with clay; mediur dense; wet; subangular; poorly graded; medium grained	n brown; very	'n	Santee	
SS 30					12-13-33	171.8_	110- - - -		POORLY GRADED SAND WITH SIL medium brown; dense; wet; subangular fine to lower coarse grained	T (SP-SM); ; poorly graded;			
				BY TUBE; = PITCHE	SITE R				FINAL LOG			HOLE NO.	' B-7



G	GEC	DTE	CHN	IICA		OG	PROJI	СТ		APSF	JOB NO. APSF	SHEE	ET NO. OF 5	HOLE NO. FB-7
SAMP. TYPE AND NO. SAMPLE	1	RECO\	JE (SP /ERY % MITS %	6		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND TORY
SS 31		20 4				5-4-9	167.8_			CLAYEY SAND (SC); with a 0.05 ft si 115 ft and few thin sandy lean clay inter yellowish brown; medium dense; wet; s graded; fine to medium grained	hell hash layer at rbeds; dark ubangular; poorl	y	1/23/98 v this must (atrificial reading).	vater level 22, be bad ly high
SS 32		1 1 1 1 1 1 1 1 1 1 1				21-43-51	162.3_	120 -		SILTY SAND (SM); some layers with o yellowish brown; very dense; wet; subar graded; very fine to fine grained	clay; medium ngular; poorly			
SS 33				• 0		14-25-35	157.3_	- 125 -		same as above				
SS 34					•	29-50-47	151.3_	- 130		same as above; medium yellowish brow	n and light brow	'n		
SS 35				1 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		5-13-10	146.3_	135 - - -		same as above; with clay; medium yello medium dense; moist; fine to lower med	wish brown; lium grained			
SS 36						6-8-9	141.5_	- 140 - -		CLAYEY SAND (SC); medium yellow dense; wet; subangular; poorly graded; y grained	ish brown; media very fine to fine	um	Warley H	ill
SS 37	• •	4 . 1 1 1 1 1 1 1 1				13-26-21	136.3_	- 145		same as above; dense; fine to lower med lower coarse	fium grained, tra	ice		
SS 38		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				25-50/3in	131.8_	- 150 - - -		SILTY SAND (SM); with thin gray clay brown to yellowish brown; very dense; poorly graded; fine to medium grained	/ laminae; light wet; subangular;		Congaree	
SS = SPLI PS = STAT						SITE				FINAL LOG			HOLE NO.	B- 7



						1000				JOB NO.	louci	ET NO.	HOLE NO.
C	GEOT	ECH	INIC	AL L	.OG	PROJE	-01		APSF	APSF	1	OF 5	FB-7
SAMP. TYPE AND NO. SAMPLE	▲ N-V	ALUE (OVER	SPT) Y %		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	<u>Lann - a cy</u> u <u>a</u> ccoom		NOTES	ON: LEVELS, CTER OF G AND MTORY
	20	40	60	80									
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	4 1 1 1 1 1 1 1	4 5 1 4 5 6 8 8 8 8 8		127.8_	-		same as above; medium brown; angular coarse grained Total depth of boring 156 feet.	, fine to lower		Hole aba grout mis	ndoned with c per 3Q5.
		4 - - - - -	4 5 7 6 6 6 6 6 6 6 6 7 7 7 7 7 7 7 7 7 7	1 7 8 8 8 8 8 8 8									
		* 5 1	: ; ; ; ;	1 1 1 1 1									
	1 1 5 6 7 7			8 8 8 1 1 1									
	: ; ; ;		; ; ; ;	: : : : : : : : : : : : : : : : : : :									
		• • •	1 5 4 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1										
			1 4 5 4 -	1 1 1 1 1 1									
		-;	• • • • • • • • • • • • • • • • • • • •	! ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;			- •				-		
		: : : : :	1 5 1 1 1 1 1	1 7 1 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8									
		1 											
	1	1 1	1 1 1	1									
	T SPOON;				SITE	I		LI				HOLE NO.	
PS = STA	TIONARY F	ISTON;	PB = P	TCHER					FINAL LOG			F	<u>B-7</u>



	C	F	TE	.н	NIC	AL L	OG	PRC	DJECT				JOB		SHEET NO.	HOLE NO.
L	_								TCO		APSF		A	PSF		
SITE				PS	Б		CC	ORDINA	ATES .	N	79344 E	-				
BEGUN			OMPLE			R	!		DRILL M			HOLE SIZE	SAMPLE		90 NEIGHT/FALL	
2/23			2/24/9		OT MEEE		s/A. Jacks				g 1500	3 7/8 in	1	L40 Ib/ 3		155.8
GROUN				-	GROUN	ID WATE		GED BY:			51500	577611	L		<u></u>	155.0
28			₹ / ₹ /										N. Kid	d/SAI	2	
	T		+ /	<u></u>		<u> </u>	<u> l</u>		1		<u> </u>	<u> </u>				
SAMP. TYPE AND NO.	SAMPLE	0 + /	N-VALU RECOV ATT. LII 20 4	ERY MITS	′ % 5 %	80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFIC	ATION	WATE CHAR DRILL	S ON: ER LEVELS, ING AND RATORY ING
	-+		1 1	<u> </u>	1	,		200.							Hand	auger to 6 feet to for underground
SS 1 SS 2 SS 3 SS 4 SS 5 SS 6 SS 6 SS 6 SS 9 SS 10 SS 11 SS 12				0	0 0	0 0	2-6-16 13-18-23 12-15-18 3-3-9 10-15-20 7-12-15 7-11-19 4-11-15 8-10-13 7-11-15 8-10-12 	281.0 279.3 278.0 276.3 275.0 273.3 272.0 269.0 267.3 269.0 267.3	5_ 10- 5_ 10- 5_ 15- 0_ 20- 5_ 20- 5_ 20- 5_ 30-		medium grain SANDY LEA yellow mottle is fine to med same as abov same as abov LEAN CLAY medium plast same as abov same as abov same as abov same as abov more sand SANDY LEA damp; mediu CLAYEY SA mottles; medi fine to mediuu same as abov trace mica	N CLAY (CL); medi s; hard; dry; medium lium grained e e; stiff; bentonite pres (CL) with sand; medicity; sand fraction is e; very stiff e e; with brownish yelle N CLAY (CL); medi m plasticity; sand is f ND (SC); medium re ium dense; damp; sub	um red with plasticity; s sent in tube lium red; ha fine to med ow mottles um red; ver ine to medi d with brow angular; po	and slightly and slightly y stiff; m grained vnish yello orly graded	interfe	co Road
			<u>¦ ▲ </u>		; 0	. .				ZZ					HOLE N	
SS = SP							SITE									FB-8
PS = ST	AT	IONA	RY PIST	ON; F	B = PIT	CHER					FINA	L LOG				T.D.O



	GEOTECHNICAL L	.OG	PROJE	CT			EET NO. HOLE NO.
SAMP. TYPE AND NO. SAMDI E	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60 80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
SS 13		22-14-16	252.5_	•	\mathbb{Z}	same as above; slightly less clay	
SS 14		22-30-34	247.5_	- - 40 - -		POORLY GRADED SAND WITH CLAY (SP-SC), clayey in places; light brownish yellow with red bands and white wisps; very dense; moist; subangular; poorly graded; fine to medium grained	
SS 15	▲ O	9-13-22	242.5	- 45	B	same as above; medium brownish yellow with a medium yellowish brown band; with band of clayey sand; dense	-
SS 16		9-11-14	237.5_	- - - 50 - -		POORLY GRADED SAND (SP) trace clay, with clay in places; medium brown and dark brown; medium dense; wet; subrounded; poorly graded; medium grained with some lower coarse	Dry Branch
SS 17		10-15-19	232.5_		ł	POORLY GRADED SAND WITH CLAY (SP-SC), with band of clayey sand; light brown with dark brown and white wisps; dense; wet; subangular; poorly graded; fine to medium grained; black Mn? pellets	
SS 18		6-14-18	227.5_	60-		same as above; light brown and light red; black Mn? mottles	
SS . 19		27-29-26	222.5_	65 - -		no recovery	Catcher is good.
SS 20		6-7-7	217.5_	- 70 — - -	Z	CLAYEY SAND (SC); medium brownish yellow; medium dense; wet; subangular; poorly graded; fine to medium grained; black Mn? mottles	
	IT SPOON; ST = SHELBY TUBE;						HOLE NO.
	TIONARY PISTON; PB = PITCHER					FINAL LOG	FB-8



		אדר	- CU		AI 1	LOG	PROJ	ECT			JOB NO.		ET NO.	HOLE NO.
	GEV					_00	<u> </u>			APSF	APSF	3	OF 5	FB-8
SAMP. TYPE AND NO.		RECC	LUE (S DVERY LIMITS	% %	80	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION		NOTES WATER CHARA DRILLIN LABOR TESTIN	LEVELS, CTER OF IG AND ATORY
SS		20	40	60		13-18-29				LEAN CLAY WITH SAND (CL), inter	rlaminated sand		Tan Clay	Interval
21				1 1 1 1 1 1 1 1			212.5	-		stringers; very light yellowish green wit bands and medium yellowish red wisps plasticity; sand is fine to medium grain	; hard; wet; medi ed; black Mn? wi	um sps		
SS 22			, , , , , , , , , , , , , , , , , , ,			9-10-20	207.5_	80-		POORLY GRADED SAND (SP) trace with clay; light brown with light yellow medium dense; wet; subangular; poorly medium grained; black Mn? mottles	ish brown zones;	-		
SS 23				0	f 1 1 1 1 1 1 1	12-23-20	202.5_	85 — - -		same as above; some zones with clay; d	lense			
SS		6 7 7 1 1	• •	 		24-16-24		- - 90-	E	POORLY GRADED SAND WITH CL. sand trace clay interbeds; light brown a	AY (SP-SC), with	1		
24		1		1 1 1 1 1	! 		197.5_	-	Ľ	sand trace cray interfees, fight orown a brown with white wisps; dense; wet; su graded; fine to medium grained	bangular; poorly			
SS 25		1 1 1 1 1 1 1		1 1 1 1 1 1 1 1		13-21-30	192.5_	- 95 - -		POORLY GRADED SAND (SP) trace with light yellow mottles; very dense; w poorly graded; fine to medium grained; minerals	et: subrounded:			
SS 26		1 5 5 1 5 1 1 1 1				26-31-50	187.5_	- 100 - -		WELL GRADED SAND (SW) trace cla places; light brown with light red mottl subangular; well graded; fine to coarse	es; very dense; we	et;		
SS 27					1 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	31-50-47	182.5_	105		POORLY GRADED SAND (SP), trace very dense; wet; subangular; poorly gra grained	clay; light brown ded; fine to medi	ı; um		
SS 28			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0	13 -50-50/4i	n 177.7_	110-		WELL GRADED SAND WITH CLAY bands of clayey sand; light brown with dense; wet; subangular; well graded; fin trace heavy minerals	white wisps: verv	·		
		Å		1		\$			27				HOLE NO	
SS = SPI PS = ST/						SITE				FINAL LOG				B-8
						1								



	250	TEC			10	20	PROJE	ЕСТ	*		JOB NO.	1	ET NO.	HOLE NO.
	JE0	TEC			- L-\ 	<u> </u>				APSF	APSF	4	OF 5	FB-8
SAMP. TYPE AND NO. SAMPLE		-VALUE ECOVE TT. LIMI 0 40	RY %	80		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS			NOTES WATER CHARA DRILLIN LABOR/ TESTIN	LEVELS, CTER OF IG AND ATORY
SS 29		<u>, 40</u>				13-8-12	172.5			CLAYEY SAND (SC); medium brown light green mottles; medium dense; we graded; fine to medium grained	ish yellow with v	ery orly	Santee	
29 SS 30				· · · · · · · · · · · · · · · · · · ·		43-49-47	167.5_	- - - - - - - - -		POORLY GRADED SAND (SP), trace brownish yellow; very dense; wet; suba graded; fine to lower medium grained;	clay: medium			
SS 31		•	φ	Å	7	24-31-50		125-		same as above; with a <0.1 ft layer of n clay	nedium yellow lea	an		
SS 32		, , , , , , , , , , , , , , , , , , ,				22-39-37	162.5_ 157.5_	- - - 130- - - -		same as above; with yellow bands and black Mn? pellets	yellow clay pods;			
SS 33		▲ 	:	: ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	ф _і	13-12-13	152.5_		Y	POORLY GRADED SAND WITH CL sand in places; medium brownish yello wet; subangular; poorly graded; fine to trace heavy minerals	w medium dense	· 1		
SS 34		:	•	•	•	3-4-7	147.5_	140 - -	0	CLAYEY SAND (SC), some zones con medium brownish yellow with very lig medium dense; wet; subangular; poorly grained; trace heavy minerals	nt brown zones;			
SS 35			Q			11-17-28		145 -		FAT CLAY (CH), trace sand; very ligh medium orange flecks; hard; wet; high	plasticity; sand		Warley F	fill
SS 36				,	-	28-25-26	142.5_ 137.5_			fraction is fine grained; trace heavy min CLAYEY SAND (SC), with light brow at top of interval; medium brownish ye wet; subangular; poorly graded; fine to most of interval is composed of silicifie	n clean sand laye llow; very dense; medium grained;			
SS = SPLI PS = STA						SITE				FINAL LOG			HOLE NO	B-8

SHEET NO. HOLE NO. 5 OF 5 FB-8	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING	Congaree Brout mix per 3Q5. Hot E NO	FB-8
APSF JOB NO. SH	DESCRIPTION AND CLASSIFICATION	same as above; very dank greenish gray. "green clay" POONIA TG RADDE SAND (5) trace clay and clams this interval, the transition is darker greates into this interval, the transition is darker greates into and includes some light gray lean clay Total depth of boring 155.8 feet.	FINAL LOG
	SOIHAAAD		
ECT	DEPTH IN FT		
PROJECT	NOITAVƏJƏ IN FEƏT	132.9	
LOG LOG	COUNT BLOW		SITE
GEOTECHNICAL L(▲ N-VALUE (SPT) G RECOVERY % A + ATT. LIMITS % 20 40 60 80		SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHER
	SAMP. TYPE AND NO.	S C	SS = S PS = S



(21	=	тс	:~	LIN		AT 1	.OG	PRO	JECT			· · · · · · · · · · · · · · · · · · ·	JOB N		SHEET N	-	HOLE NO.
SITE		20		.0	1 11 1				COORDINA	TES		APSF	•			1 OF	-	FB-9
5115				AI	PSF				COORDINA	120	N	79185 E	54845		MICLE		90	
BEGUN					D DI	RILLEI	२		· · · · · ·			ND MODEL	HOLE SIZE	SAMPLE H	AMMER	WEIGHT/F		TOTAL DEP
2/24/9			2/26					es/S. Ro		Fa	ailin	g 1500	3 7/8 in	1	40 lb/	30 in		160.3
GROUND			¥	70.1	EL. GI		D WAT 98	ER LC	OGGED BY:					R. Gelin	06/SA	IC		
290	7.0 T		<u>¥</u>	/		*****		<u>_</u>		1	~	1	••••••••••••••••	R. Ocha	45/5/1		<u> </u>	
SAMP. TYPE AND NO. SAMPLE		D R	ECC	VE	: (SP [.] RY % ITS %	6		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	CRIPTION AND CI	ASSIFICA	TION	WA CH DR LAE	ARA(LEVELS, CTER OF G AND TORY
		20)	40	6	0	80		290.0									
		1 1 4 3 1 7 1 8 8 8							287.5			Some asphal	tic fill.			che	nd aug ck for rferen	ger to 6 feet aces.
ss		; ; ; ;	•		, , , , , ,			6-14-15	5	5.		SILTY SAN	D (SM), trace clay; m grayish brown; mediuu	edium brown	, reddish	1		
1 SS 2		4 1 1		1 1 1			0	9-26-26				i cubangular i	poorly graded; fine to ve; with clay; medium	meduum grai	ned			
SS 3		1	*	1 1 1	1 1 1		0	14-16-1	281.0 6 279.5] 10.		same as abov	ve; with two thin light	brown layers	s; dense			
SS 4		1 1 1	A	4 1 1	1 1 1		0	9-11-12	2 278.0]		some light b	AN CLAY (CL); med rown; very stiff; moist ry fine to fine grained ve; wet; sand fraction	; low plastici	ty; sand	1		
SS 5		Ai A'		1	1 1	0	1 1 1	9 <u>5-8-10</u>	276.5			grained		is fine to mee	lium 			
SS 6				1 1 1	1 1 1	0	t i	7-7-8 6-9-9	275.0	15-			ve; stiff; moist AND (SC); medium re	ddish brown	medium	n Toh	acco	Road
SS 7 SS		¦		1	1 		; ; 0		273.5	4	Ű	dense; moist	; subangular; poorly g	raded; fine to	mediun	n 100		litud
8 SS) 	1 1 1		0	7-7-10	272.0		¥		ve; medium brown an	d reddish bro	wn			
9			1	, , ,	, 1 1		; o	1-10-12	270.5	4	¥4		ve; medium brownish	red vellowis	h brown			
SS 10		1 1 1 1		1 1 1 1	ו נ נ נ נ				269.0	20		and light gra	y	ieu, yenowis	11 010 411	•		
SS 11		: ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	^				0	9-12-15	<u>5</u> 263.5	25		medium vell	AN CLAY (CL), with owish brown with lig stiff, moist; medium p	ht grav and m	interbeds aroon	s;	. .	
SS 12				1 1 1 1 1 1 1 1 1 1 1 1	1 4 4 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	7-9-8	258.2	30		I medium brow	AND (SC), with some wnish red; medium de d; fine to medium gra	ense: moist: s	nterbeds; ubangula	ar;		
SS = SPL								SITE	 E		-	FINA	L LOG			HOL	e no. F	` B-9



6	SEOTECH		OG	PROJ	TOE			JOB NO.		ET NO.	HOLE NO.
						<u> </u>	APSF	APSF	2	OF 5	FB-9
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (\$ ○ RECOVER) + ATT. LIMIT\$ 20 40	r %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION		NOTES WATER CHARAG DRILLIN LABOR/ TESTIN	LEVELS, CTER OF IG AND ATORY
SS	*	0	10-9-12		_	77	same as above				
13 		0	12-16-16	253.2_	- - - 40-		same as above; medium yellowish brow	n; dense			
14		· · · · · · · · · · · · · · · · · · ·	13-15-15	248.4_	- - 45		same as above; medium dense				
SS 15			13-13-13	243.5_			Same as acove, medium dense				
SS 16			13-24-37	238.0_			SILTY SAND (SM); medium brown, liq some red oxidiation spots, very dense; v graded; fine to lower coarse grained	ght brown, and vet; angular; poor	rly	Dry Bran	ch
SS 17			8-9-11	232.5_	60-	Ű	CLAYEY SAND (SC); medium yellow dense; moist; subangular; poorly graded grained	ish brown; mediu ; fine to medium	m		
SS 18	04		15-17-35	227.5_	- - - 65 —		SILTY SAND (SM); medium brown; w subangular; well graded; fine to coarse water rounded gravel	ery dense; wet; grained trace fine			
SS 19			14-17-19	222.5_	- - - Z 70		CLAYEY SAND (SC), with some thin portions; light brown; dense; wet; suban graded; fine to medium grained	clayey sand gular; poorly			
SS 20			11-13-15	217.4_	-		SILTY SAND (SM), with thin clayey sa brown to medium brown; medium dens poorly graded; fine to lower coarse grai	nd layers; light e; wet; subangula ned		HOLE NO.	
	T SPOON; ST = SH TIONARY PISTON; I		SITE				FINAL LOG				' B-9



	PEOTECHNICAL	OC PR	OJECT		JOB NO.	SHEET NO.	HOLE NO.
C	GEOTECHNICAL L	.06		APSF	APSF	3 OF 5	FB-9
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) O RECOVERY % + ATT. LIMITS %	BLOW COUNT ELEVATION IN FEET	DEPTH IN FT	DESCRIPTION AND CLASS	SIFICATION	NOTES WATER CHARA(DRILLIN LABOR/ TESTIN	LEVELS, CTER OF IG AND ATORY
	20 40 60 80						
SS 21		4-6-10 212	.5	LEAN CLAY (CL), with sand and high clay and clayey sand layers; medium ye yellowish brown; very stiff; wet; mediuu fraction is fine to medium grained trace	ly variable sandy llowish gray and m plasticity; sand coarse	Tan Clay	Interval
SS 22	▲ 0	3-8-14 207	.6	CLAYEY SAND (SC), with sandy clay yellowish gray and yellowish brown; su dense; wet; poorly graded; fine to media	layers; medium bangular; mediur um grained	n	
SS 	OA	38-50/5in 203	.1	POORLY GRADED SAND WITH SIL brown; very dense; wet; subangular; po medium grained	T (SP-SM); light orly graded; fine t	to	
SS 24		5-6-10	.5	CLAYEY SAND (SC), with sandy clay yellowish brown; medium dense; wet; s graded; very fine to fine grained; with b	interbeds; mediu ubangular; poorly lack Mn? staining	ım y g	
SS 25		10-9-9	95	same as above; medium yellowish brow brown; fine to medium grained	m and grayish		
SS 26	Φ 🔺	18-30-30	.6	POORLY GRADED SAND WITH SIL brown to medium brown; very dense; w poorly graded; fine to upper medium gr	et: subangular:		
SS 27		18-30-30	.5	same as above			
SS 28 SS 29 SS = SPLI	T SPOON; ST = SHELBY TUBE;	4-4-5 1-1-2 175 SITE	\neg	CLAYEY SAND (SC); medium yellow wet; subangular; poorly graded; tine to with black Mn? staining same as above; dark yellowish brown; v	medium grained;	Overdrill HOLE NO.	
PS = STAT	FIONARY PISTON; PB = PITCHER			FINAL LOG		_	ד-ע



·

GEC	DTEC	CHN	ICA	LL	OG	PROJ	-01		APSF	JOB NO. APSF	1	ET NO. OF 5	HOLE NO. FB-9
	N-VALU RECOVI ATT. LIN	ERY % MITS %		~	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS			NOTES WATER	ON: LEVELS, CTER OF G AND ATORY
SS 30		<u>0 60</u>) 81 1 1 1 1 1		4-3-8	173.5_	-		SILTY SAND (SM), portions with clay brown and brown; medium dense; wet; graded; fine to medium grained	y; medium reddis subangular; poo	h rly	-	
SS 31			0		16-16-18	168.5_	120-		same as above; with a few thin gray cla medium yellowish brown; dense; very t	ay laminations; fine to fine graine	ed		
SS 32				22-29-32	163.5_	- 125 – -		POORLY GRADED SAND WITH SII interbeds of lean clay and clayey sand; yellowish grayish brown, and light gray subangular; poorly graded; fine to med	light brown, very dense: wei	ı I;			
SS 33			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		18-27-35	157.9_	- 130- - -		same as above; light brown grading to very fine to medium grained	yellowish brown;			
SS 34		8 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	 	0	WH/20in	152.8_	- 135 — - -		CLAYEY SAND (SC); medium yellow loose; wet; subangular; poorly graded; grained; very uniform	vish brown; very very fine to fine		Overdrill	on clean o
SS 35		4 1 3 1 1 1 1 1	1 4 4 4 4 4 1 1 1	C	5-6-8	149.2_	- 140- -		same as above; light yellowish brown; moist; trace turitella shells	medium dense;			·
55 36					12-13-19	144.2_	- 145 -		SANDY LEAN CLAY (CL), with clay medium brownish gray and yellowish t medium plasticity; sand fraction is very	prown: hard: wet:		Warley H	fill
SS 37					17-20-21	139.2_	- 150 – -		same as above; medium yellowish brov grained; with silicified chips	wn; sand is fine			
SS				E;	13-29-29 SITE		-		CLAYEY SAND (SC); dark yellowish	red with light gr	een	HOLE NO.	B-9



G	SEO	TEC	HN	IIC/		OG	PROJE	CT		APSF	JOB NO. APSF		ET NO. OF 5	HOLE NO. FB-9
SAMP. TYPE AND NO. SAMPLE	OR	-VALU ECOVI TT. LIN	ERY 9	6		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	<u></u>		NOTES	ON: LEVELS, CTER OF IG AND ATORY
38	2	0 40) 6	<u>0</u>	30		134.2_		\mathbb{Z}	wispy laminae; very dense; wet; subang fine to coarse grained	jular; well graded	1;		
- 55 39	, , , , , , , , , , , , , , , , , , ,		•	0	•	 50/3in	129.7_	- - - 160 –		SILTY SAND (SM); light brown to me dense; wet; subrounded; well graded; fi				water level (st. ndoned with x per 3Q5.
		4 9 8 8 8 8 8 8 8 8 8 8 9 9 9 9 9 9 9 9		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	• • • • • • • • • • • • • • • • • • •									
	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			: : : : : : : : : : : : : :									
				• • • • • • • • • • • • • • • • • • •	· · · ·									
				• 1 1 1 1 1 1 1 1 1 1 1 1						· · · · · · · · · · · · · · · · · · ·				
	1			; ; ;	1 5 5									
SS = SPLI	T SPOC) N; ST =	SHEL	BY TU	BE;	SITE			•	FINAL LOG			HOLE NO	 B-9



GEOTECHNICAL LOG APSF APSF APSF APSF F10 APS APSF MOLE FROM HORIZONAL MOLE FROM HORIZONAL 90 BEGUM COMPARE STORAGE SAPE MOLE FROM HORIZONAL 90 STE COMPARE STORAGE SAPE MOLE FROM HORIZONAL 90 STE CANCE STAR MARK HORIZONAL SAPE MOLE FROM HORIZONAL 154.8 STE A NALL (SET) SET SET SET N. Kidd/SAIC UP OF THEL GROUPS WATE SET SET SET SET N. Kidd/SAIC NOTES CONCENTRE OF THE SET CONCENTRE SET		~			~! !			~~	F	ROJE	CT				JOB NO.	SHEET NO.	HOLE NO.
N79566 E 54990 90 226098 227738 GravesA. Jackson Failing 1500 3 7/8 in 140 Ib/ 30 in 154.8 226098 227738 GravesA. Jackson Failing 1500 3 7/8 in 140 Ib/ 30 in 154.8 284.4 ± N. Kidd/SAIC N. Kidd/SAIC N. Kidd/SAIC 284.4 ± ± 50 DESCRIPTION AND CLASSIFICATION NOTES ON: WATCR INFORMATION CLASSIFICATION 20 40 60 57.13 276.9 STATUS STATUS <t< td=""><td></td><td>G</td><td>iEC</td><td></td><td>CH</td><td>NIC</td><td>AL L</td><td>.UG</td><td></td><td></td><td></td><td></td><td>APSF</td><td></td><td></td><td></td><td></td></t<>		G	iEC		CH	NIC	AL L	.UG					APSF				
BEOM COMPLETED FORLIER CONTOPEL PORE SIZE SAMPLE HAMMEN WEIGHTFALL TOTAL DEPTH (140 Ib/ 30 Ib) CONTOPEL (140 Ib/ 30 Ib) <thcontopel (140 Ib/ 30 Ib)</thcontopel (140 Ib/ 30 Ib)	SITE								COORD	INATE	ES				ANGLE		
2226/98 2277/98 Crarce/A. Jackson Failing 1500 3.7/8 in 140 lb/ 30 in 154.8 GROUND LL DEFINEL. CROWN WATER CLOGGED DY. LOGGED DY. N. Kidd/SAIC N. Kidd/SAIC 284.4 4 A. N-VALUE (SPT) O. RECOVERY % 55 S DESCRIPTION AND CLASSIFICATION OFFICATION OF TESTING NOTES ON: WATER LEVELS, WATER LEVELS, WATER LEVELS, DESCRIPTION AND CLASSIFICATION DATES TING NOTES ON: WATER LEVELS, WATER LEVELS, WAT																	
SROUND EL DEFINIEL GROUND VATER COGGED BY: N. Kidd/SAIC 284.4 ¥ / N. Kidd/SAIC W A M-VALUE (SPT) String String String NOTES ON: V A M-VALUE (SPT) String String DESCRIPTION AND CLASSIFICATION WATER LEVELS, OPARACTER OF PARACTER OF PARACTER OF PARACTER OF 20 40 50 80 284.4 -	1		- 1			DRILL	ER			D							
284.4 N. Kidd/SAIC U A. N-VALUE (SPT) O RECOVERY % 4 25 State and construction and construction by a											Fa	ilin	g 1500	3 7/8 in	140 lb/	30 in	154.8
H A NVALUE (SPT) O RECOVERY % State State NOTES CM: Characters of DRECOVERY % NOTES CM: Characters of DRECOVERY % 20 40 60 80 284.4 1 Bit State Bit State Bit State Description and classification Notes characters of DRECOVERY % 35 20 40 60 80 284.4 1 Bit State Hard naget to 6 feet to therefore ces. 35 3 4 0 57.13 276.9 Same at above; find anne at above; find same at above; find at same find same	1					GROU	IND WAT	ER	OGGED	BY:					N. 17: 33/04.1	~	
E E	2	<u>84</u> .	.4	<u>¥ i</u>		. <u> </u>	····					T			N. KIGG/SAT		·····
SS A Q 3-7.13 SANDY LEAN CLAY (CL): madian red with light yellow interforences. SS A Q 3-7.13 SANDY LEAN CLAY (CL): madian red with light yellow interforences. SS A Q 3-7.13 Sandar State and with made and the made and with light yellow interforences. SS A Q 11.17.23 275.4 Sandar State and bases. Indi SS A Q 17.17.23 273.9 Image and bases. Indi SS A Q 17.17.23 272.4 Sandar States. The originan red. denset. damp. states and bases. Indi SS A Q 17.17.21 270.9 Image and bases. The originan red. denset. damp. states. The originant of the originant denset. damp. states. The originant of the originant denset. damp. states. The originant denset. The origin	SAMP. TYPE AND NO.	SAMPLE	0 F + <i>F</i>	RECON	VER) IMITS	(% S %	80	BLOW			DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFICATION	WAT CHAI DRIL LABC	ER LEVELS, RACTER OF LING AND DRATORY
SS A O 37-13 SANDY LEAN CLAY (CL); medium red with light yellow and white modifier, yery stiff, dor, medium plasticity; sand is fine to medium plasticitity; sand is fine to medium plasticity; sand is fine		++	4	<u>, 0 4</u>	<u>40</u>	1				04.4		<u> </u>		······································		Hand	auger to 6 feet to
SS A Ø 15/14-22 276.9 Image: Sime as above; finad SS A Ø 271.9,1 same as above; moist; no motites SS A Ø 9/16/20 272.4, same as above; finad SS A Ø 9/16/20 272.4, same as above; fination count grained SS A Ø 9/16/20 272.4, same as above; fination count grained, finageneti of typical Attamha cobbit in spoon SS A Ø 7/14/17 260.4, 15 LEAN CLAY WITH SAND (CLY, medium red, dense; damp; subangular; poorly graded, fine to consiture grained Same as above; fination counting grained SS A Ø 7/12/17 260.4, 15 LEAN CLAY WITH SAND (CLY, medium red, wery stiff; moist; medium plasticity; sand is fine onedium grained SS A Ø 9/14/26 260.4, 15 LEAN CLAY WITH SAND (CLY, medium red, wery stiff; moist; medium plasticity; sand is fine onedium grained SS A Ø 9/14/26 263.4, 20 SLT (ML), andy in place; red, white; yellow; and is fine or medium grained SS A Ø 9/14/26 253.4, 30 SLT (ML), andy in place; red, wine;	SS					0		5-7-1	3		5		SANDY LEA	AN CLAY (CL); medi	ium red with light yell	interf	for erences.
SS A Q 275.4. Io same as above; moist; no motites SS A Q 7.16-20 272.4. CLAYEY SAND (SC); medium red; dense; damp; subdangular; poorty gradet; fine to coarse grained Tobacco Road SS A Q 7.14-17 260.4. Io Eans eas above; fine to medium grained, fragment of typical SS A Q 7.12-17 260.4. Io Eans CLAY WITH SAND (CL); medium red; hard; damp; modum plasticity; sand is fine to medium grained SS A Q 7.12-17 260.4. Io SS A Q 7.12-16 264.9. SANDY LEAN CLAY WITH SAND (CL); medium red; hard; damp; modum plasticity; sand is fine to medium grained SS A Q 9 9 263.4. 20 SS A Q 9 263.4. 20 SS A Q 263.4. 20 SS A Q 214-26 254.4. SS A Q 214-26 254.4. SS A Q 10-14-20 258.4. SS A Q 214-26 254.4. SS A Q 214-20 254.4. SS A Q 10-	SS			A			1 1 1	Q15-14-	22 27	76.9_			is fine to mee	lium grained	nedium plasticity; san		
SS A Q 17:17:23 2/3:2 same as above SS A Q 5:16:20 272.4 CLAYEY SAND (SC), medium red, denser, damp; subangular, poorty graded; fine to coarse grained Tobacco Road SS A Q 7:14:17 269.4 15 LEAN CLAY WTH SAND (CLY, medium red, hard; damp; medium plasticity; sand is fine to medium grained Tobacco Road SS A Q 7:12:17 267.9 SANDY LEAN CLAY WTH SAND (CLY, medium red, hard; damp; medium plasticity; sand is fine to medium grained SANDY LEAN CLAY WTH SAND (CLY, medium red, hard; damp; medium plasticity; sand is fine to medium grained SS A Q 7:12:17 267.9 SANDY LEAN CLAY WTH SAND (CLY, medium red, hard; damp; medium plasticity; cand is fine to medium grained SS A Q 7:12:17 266.4 LEAN CLAY WTH SAND (CLY, medium red, wery stiff, moist, medium plasticity; cand is fine to medium grained SS A Q 9:14:26 263.4 20 SS 10 10:14:20 258.4 25 SILTY SAND (SM), light red with white motiles and subangular; poorty graded; fine to medium grained SS 10 9:14:20 253.4 30 11 10 SS 9 9:14:20 253.4 30 11 11 SS 9:14:20	SS			A		- - - -	1	• 8-13-2	20		10-		same as abov	ve; moist; no mottles	p		
SS A Q 9-16-20 270.9 subangular, poorly gradet; fine to carse grained Tobacco Koad SS A Q 7-14-17 270.9 subangular, poorly gradet; fine to carse grained Tobacco Koad SS A Q 7-12-17 267.9 Same as above; fine to medium grained Fragment of typical SS A Q 7-12-17 267.9 Same as above; fine to medium grained Fragment of typical SS A Q 7-12-17 267.9 Same as above; fine to medium grained Fragment of typical SS A Q 7-12-17 267.9 Same as above; sand is fine to medium grained Fragment of typical SS A Q 9-14-26 266.4 Same as above; sand is fine to medium red, there, thick, yellow, multicolored; hard, moist, sand fraction is fine grained Same as above; sand is mostly fine grained SS A Q 9-14-20 253.4 25 Same as above; sand is mostly fine grained SS A Q 9-14-20 253.4 30 Same as above; sand is mostly fine grained SS SS A Q 9-14-20 253.4 30 Same as above; sand is mostly fine grained SS SS SIT SST ST				 . 		1	ů ,	11-17-	23				same as abov	/e			
35 7 7 7 7 7 8 A 0 8:13:19 8 269.4 15 15 LEAN CLAY WITH SAND (CL); medium red; hard; damp; medium plasticity; sand is fine to medium grained sand plasticity; sand is fine to medium grained damp; medium plasticity; sand is fine to medium grained treating plasticity; sand is fine grained; treating treating plasticity; sand is fine grained; treating plasticity; sand plasti				¦ ▲			2 1 1 1		20		•		subangular; p	boorly graded; fine to	coarse grained		co Road
SS A O 7.12-17 267.9 267.9 SS A O 6.12-16 264.9 264.9 20-100 SS A O 9.14-26 263.4 20-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-10-14-20 258.4 25-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-10-14-20 258.4 25-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-10-14-20 258.4 25-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-10-14-20 258.4 25-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-12-20 258.4 25-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-14-20 258.4 25-100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS 10-14-20 258.4 253.4 30-1100 SILTY SAND (SM); tight red with white motiles and occasional medium grained SS = SPUT SPOON; ST = SHELBY TUBE; SITE SITE SITE	6				1 1 1	• • •	Ú		26	69.4_	15-		Altamaha col	bble in spoon			
SS 9 6-12-16 266.4 LEAN CLAY WITH SAND (CL); medium red with light yellow and is fine grained. Trace mica SS 9 9-14-26 264.9 20 IO 9-14-26 263.4 20 SILT (ML), sandy in places; red, while, yellow, multicolored; had; moist; sand fraction is fine grained; trace mica SS 10 10-14-20 254.4 25 SILTY SAND (SM); light red with white mottles and occasional medium yellow bands; dense; moist; subangular, poorty graded; fine to medium grained SS 11 258.4 25 SILTY SAND (SM); light red with white mottles and occasional medium yellow bands; dense; moist; SS 12 9-14-20 253.4 30 30 Same as above; sand is mostly fine grained SS = SPLIT SPOON; ST = SHELBY TUBE; SITE SITE HOLE NO. FB_10	7				4 1 1	4 1 1	1		26	57.9_	-		damp; mediu	m plasticity; sand is f	ine to medium graine		
SS 10 9:14-26 264.9 20 SILT (ML), sandy in place; red, white, yellow, multicolored; hard; moist; sand fraction is fine grained; trace mica SS 11 10 10-14-20 263.4 20 III (ML), sandy in place; red, white, yellow, multicolored; hard; moist; sand fraction is fine grained; trace mica SS 11 10 10-14-20 258.4 25 III (ML), sandy in place; moist; sand fraction is fine grained; SS 12 0 10-14-20 258.4 25 III (ML), sandy in place; moist; sand fraction is fine grained; SS 12 0 9-14-20 258.4 25 III (ML), sandy in place; moist; sand fraction is fine grained; SS = SPLIT SPOON; ST = SHELBY TUBE; SITE SITE SITE HOLE NO.	8 				4 - - -	, , ,	o l	6-12-1	26	66.4_	-						
SS 11 11 11 11 12 SS SS SS SS SS SS SS SS SS	SS			1 1 1 1	1 1 1 1	1 1 1 1	ф Ч	9-14-2	26		- 20 -		<u>plasticity (CL</u> SILT (ML), s multicolored;	.); sand is fine grained	1: trace mica		
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	-11					0			29				 occasional m subangular; p 	edium yellow bands; soorly graded; fine to	dense; moist; medium grained		
SS = SPLIT SPOON ST = SHELBT TUBE; STC FR.10	-			1	ĭ	<u>'</u>	1 (<u> </u>							HOLE	NO.
	ł							50	C.				FINA	LTOG			



G	EOTECHNICAL L	.OG	PROJE	CT		APSF	JOB NO. APSF		et no. Of 5	HOLE NO. FB-10
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60 80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND TORY
SS 13		15-27-37	248.4_	1	1	POORLY GRADED SAND WITH SIL red and medium orange; very dense; me poorly graded; fine to medium grained	T (SP-SM); light Dist; subangular;	L I		
SS 14		14-24-28	243.4_	40		POORLY GRADED SAND WITH CL. portions silty; light brownish yellow wit very dense; moist; subangular; poorly g medium grained	th white laminae:			
\$S 15	0	20-32-49	238.4_	45	ľ	same as above; light yellowish brown w purple zones; wet; subrounded	rith light reddish			
SS 16		9-15-17	233.4_	- 50		CLAYEY SAND (SC); medium yellow wet; subangular; poorly graded; fine to	ish brown; dense medium grained	;	Dry Bran	ch
SS 17	0	16-20-30	228.4_	55-		WELL GRADED SAND WITH CLAY yellowish brown with medium reddish b brownish yellow zones; very dense; wet graded; fine to coarse grained	prown and mediu	m i		
SS 18		12-19-23	223.4_	60 -	ľ	POORLY GRADED SAND WITH CL in places; medium brownish yellow with light reddish brown zones; dense; wet; s graded; fine to medium grained	AY (SP-SC), clay h white wisps and subangular; poorl	yey d ly		
SS 19		10-14-19	218.4	65		same as above; occasional coarse sand pellets	grains; black Mn	?		
SS 20		6-16-29	213.4_	- 70 - -	ľ	same as above; with interlayered mediu dark orange sand; black Mn? wisps; tra flattened quartz pebbles at top of interva	ce heavy mineral	ıd s;		
				-					HOLE NO.	
	T SPOON; ST = SHELBY TUBE; FIONARY PISTON; PB = PITCHER	JULE				FINAL LOG				B-10



G	SEC	OTE	CHN	lica	L L	OG	PROJE	ECT		APSF	JOB NO. APSF		ET NO. OF 5	HOLE NO. FB-10
SAMP. ITPE AND NO. SAMPLE	0	N-VALU RECOV ATT. LII	ERY %	6		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	1	<u> </u>	NOTES	ON: LEVELS, CTER OF IG AND ATORY
SS 21	:	<u>20 4</u>	06	0 5 7 1 1	30 - - - - - -	16-23-28	208.4_			LEAN CLAY (CL), trace sand; light bi dark orange laminae; hard; moist; med is fine to coarse grained; black Mn? pe	ium plasticity; sa	vith nd	Tan Clay	/ Interval
SS 22					۰ ۱ ۱ ۱ ۱ ۱	8-19-31	203.4_	- 80 -		POORLY GRADED SAND WITH CL brown; dense; wet; subangular; poorly medium grained; trace heavy minerals; interval is light yellow sandy clay	graded: fine to	ht		
SS 23						15-25-39	198.4_	- 85 — -		same as above; clayey in places; mediu very dense; black Mn? wisps; light yell clay	m yellowish brov ow interlaminated	vn; d		
SS 24			ο		1 1 1 1 1 1 1 1 1 1 1 1	25-39-31	193.4_	- 90 -		POORLY GRADED SAND (SP), trace with very light brown zones; very dense poorly graded; fine to medium grained; almost no clay in the top of the interval minerals	black Mn? pelle	ed:		
SS 25		0		1 1 1 4 4 1 4	1 1 1 1 1 1 1 1	26-23-30	188.4_	- 95 — -	· · · · · · · · · · · · · · · · · · ·	same as above; with clay at the bottom brownish yellow; light brown at the top	of the interval; li of the interval	ght		
SS 26			0			26-42-50	183.4_	- 100 -		same as above; trace clay; light brown;	black Mn? wisps	5	1/24/98 v 26.68 ft. not consi other me taken in i	vater level (Water leve stant with asurements
55 27 -					· · · · · · · · · · · · · · · · · · ·	17-24-33	178.4_	- 105 -	P	POORLY GRADED SAND WITH CL brown and light yellow; very dense; we poorly graded; fine to medium grained; also heavy mineral stringers	t; subangular;		borings.	icai o y
SS 28)			1 2 1 1 1 1 1 1 1 1 1 1		25-41-48	173.4_	- 110- -		no recovery			Plastic ca	atcher is go
		ON; ST	= SHEL			SITE		-		FINAL LOG			HOLE NO.	B-10



Ģ	SEC	TEC	CHN		L L	OG	PROJE	ECT		APSF	JOB NO. APSF		ET NO. OF 5	HOLE NO. FB-10
SAMP. ITPE AND NO. SAMPLE		N-VALU RECOVI	ERY %	6	<u> </u>	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION			LEVELS, CTER OF IG AND ATORY
SS 29		20 <u>4</u> (06	8 0	30	20-31-30	168.4_			POORLY GRADED SAND WITH CL medium brownish yellow; very dense; poorly graded; fine grained; black Mn? minerals	wet: subangular:	eavy	Santee	
SS 30	0				1 1 1 1 1 1 1	26-36-36	163.4_	120-		same as above; with interlaminated ver wisps	y light green clay	,		
SS 31)	•	1 1 1 1 1 1 1 1 1	34-33-36	158.4_	- 125 – -		same as above; color grades downward dark reddish brown; iron cemented san interval	l to light yellow; d nodule at top o	ſ		
SS 32					1 1 1 1 1 1 1 1 1 1	9-16-24	153.4_	130-		same as above; no light yellow zones; n	nedium dense		1/27/98 36.68 ft. not consi other wa	water level (Water leve stant with per level
SS 33						17-21-22	148.4_	- 135 -		CLAYEY SAND (SC), with clay string brown, light yellowish brown, and orar stringers; dense; wet; subangular; poor grained; trace heavy minerals; trace mi turritella shells	ige with light gre	en	readings	in the area.
SS 34						919-31-40	143.4_	140-		same as above; with no light green clay dense	v stringers; very			
SS 35					· · · · · · · · · · · · · · · · · · ·	7-18-36	138.4_	145 -		CLAYEY SAND (SC), with interbedde fine to coarse sand layers; medium yell orange zones and light brownish yellov dense; wet; subangular; poorly graded; mica; trace heavy minerals; silicified to	owish brown wit v mottles; very fine grained: trad	h	• ·	
<u>SS</u> 36			۵	- 4 1 1 1 1 1 1 1	- 1 1 1 1 1 1 1 1	<u>50/5in</u>	134.5_	150-		SANDY FAT CLAY (CH); very dark j very light green band; hard; wet; high fine to coarse grained; 'green clay'	grayish green wit slasticity; sand is	h	Warley I	fill
		ON; ST =				SITE	129.6_			FINAL LOG			HOLE NO	B-10



		EOT			AL L	06	PROJ	ECT			JOB NO.		ET NO.	HOLE NO.
ی ۲۰۰۰	7			UIVIC			<u> </u>	Γ		APSF	APSF	5	OF 5	FB-10
SAMP. TYPE AND NO. SAMPLE		ORE	alue (Cover 7. limit	Y %		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION		NOTES WATER CHARA DRILLIN LABOR TESTIN	LEVELS, CTER OF IG AND ATORY
SS 37	╞		40	60	80	50/4in			-	no recovery Total depth of boring 154.8 feet.			Hole aba	ndoned with x per 3Q5.
37										Total depth of boring 154.8 feet.			grout mi	x per 3Q5.
							457						· · · ·	. <u>-</u>
S = SPLIT S = STAT						SITE				FINAL LOG			HOLE NO	B-10



	~r						PRO.	JECT				JOB N		SHEET NO	1	HOLE NO.
	GE	OIE	CF	INI						APSF		A	PSF	1 OF		FB-11
SITE						C	OORDINA	TES			= (0.04		ANGLE	FROM HOR		
			APS							79317 E	54981 HOLE SIZE			WEIGHT/FA	90	TOTAL DEPTH
BEGUN	~~	COMPL				. .						[40 lb/			
2/19/ GROUNE		2/20			Grav	es/A. Jack	GED BY:	Fa	illing	g 1500	3 7/8 in	<u> </u>	40 10/	50 11		158.7
289		UEP ↓ ↓		GRC			GED BT.					N. Kid	d/SAT(~		
203	7.0 	<u> </u>	<u>/</u>				-1-1					111 1114		<u> </u>		
SAMP. TYPE AND NO. SAMDIE	j	N-VAL RECO ATT. L	VER	Y % S %	20	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFICA	TION	WA CH/ DRI LAE	ARAC	LEVELS, TER OF 3 AND TORY
├ ──┼	+-	20	40	60			289.8							Han	d aug	er to 6 feet to
SS 1 SS 2 SS SS 4 SS 5 SS 6 SS 7 SS 8 SS 9 SS 10 SS 11 SS				Δ	0	1-2-9 19-26-29 15-22-25 2-4-20 9-13-13 11-15-16 11-16-18 10-13-12 6-8-10 7-12-16 7-12-16 4-4-5 4-5-6	281.3 279.8 278.3 276.8 275.3 273.8 277.3 270.8 269.3 269.3			no soil recove very dense CLAYEY SA motiles; dens medium grair same as abov the interval; a same as abov same as abov same as abov same as abov same as abov same as abov same as abov clay construction same as abov same as abov	e; medium dense; ben ictual soil recovery is e with no bentonite e; dense	d with light poorly grade tonite is pre less (about (content; me um red; very tion is fine to d; loose; dat medium gra	cP1 push brown ed; fine to sent withi .3 feet) dium den: dium den: y stiff; to coarse	chec inter e ?); n se	acco F	underground ces.
12		5 7 1 1 1 1 1 1 1 1 1 1	• • • • •	 	1 1 7 5 2 1		257.8									
SS = SPL						SITE								HOLE	E NO.	2 11
PS = STA		ARY PIS	TON;	PB = f	PITCHER					FINA	LLOG				17	3-11



GEOTECHNICAL	LOG	PROJ	ECT		APSF	JOB NO. APSF	SHEE	T NO. OF 5	HOLE NO. FB-11
H O RECOVERY % d O RECOVERY % d O RECOVERY % d O RECOVERY % d O RECOVERY %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	4,		NOTES WATER	ON: LEVELS, CTER OF G AND ATORY
20 40 60 80 SS I3 O O SS I4 O O	3-2-5	252.8_ 251.3_	- 40-		same as above; loose same as above; medium red, medium p yellow; dense	urple, and mediu	ım		
SS 15	6-9-11	246.3_			same as above; some zones contain less brownish yellow with white wisps; med subangular; poorly graded; fine to medi	ium dense; moisi	t;		
SS 16	11-16-20	241.3_	50-	P	POORLY GRADED SAND WITH CL/ medium yellowish brown with dark bro wet; subrounded; poorly graded; mediur	wn wisps; dense;			
SS 17	5-11-14	236.3_	55-	7]]	CLAYEY SAND (SC); medium browni dense; wet; subangular; poorly graded; f grained	sh yellow; mediu ine to medium	um	Dry Bran	ch
SS 18	12-18-17	231.3_	60		same as above; with medium gray zones	; dense			
SS 19	16-22-17	226.3_	65-	P	POORLY GRADED SAND WITH CLA in places; very light brown and very ligh with white wisps; dense; wet; subangula fine to medium grained	t brownish yello	w	. ·	- -
SS 20	9-15-13	221.3_	- - - 70		same as above; medium dense; trace mid	28			
SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHER	SITE	216.3_	-		CLAYEY SAND (SC); some zones con interbedded clay layer at bottom of inter grading downward to grayish red; loose; poorly graded; fine to medium grained FINAL LOG	val: medium red	r,	IOLE NO.	B-11



	250	TE	പ		A I 1	00	PROJ	ECT	·		JOB NO.	1	ET NO.	HOLE NO.
	JEC		CH	NIC		.06			,	APSF	APSF	3	OF 5	FB-11
SAMP. TYPE AND NO. SAMPLE	О F + 4	1-VALI RECO\ \TT. LI	/ERY	° %	80	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND ATORY
SS 22					1 1 1	8-11-12	211.3_	80-		same as above; interbedded sandy lean brownish yellow with white wisps and o dark gray mottles; medium dense	clay; medium lark brown and		Tan Clay	Interval?
SS 23				· · · · · · · · · · · · · · · · · · ·		10-24-22	206.3_			POORLY GRADED SAND WITH CL. brown with light brownish yellow zones subangular; poorly graded; fine to medi	s; dense; wet;	ıt		
SS 24		0	* * * * * * * * * *	1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1	27-50-50/5i	n 201.4_	- 90		POORLY GRADED SAND (SP) trace very dense; wet; subrounded; poorly gra medium grained	clay; light brown ded; fine to	:		
SS 25		0				15-23-26	196.3_	- - - 95 –		same as above; dense; trace heavies				
SS 26		1		0		6-14-27	191.3_	- - - 100		CLAYEY SAND (SC); some zones are medium brownish yellow with white wi subangular; poorly graded; fine to medi pellets (Mn?)	sns: dense: wet:	k		
SS 27				t 1 1 1 1 1 1 1 1		26-50-44	186.3_	- - - 105 –		POORLY GRADED SAND (SP) trace contain slightly more clay, light brown a yellow; very dense; wet; subrounded; po medium grained	and brownish		·	
SS 28		· · · · · · · · · · · · · · · · · · ·				19-37-45	181.3_	- - - 110-		same as above except no brownish yello	w color			
SS 29 SS 30			i	1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1		2-2-3 7-8-13	176.3_ 174.8	-		FAT CLAY (CH) with interlaminated s sandy in places; white and very light bro plasticity; sand is fine to coarse grained shell fragments: black pellets (Mn?) SANDY FAT CLAY (CH); with interla	own; firm; wet; h ; possible weathe	igh red 1	Santee	
SS = SPLI PS = STA						SITE				FINAL LOG	<u> </u>			B-11



G	EOTECHNICAL I	.OG	PROJ	ECT		APSF	JOB NO. APSF		ET NO. OF 5	HOLE NO. FB-1
P. TYP	▲ N-VALUE (SPT) O RECOVERY % + ATT. LIMITS %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SSIFICATION			LEVELS, CTER OF G AND ATORY
	20 40 60 80					clay layers; very light green with med mottles; very stiff; wet; high plasticity medium grained with occasional coar pellets (Mn?)	sand is fine to	wn		
SS 31	0	12-24-33	169.8_	- 120 —		CLAYEY SAND (SC); very light bro brownish yellow; very dense; wet; sut graded; fine grained; black pellets (M	wn and medium vangular; poorly n?)			
SS 32		18-34-43	164.8_	- - 125 -		POORLY GRADED SAND WITH C medium brownish yellow; very dense; poorly graded; fine grained; trace hear	wet: subangular:			
SS 33		22-26-44	159.8_	- - 130-	Ľ	same as above with wisps of light gree	en clay			
SS 34		24-28-24	154.8_	- - 135 -	Y	same as above; medium yellowish bro mottles	wn with light yello	w		
SS 35		20-23-17	149.8_	- - 140		same as above; light yellowish brown laminae; dense; the very top of the into orange clayey sand, which grades dow interval (color and clay content); turrit of interval	erval is medium			
SS 36		O ₁₁₋₂₆₋₃₀	144.8_	145 -		FAT CLAY (CH); sandy in places; lig hard; wet; high plasticity; sand fractio turritella shell fragments	n is fine grained;		Warley H	ill
SS 37		015-11-20	139.8_	150-		SANDY FAT CLAY (CH); medium y brownish yellow with light green wisp plasticity; sand is fine to coarse graine	ellowish red and s; hard; damp; hig d	h		
SS 38	0	28-37-40	134.8	-	ľ	POORLY GRADED SAND WITH C medium yellowish brown; very dense;	LAY (SP-SC); wet; subrounded;		Congaree	
	SPOON; ST = SHELBY TUBE; DNARY PISTON; PB = PITCHER	SITE				FINAL LOG				B-11



		TEC				00	PROJE	CT					ET NO.	HOLE NO.
C	5EO	TEC	HN			UG				APSF	APSF	5	OF 5	FB-11
SAMP. TYPE AND NO. SAMPLE	0 R + A	I-VALU ECOVI .TT. LIN 0 40	ERY % /ITS %	/o /o	30	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS			NOTES WATER CHARA DRILLIN LABOR/ TESTIN	LEVELS, CTER OF G AND ATORY
		<u> </u>	<u> </u>							poorly graded; medium to coarse graine	ed (congaree ?)			
			•			.50-50/2in	131.1_	-		A small amount of clayey and sandy/grapulled from the shoe. this material is pr	avelly material w obably sloughed	as		
										· · · · · · · · · · · · · · · · · · ·				
SS = SPL	IT SPO	ON; ST =	SHEL	BY TUE	: BE;	SITE							HOLE NO.	
PS = STA			ON: PB	= PITC	HER	1				FINAL LOG			F	B-11



GEOTECHNICAL LOG Mark APSF APSF APSF APSF APSF PD12 BITE APSF							PRO	JECT				JOB NO	D.	SHEET NO.	HOLE NO.
NT 79376 E 55003 M 79376 E 55003 M 79376 Same 5500 Same 55000 Same		GE	OTE	СН	NICAL					APSF					
Description COMPLETED GRULER OPALL EXEMPTION DOIL OFFICE SAMPLE HAMARE WEIGHT FALL OTAL DEFIN 2027798 3.378 /sin 1401 Ib/3 0 in 156.3 360000 EL DEFINITEL GROUND WATER LOGGED BY. N. Kidd/SALC 208.9 ¥ / N. Kidd/SALC N. Kidd/SALC 209 A. N-VALUE (SPT) Stress Stress Stress Stress 20 40 60 80 288.9 Y N. Kidd/SALC 20 40 60 80 288.9 Y O CLVEY (2MD (SC) median red. loore; mediant down of the stress with diver and by graded. Ento the strest and by graded. Ento the stress with dinter and by graded. Ent	SITE					C	OORDINA	TES				. /	ANGLE F		ITAL
CLAUPE Construction Failing 1500 3 7/8 in 140 lb/ 30 in 156.3 CROUND L. DEPTHEL CROUND WATER CLAUPE LOGGED BY: Land N. Kidd/SAIC N. Kidd/SAIC 28.9 Construction Street Street N. Kidd/SAIC N. Kidd/SAIC u Street A. M-VALUE (SPT) O. RECOVERY % Street Street Street N. Kidd/SAIC u Street A. M-VALUE (SPT) O. RECOVERY % Street Street DESCRIPTION AND CLASSIFICATION CHARGE/ER OF DESCRIPTION AND CLASSIFICATION NOTES ON: WHERE REVELS, WHERE REVELS, WHERE REVELS Street Street Street Street Street Street												1			r
SR A O SK SK SK SK CLAYEY SAND (SC), medium rod, losse; modil: subagilar, poorly graded, fine to medium grained MOTES ON: WATER LEVELS, CHARACTER OF VARACTER OF CHARACTER OF VARACTER OF CHARACTER O					DRILLER										1
288.9 ¥ / N. Kidd/SATC u A B								Fa	ilin	g 1500	3 7/8 in	14	10 Ib/ 3	30 in	156.3
H Normalized Normalico Normalico Normalico					GROUND WA	TER LOG	GED BY:					N KIAA	USATC	n e	
E E	28	88.9	¥ /					1				N. Kluu	ISAIC	<u> </u>	
SS A O 12-6 SS A O 12-6 SS A O 12-6 SS A O 12-7 SS A O 12-17 S	SAMP. TYPE AND NO.) RECO	VERY	% %	BLOW COUNT		-	GRAPHICS	DESC	RIPTION AND CL	ASSIFICAT	TION	WATEF CHARA DRILLII LABOR	LEVELS, CTER OF NG AND ATORY
SS A O 1-2-6 SI CLAYEY SAND (SC), medium red, loose; moist; subagalar, poorly graded; fire to medium grained SS A O 8-12-17 281.4, same as above; medium dense SS A O 8-12-17 278.4, same as above; clay content increases with each or medium grained SS A O 8-12-17 278.4, same as above; clay content increases with each or medium grained SS A O 8-12-17 276.9, same as above; clay content increases with each or medium grained SS A O 8-12-27 275.4, same as above; clay content increases with each or medium grained SS A O 8-18-20 273.9, 15 same as above; fire to lower medium grained SS A O 12-12-17 276.4, same as above; fire to lower medium grained same as above; fire to lower medium grained SS A O 12-12-17 276.9, same as above; fire to lower medium grained same as above; medium donse SS A O 12-12-17 276.9, 276.9, 276.9, 277.9, 277.9, 277.9, 266.9, 277.9, 277.9, 266.9, 277.9, 266.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 267.9, 277.9, 266.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.9, 277.				<u>40</u>			288.9	<u>'</u>			····			Hand au	ger to 6 feet to
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.	1 SS 2 SS 3 SS 4 SS 5 5 5 8 SS 6 SS 7 SS 8 SS 9 SS 10 SS 11					8-12-17 8-13-22 8-12-13 7-12-17 8-18-20 14-15-20 12-12-17 11-19-19 12-7-7 4-5-5	279.9 278.4 276.9 275.4 273.9 272.4 270.9 269.4 267.9	- - - - - - - - - - - - - - - - - - -		subangular; j same as abov same as abov same as abov interval POORLY GI red; dense; m medium grai same as abov same as abov same as abov same as abov	poorly graded; fine to re; medium dense re; dense re; dense re; clay content is con RADED SAND WITH noist; subangular; poo ned re; fine to lower medi re; medium dense; fin re; dense; borderline c re; medium dense AND (SC); medium re poorly graded; fine gr oarse grains	redium grain y content incr sistent through H CLAY (SP- rly graded; fin um grained e to medium g clayey sand ed; loose; moi ained; occasio	eases with h the SC); light te to grained st; mal	h Tobacco	nces.
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE HOLE NO.			1 - - - -	• • • • • • •					-						
FINAL LOC FR-12	<u> </u>			- 00		ISITE			V/	L					
	1									FINA	L LOG			F	B-12

•



GEOTECHNICAL L	LOG PROJECT JOB NO. APSF APSF						SHEET NO. HOLE NO. 2 OF 5 FB-12
W. H. H. H. H. H. H. H. H. H. H	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS		NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
SS 	10-15-18	252.9_	-		same as above; light reddish yellow; mo medium grained	ist; fine to lower	
SS 14	14-21-25	247.9_	40	Ľ	POORLY GRADED SAND WITH CLJ borderline trace clay; light reddish yello bands; dense; damp; subangular; poorly medium grained	w with medium r	ed .
SS 15 ○	8-14-18	242.9_	45 -	Ű	CLAYEY SAND (SC); light reddish ye yellowish red zones and white wisps; de subangular; poorly graded; fine to medi	nse: moist:	
SS 16	18-30-25	237.9_	50 — - - -	ľ	POORLY GRADED SAND WITH CLA medium brownish yellow; very dense; n poorly graded; fine to medium grained	Y (SP-SC); ooist; subrounded	; Dry Branch
SS 17	9-14-23	232.9_	55		CLAYEY SAND (SC); medium yellow with dark yellowish brown zones; dense; moist; subangular; graded; medium grained		Water level 16.92 ft. This water level reading is inconsistant with the water level measurements from other borings in the area.
18	75-25-34				POORLY GRADED SAND WITH CLAY (SP-SC); medium brownish red; very dense; wet; subangular; poorl graded; fine to medium grained		ly
	25-19-21 222.9 65 - 65 - 65 - 65 - 65 - 65 - 65 - 65 -				w:		
	18-21-28	217.9_	70		same as above; trace heavies		
SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHER	SITE			<u>/</u> ./	FINAL LOG		HOLE NO. FB-12



G	GE	OTE	CHN		AL L	OG	PROJ	CT		APSF	JOB NO. APSF	SHEE	T NO. OF 5	HOLE NO. FB-1	
AND NO. SAMPLE		N-VAL RECO	.UE (SF VERY	РТ) %	<u> </u>	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLA			NOTES	ON: LEVELS, CTER OF IG AND ATORY	
SS 1		20	40 (50	80	19-25-21	212.9_			CLAYEY SAND (SC); light brownis subangular; poorly graded; fine to me mottles (Mn?); flat quartz pebbles at heavies	h yellow; dense; w dium grained; blac top of interval; trac	ret; ck ce			
SS 22				- - - - - - -	1 1 1 1 1 1 1 1 1	3-6-10	207.9_	- 80 -		SANDY LEAN CLAY (CL); mediun white, and medium orange; very stiff; plasticity sand is fine to medium grain	wet; medium		Tan Clay Interval		
SS 23				•	4 6 7 8 8 8 8 8 8 9 9 8	32-35-31	202.9_	- 85 — -		No recovery					
SS 24		4			0	9-18-18	197.9_	- - 90 - - -		POORLY GRADED SAND WITH C borderline clayey sand; light brownist subangular; poorly graded; fine to me heavies	LAY (SP-SC); 1 yellow; dense; we dium grained; trac	et;			
SS 25		· · · · · · · · · · · · · · · · · · ·		I 8 8 8 4 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8	, , , , , ,	16-21-30	192.9_	- - 95 - -		same as above; some areas have trace light reddish brown with areas of ligh very dense	eas have trace clay; light brown at areas of light brownish yellow;				
SS 26		0		• • • • • • • • • • • • • • • • • • •	: ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	16-20-22	187.9_	- - 100 — -		same as above; light brownish yellow dense; moist; black pellets (Mn?)	and light yellow;				
SS 27		O	- - - - - - - - - - - - - - - - - - -		- - - - - - - - - - - - - - - - - - -	28-29-41	182.9_	- 105 — -		POORLY GRADED SAND (SP) trac very dense; wet; subrounded; poorly g medium grained; trace heavies; black	raded; fine to	ı;			
SS 28	0				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	18-16-17	177.9_	- - - - -	P	POORLY GRADED SAND WITH C brown; dense; wet; subrounded; poor medium grained with occasional coar heavies	ly graded; fine to	ht			
		POON; ST				SITE		-		FINAL LOG			HOLE NO.	B-12	



	GEOTECHNICAL LO	G PROJECT	B PROJECT JOB NO. APSF APSF												
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60 80	ELEVATION ELEVATION IN FEET DEPTH IN FT													
SS 29 SS 30	WR/1	6in-5/2in -24-36 171.4_	CLAYEY SAND (SC); medium yell- wet: subangular, poorly graded; fine same as above; zone of very sticky sa dense; fine to medium grained	wish brown; loose; rrained: trace heavies ndy fat clay; very	Santee										
SS 31	O 🔺 17-	-27-42 166.4_	POORLY GRADED SAND WITH C yellowish brown; very dense; wet; sul graded; fine to medium grained; trace	LAY (SP-SC); light angular; poorly heavies; trace mica											
SS 32	O ▲ <u>2</u> 6-	125 	same as above	same as above											
SS 33	▲ ○ 17-	130 12-28 156.4_	same as above with white bands; den medium grained	e; fine to lower											
SS 34	▲	-7-8 151.4_	CLAYEY SAND (SC); medium redd light brown zones; medium dense; we graded; fine grained; black mottles (N	sh brown with very t; subangular; poorly In?); trace heavies											
SS 35	4	-3-7 146.4_	same as above; loose; clay content is	lightly higher											
SS 36	▲ 6 12-		SANDY FAT CLAY (CH); very light brownish yellow with medium orange downward to dark orange; hard; wet; is fine to medium grained; trace heav	wisps; color grades high plasticity; sand	Warley Hill										
SS 37	O 🔺 11-34	4-5073ih 136.6_	with light green												
1		SITE	IS = SPLIT SPOON; ST = SHELBY TUBE; SITE FINAL LOG												



C	GEOTECHNICAL L	OG	PROJE	CT		ADOF				SHEET NO. HOLE NO. 5 OF 5 FB-12		
						APSF	APSF	5	OF 5	FB-12		
SAMP. TYPE AND NO. SAMPLE		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION		NOTES WATER CHARA DRILLIN LABOR/ TESTIN	LEVELS, CTER OF IG AND ATORY		
	20 40 60 80											
88 38		-50/4in-	132.6_		_	Total depth of boring 156.3 feet.			Hole abandoned with grout mix per 3Q5.			
							-		• •			
		SITE							HOLE NO			
	IT SPOON; ST = SHELBY TUBE; TIONARY PISTON; PB = PITCHER	SILE				FINAL LOG			F	<u>B-12</u>		



			OT	FOU			00	PR	OJECT				JOB NO.		HEET NO.	HOLE NO.
	G	5E		ECH	INIC	CAL L	UG				APSF	•	APS		1 OF 3	FB-13
SITE								COORDIN	ATES			- 1001	A	NGLE FR	OM HORIZON	ITAL
BEGUN			00145	APS	SF	<u></u>					79314 E	54981 HOLE SIZE	SAMPLE HAN		90	TOTAL DEPTH
3/5				5/98	DRILL				1		g 1500	3 7/8 in	1) lb/ 3(117.5
GROU					GRO	UND WATE	s/S. Ro	OGGED BY		41111	<u>g 1300</u>	<u> </u>		10/ 50	/ 111	11/.5
	<u>89</u>			1									N. Kidd/	SAIC		
	Ť	<u> </u>					1									
₁₁₁			N-V/	ALUE (SPT)			7							NOTES	
SAMP. TYPE AND NO.	Ш	0	REC	OVER	Y %		≥₹	ELEVATION IN FEET	Z	ļΫ					WATER	LEVELS,
e Ģ	ME						BLOW		L S L S L Z L H H H H H H H H H H H H H H				ASSIFICATI	ION	DRILLIN	CTER OF
AN	S	+	ATT.	LIMIT	5%		0			ц Б					LABOR/ TESTIN	ATORY
					~~									,		0
	┼┤		20	40	60	80		289	./				<u> </u>		Hand au	ger to 6 feet to
			i i	1	1	1				4					check to interfere	ger to 6 feet to r underground nces
			+	1 1	1	1				4						
			1 1	i I	+	1				1						
			t t		1	1				. 1						
			i i	•	1	1			-	5-						
			•	•	*	1				1						
			1			i i				4						
			1 4	:	:	I I				4						
				,	•	1			10)-						
					1	l l				-						
			i i					5		-						
				:				-		-						
			•	;		i				4						
			t I	: :	•	1			15	5-1						
			1 1	:	4 4	1]			_			
			•	:	+	1]			•			
			:		:	1				1						
			+ 1			-			20	<u> </u>						
			:													
			•		:	1				4						
			1			1				-						
			÷			1				-						
					•	1	 D		25	5-						
ST 1						•	Ĭ				<pre>SANDY LE medium red;</pre>	AN CLAY (CL); bord damp; medium plasti rained	icity; sand fracti	i sano; ion is fine	250 psi,	rest 15 min.
	Щ		:			1		262	.2_	-1///	to medium g	rained				
			;							1						
:		• •	1		1 1	:			3(_ <u>_</u>		· · · · · · · ·				- · · ·
			•		•	1			36	`]						
			•	•		1				-	,					
			1	,	י י	!				4						
			1		1	, 				4						
			i		i i	I I			3:	5-						
1					:	I I				+						
			t t		, 1	1	1			+						
			с 8	•	1	I I				1						
			1	1	1	1 1				1						
SS = S	PLI	T SF	OON;	ST = SH	IELBY	TUBE;	SITI	SITE							HOLE NO	
PS = S	TA	TION	ARY F	ISTON;	PB = F	ITCHER					FINA	L LOG			<u> </u>	<u>B-13</u>



GEOTECHNICAL LO	CG	PROJ	ECT		JOB NO. APSF APSI		EET NO. 2 OF 3	HOLE NO. FB-13
$ \begin{array}{c} \mathbf{H} \\ \mathbf$	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIFICATIO	WATER CHARA DRILLIN LABOR	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING	
			1					
			45					
			-					
			50-					
			-					
			- 55					
			-					
			60 -					
			-					
			65					
			1					
			1					
			70 -					
			-					
ST I	•		75 -		POORLY GRADED SAND WITH CLAY (SP-SC)		200 psi,	rest 15 min.
2		212.7_ 211.7_	-		POORLY GRADED SAND WITH CLAY (SP-SC) medium reddish brown with light yellow, purple, an clay stringers; wet; subangular; poorly graded; fine medium grained LEAN CLAY WITH SAND (CL); sandy in places; light tan, white, and brown; wet; medium plasticity; fraction is fine grained; trace heavies	d white to black,	ſ	
			80-		light tan, white, and brown; wet; medium plasticity; fraction is fine grained; trace heavies	sand		
			-					
			- 85 —					
S = SPLIT SPOON; ST = SHELBY TUBE; S = STATIONARY PISTON; PB = PITCHER	SITE			·	FINAL LOG		HOLE NO	B-13



GEOTECHNICAL LO	06	PROJE	ст			JOB NO.	SHEET	1	IOLE NO.
A N-VALUE (SPT) O RECOVERY % O RECOVERY % H ATT. LIMITS %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	APSF DESCRIPTION AND CLASS	APSF	N C D L	OTES C VATER L HARAC PRILLING ABORA	EVELS, TER OF AND TORY
			90						
ST O		173.2_ 172.2_			CLAYEY SAND (SC); (may be slough medium brown with white wisps; wet; s graded: fine to medium grained SANDY LEAN CLAY (CL); light green medium plasticity: sand fraction is fine. Total depth of boring 117.5 feet.	ed material); subangular; poor nish yellow; wet; grained	y y H g	-	st, 10 min. doned with per 3Q5.
S = SPLIT SPOON; ST = SHELBY TUBE; S = STATIONARY PISTON; PB = PITCHER	SITE				FINAL LOG		н	OLE NO. FI	8-13



			13.11/		~~~	PRC	JECT		· · · · · · · · · · · · · · · · · · ·		JOB N	0.	SHEET NO.	HOLE NO.
	5E(DTECH		JAL L	.OG				APSF		A	PSF	1 OF	
SITE						COORDINA	TES					ANGLE	FROM HORI	,
		AP		50					79437 E	54990 HOLE SIZE		AMMER	9 WEIGHT/FAL	
BEGUN		OMPLETER				•			g 1500	3 7/8 in		40 lb/		80.0
3/6/9 GROUND		3/6/98 DEPTH/E	L GRO	UND WAT		odgers LOGGED BY:			g 1300	J //0 III	I	40 10/	<u> </u>	00.0
287		♀ / ¥ /									N. Kide	d/SAI	С	
				****	<u> </u>			T		an a				
SAMP. TYPE AND NO. SAMPLE	▲ ○ + /	N-VALUE RECOVER	RY %		BLOW		DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	.ASSIFICA	TION	WAT CHA DRIL	ES ON: ER LEVELS, RACTER OF LING AND DRATORY FING
	ļ:	20 40	60	80		287.:	2							
ST [0	267.	25 - 30 - 35 - 35 - 35 - 35 - 35 - 35 - 3						700 p	si, rest 15 min.
ST I				1 1 1 1		214. 213. 208. 207.	2 ⁻ 75-		medium red; grained; coul same as abov Vellow: fine t SANDY LEA clay; medium Wet: medium CLAYEY SA subangular; t mica: trace h	ADED SAND WITH wet; subangular; poo d be washed out mate o medium grained AN CLAY (CL); with red, white, and medi plasticity; sand fracti MD (SC); medium b poorly graded; fine to eavies of boring 80 feet	rly graded; m rial iyey; medium interbedded ium brownish ion is coarse rownish vello	light yell yellow; grained	h ow Hole grout	si, rest 15 min. si, rest 15 min. abandoned with mix per 3Q5.
SS = SPL	I IT SPC	ON; ST = S	HELBY	TUBE;	 sr	re		<u> </u>	l				HOLE	
PS = STA		RY PISTON	; PB = P	ITCHER					FINA	L LOG				FB-14



[~					~~~	DG PROJECT JOB NO. S APSF APSF								HOLE NO.
	G	EOI	ECF	INIC	CALI	JOG				APSF	•	A		1 OF 3	FB-15
SITE							COORDIN	TES					ANGLE F	ROM HORIZO	NTAL
			APS	SF						79179 E				90	170741 000711
BEGUN			PLETED	DRILL						ND MODEL	HOLE SIZE			VEIGHT/FALL	TOTAL DEPTH
3/6			9/98		Grav	es/S. Ro	odgers OGGED BY:		ilin	g 1500	3 7/8 in	1	40 lb/ 3	50 in	115.0
GROUN			EPTH/EL ! / ! /	GROL	UND WAT		OGGED B1					N. Kid	A/SATC		
	91.	/ 1			.	<u></u>	<u> </u>					14. 1644	<u>u/0/110</u>	<u> </u>	
SAMP. TYPE AND NO.	SAMPLE	O REC	ALUE (COVER . LIMIT	Υ%		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	CRIPTION AND CL	_ASSIFICA	TION	CHARA DRILLI LABOF	R LEVELS, ACTER OF NG AND ATORY
S :														TESTI	٩G
	_	20	40	60	80		291.	7		·····					
ST 1						0	266. 265.	-		in places; me medium to c SILT (ML);	RADED SAND WITH dium red; moist; sub oarse grained: may be dark red, very light re- wisps of clay; moist; b	angular; poor washed out d, and white	rly graded; material with very	ey 400 psi	rest 15 min.
SS = SI	PLIT	SPOON	ST = SH	ELBY	TUBE;	SIT	E							HOLE N	
PS = ST	ΤΑΤΙ	IONARY I	ISTON;	PB = P	ITCHER		FINAL LOG FB-15								



GEOTECHNICAL LO	DG PRC	JECT	JOB NO. APSF APSF	SHEET NO. HOLE NO. 2 OF 3 FB-15
W O O C O W V O RECOVERY % O RECOVERY % O C V V V V O V V V V V V V V V V V V V	BLOW COUNT ELEVATION IN FEET	DEPTH IN FT		NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
		45-		
		50-		
		55-		
		60		
		65		
		70-		
ST 2 ST 3	, 211. 210. 209.	7 *	POORLY GRADED SAND WITH CLAY (SP-SC); medium brownish yellow; wet; subangular; poorly grader fine to coarse grained; sample was falling out of tube wh withdrawn from the hole CLAYEY SAND (SC); medium brownish yellow; wet; subangular; poorly graded; fine to medium grained with occasional coarse grains LEAN CLAY (CL): interlaminated sands; light brownish	d; en 500 psi, rest 15 min. 500 psi, rest 15 min.
SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHER	SITE	85-	LEAN CLAY (CL); interlaminated sands; light brownish yellow with medium brownish yellow zones and black wisps; wet; medium plasticity; sand is fine to medium grained; black wisps (Mn?) FINAL LOG	HOLE NO. FB-15



G	EOTECH	INICAL	LOG	PROJ	ECT			1 (SHEET NO. HOLE NO	
				<u> </u>	T		APSF	APSF	3 OF 3	FB-1
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (○ RECOVER + ATT. LIMIT 20 40	Υ%	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND	CLASSIFICATION	CHARA	LEVELS, CTER OF NG AND ATORY
ST 4			Φ	190.7_	90- - - - - - - - - - - - - - - - - - -		CLAYEY SAND (SC); some a light brown with white and ver subangular; poorly graded; fine mottles (Mn?)	zones are sand with clay; y light yellow mottles; wet; e to medium grained; black	350 psi,	rest 15 min
ST 5		0		176.7_	- 110- - - 115-		same as above; zones of sandy with light gray and white zone: Total depth of boring 115 feet.	5	n 700 psi, Tube is c bottom Hole aba grout mi	rest 15 min rushed at tl ndoned wit x per 3Q5.
SS = SPLIT	SPOON; ST = SH	ELBY TUBE;	SITE						HOLE NO	B-15

•



	(20	ΛΤ		JN			OG PROJECT JOB NO. APSF APSF								SHEET NO.	HOLE NO.	
												APSF	•			1 OF 3	FB-16	
SITE					a			C	OORDIN	ATES			C 400 0		ANGLE F	ROM HORIZO	NTAL	
BEGU			CON	AP								79212 E	54889 HOLE SIZE			90 WEIGHT/FALL	TOTAL DEPTH	
3/9		0		1/98	1		~	./C 10 . 4				g 1500	3 7/8 in		40 Ib/ 3		120.0	
GROU								s/S. Roda	GED BY:			<u>g 1300</u>	5 //0 II	1	TU IU/ .	<u>50 m</u>	120.0	
	90		▼	1										N. Kidd	I/SAIC	2		
	T								1	Τ	Ι	- <u>-</u> ,						
ω			N-V/	ALUE	(SPT	7			z		6					NOTES	ON.	
l₽ġ	Щ	0	REC	OVEF	λ Υ %	1		≥₽	5 E	Ž	Ű₽					WATE	R LEVELS,	
SAMP. TYPE AND NO.	NF						-	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	_ASSIFICA	TION		ACTER OF NG AND	
NAS A	Ś	+	AH	. LIMIT	15 %)		-0		DE	ŋ					LABOR	ATORY	
			~~	40	~				290.							1201		
			20	40	<u> </u>	<u>1 80 (</u>			290.	<u>-</u>						Hand a	iger to 6 feet to	
			1	1	T I	;					1					interfere	iger to 6 feet to or underground ences.	
			1	1	1	1					1							
1			1	1	1	. 1]							
1			1	;	1	ł				5-								
				1	1	:												
			1	1	r I	4												
			1	1	1	1												
			1	1	I I	t 1					$\left \right $							
			i i	1	1	,				10-								
			1		1	1												
			1		1	•					$\left \right $							
1			1		1	1					$\left \right $							
			1	į		i i	1											
ST			ı I	1	1	:		P	274.	15-	$\overline{\mathbf{V}}$	CLAYEY SA	AND (SC); medium re d: fine grained /e; medium brownish	ed; damp; sub	angular;	500 psi,	15 min.	
			r N	1	1	,		:	273.		\mathbb{Z}	same as abov grained; trace	e; medium brownish	yellow; fine to	o mediun	n		
	T		i i	:	1	:						giameu, uaca	e neavies					
			1 1	•	1													
			i	:	•	1				20-								
			1		1	:												
			1 1	:	1	4 :				.	$\left \right $							
			1	•	1	•					$\left \right $							
			1	:	!	;												
			ł	•	, ,					25-								
			1			:					1							
			i	•	:						1							
			1	۱ ۱	;													
· ·			1	1 1	1	· •		•••		30-								
			1	1	1	1												
			1	1 1	!	1					$\left \right $							
			1	, , ,	1						4							
			1	1	1	1					+							
1			i I	1	1	1 1				35-	-							
1			i I	ı I	1						-							
			1 1	:	1	1 1			1		-							
			L F	1	1	f				ŀ	1							
			1	1		1					1							
SS = S	S = SPLIT SPOON; ST = SHELBY TUBE;															HOLE NO.		
PS = S	TA	TION	ARY F	ISTON	; PB =	PITCH	ER			FINAL LOG						FB-16		



G	GEOTECHNICAL LO	G PROJECT	JOB NO. APSF APSF	SHEET NO. HOLE NO. 2 OF 3 FB-16
SAMP. TYPE AND NO. SAMPLE		BLOW COUNT IN FEET DEPTH IN FT GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
		45 - -		
		50		
		55-		
	1 1 1 1 1 1 1 1 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 - 1 1 1 -	60-		Lost 800 gallons of water. See *
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	65-		
		70-		
		80-		
ST 2		85-	EAN CLAY WITH SAND (CL); sandy in places; nterbedded sand stringers; medium brownish yellow,	350 psi, rest 15 min.
	IT SPOON; ST = SHELBY TUBE; NTIONARY PISTON; PB = PITCHER	SITE .	FINAL LOG	HOLE NO. FB-16



GEOTECHNICAL L	OG	PROJ	ECT		APSF	JOB NO. APSF		et no. Of 3	HOLE NO. FB-16
A N-VALUE (SPT) A N-VALUE (SPT) C N A C	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS			NOTES WATER CHARAC DRILLIN LABORA TESTING	LEVELS, CTER OF G AND TORY
		204.1	-		white, and light red; wet; medium plasti medium grained; this zone is highly vari sand content	city; sand is fine iable with respec	to to		
			90— - -						
ST J)		- 95 — -		CLAYEY SAND (SC); medium browni light yellow and white zones; wet; subar graded; fine to medium grained; black w	sh yellow with		250 psi, r	est 15 min.
		191.1_	- 100 — -	Z	graded; fine to medium grained; black w	iguiai, poorry visps (Mn?)			
	-		105 -						
			- - 110					ſ	
			115 - -			·		Lost circu	lation at 118
			- 120 -		Total depth of boring 120 feet,			Lost over gallones c "After lo circulation buckets o pellets we the hole a to hydrate approxim Tried to r drilling ar feet, rods the hole. took an ar gallons of Hole fina	of water. ss of n two f bentonite f bentonite ire placed in nd allowed : for ately 1 hour. esume to after 60 got stuck in The hole ditional 800
SS = SPLIT SPOON; ST = SHELBY TUBE; PS = STATIONARY PISTON; PB = PITCHER	SITE				FINAL LOG			HOLE NO.	B-16



GE	OTECH	NICAL L	.OG	PRO	JECT		APSF		JOB N	io. PSF	SHEET NO.	HOLE NO. FB-16A
SITE			C	OORDINA	TES						FROM HORIZON	ITAL
BEGUN	APS COMPLETED						79207 E	54890 HOLE SIZE			90 WEIGHT/FALL	TOTAL DEPTH
3/11/98	3/12/98		es/S. Rodg				g 1500	3 7/8 in		40 lb/		116.0
GROUND EL.	DEPTH/EL.	GROUND WAT		GED BY:			-		_1			
290.1	♀ / ¥ /			<u></u>			<u>,,</u>		N. Kid	d/SAI	<u>C</u>	
	N-VALUE (S RECOVER) - ATT. LIMITS	(% 5 %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND C	LASSIFICA		CHARA	LEVELS, CTER OF NG AND ATORY
				290.	1 5 10 15 20 30 35 40 45 50 60 65 70 75 80 90 105 100 115		Total depth o	f boring 116 feet.			Advance mude ro resume s 118 ft, b circulati depth in Lost circ fect. Hole aba	ger to 6 feet to r undergroune nces. = hole with tary method to iampling at ecause of lost on at that hole FB-16.
	POON; ST = SH		SITE				TUTNIA	L LOG			HOLE NO	B-16A
PS = STATIO	NARY PISTON; I	PB = PITCHER										



^

APSF-NE N 79244 E 55520 90	SITE			<u> </u>	NIC			COORDINA	TES	NO	rtheast Ex	pansion	I	IEX ANGLE	FROM HORIZ	
BEGUN COMPLETED DRALLER DOWL THE ADDR ADD VOICE DOWL THE ADDR ADD VOICE SAMPLE FAMILE AVECHT/FAUL TOTAL DEF 413308 420308 3.0000 BL Commingham Offers Failing 1500 3.78 in 140 1b/30 in 145.0 GROUND EL DEFUNEL GROUND WATER COORED DY: N. Kidd/SAIC N. Kidd/SAIC 283 4 N-VALUE (SPT) State State DESCRIPTION AND CLASSIFICATION WTER LEVELS, CHARACTER OF 20 40 60 80 23.31 State <	SHE		AI	PSF-	NE			0001.0.14		N	79244 E	55520				
GROUND EL DEPTHEL GROUND WATER LOOGED BY N. Kidd/SAIC 283.1 ¥ / N. Kidd/SAIC W A N-VALUE (SPT) SE SE SE OCENTRY % SE SE CHARACTER NO BS A N-VALUE (SPT) SE SE SE SE CHARACTER NO CHARACTER NO BS A O 60 23.1 CHARACTER NO CHARACTER NO CHARACTER NO SS A O 60 23.1 CHARACTER NO CHARACTER NO SS A O 60 20.40 60 80 23.1 CHARACTER NO SS A O 53.3 274.6 SS COCRELY GRADED SAND (SP) trace clay, light hown, interferences CHARACTER NO SS A O 714.17 271.6 COCRELY GRADED SAND (SP) trace clay, light hown, interferences CHARACTER NO SS A O 121.52 270.1 COCRELY GRADED SAND (SP) trace clay, light hown, interferences CHARACTER NO SS A O 121.52 270.1 COCRELY GRADED SAND (SP) t	BEGUN					२			DRILL M			HOLE SIZE				
283.1 ¥/ N. Kidd/SAIC # A. N-VALUE (SPT) B Y Notes on the second										ailin	g 1500	3 7/8 in	1	40 lb	/30 in	145.0
Nortes Nortes<					GROUN	D WATE	ER LO	OGGED BY:					N. Kid	d/SAI	C	
E D Description Description <thdescription< th=""> Description <thdescription<< td=""><td></td><td></td><td><u>+ /</u></td><td></td><td></td><td></td><td><u>l</u>.</td><td><u> </u></td><td><u> </u></td><td>Ī</td><td></td><td></td><td></td><td></td><td></td><td></td></thdescription<<></thdescription<>			<u>+ /</u>				<u>l</u> .	<u> </u>	<u> </u>	Ī						
20 40 60 80 283.1 SS A O 344 For the second s	м	۸	N-VAL	UE (S	SPT)			z	E	S						
20 40 60 80 283.1 SS A O 344 For the second s	[₽] S H	0	RECO	VERY	%		≥₹		N.	PH	DESC					
20 40 60 80 283.1 SS A O 344 For the second s	- UN ND	+	ATT. L	IMITS	s %		L R R	N N N	L L	RAF	DESC				DRILL	ING AND
SS A O 3-44 POORLY CRADED SAND (SP) race clay, light brown, the check of the construction of the	S N	•						<u> </u>	Ö	O						
SS A O 3-44			20 4	40	60	80		283.	1	<u> </u>					Hand	auger to 7 feet
35 274.6. 1000; vect subangular poorly graded; fine to medium 35 273.1. 10 1000; vect subangular poorly graded; fine to medium 35 273.1. 10 1000; vect subangular poorly graded; fine to medium 35 273.1. 10 1000; vect subangular poorly graded; fine to medium 35 273.1. 10 1000; vect subangular poorly graded; fine to medium 35 273.1. 10 1000; vect subangular poorly graded; fine to medium 35 273.1. 10 1000; vect subangular poorly graded; fine to medium 35 271.6. 271.6. 271.6. 271.6. 355 270.1. 271.6. 271.6. 271.6. 271.6. 355 270.1. 100.15.222 270.1. 271.6. 271.6. 271.6. 355 270.1. 100.15.222 271.1. 271.6. 271.6. 271.6. 271.6. 271.6. 357 37.7. 267.6. 271.7. 267.6. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7. 271.7.				· • • •	1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1			5.						check	for undergrou
SS 274.6 printed: trace heavies: SS 273.1 10 Proxing trace heavies: SS 273.1 10 Proxing trace heavies: SS 271.6 Proxing trace heavies: Proxing trace heavies: SS 271.6 Proxing trace heavies: Proxing trace heavies: SS 271.6 Proxing trace heavies: Proxing trace heavies: SS 7 714-13 271.6 Proxing trace heavies: SS 0 714-13 270.1 Proving trace heavies: SS 0 10-13-22 270.1 Proving trace heavies: SS 0 12-15-21 267.1 Stame staboxe: fight red, with medium red zones; hard; dame: medium proxing trace heavies: SS 0 10-14-16 265.6 Proversity reduce fine to medium grained. SS 0 10-14-16 265.6 Proversity reduce fine to medium red zones; hard; dame: medium fred medium red zones; hard; dame: medium fred motice heavies: SS 0 10-14-16 265.6 Proversity reduce fine to medium grained. SS 0 10-14-16 265.6 Proversity reduce fine to medium red zones;		•	1 1 1 1	: : :	· · · · · · · · · · · · · · · · · · ·		3-4-4				POORLY G	RADED SAND (SP) ubangular; poorly gra	trace clay; lig ded; fine to r	ght brow nedium	n;	
2 273.1 10 medium brown with medium symbols ref motiles; modils subangular, poorly graded; fine to medium energy mixed; medium dense; damp; medium plasticity; sand is fine; one dium grained 35 4 0 714-13 270.1 55 4 0 714-13 270.1 55 4 0 914-19 268.6 55 4 0 1215-21 267.1 7 265.6 30-0 1215-21 267.1 7 265.6 264.1 30-0 10-12-17 7 265.6 264.1 30-0 10-12-17 7 262.6 20-0 311-15-17 266.6 311-15-17 7 262.6 20-0 311-15-17 266.6 311-15-17 85 4 0 10-12-17 266.6 311-15-17 10 4 0 10-12-17 266.6 311-15-17 11 4 0 10-12-17 266.6 311-15-17 12 53.6 0 10-12-17 257.6<	_		, į		0		3-5-9	274.	6_	\mathbf{r}	grained: trac POORLY G	e heavies RADED SAND WITH	I CLAY (SP	-SC):		
SS 0 7:14:13 271.6. SS 0 9:14:19 268.6. SS 0 9:14:19 268.6. SS 0 12:15:21 267.1. SS 0 12:15:21 267.1. SS 0 10:12:17 265.6. SS 0 10:12:17 262.6. SS 0 10:12:17 255.1. SS 0 <td>2</td> <td></td> <td>1</td> <td></td> <td></td> <td>0</td> <td></td> <td>273.</td> <td>110-</td> <td></td> <td>_ medium den:</td> <td>se; moist; subangular;</td> <td>poorly grad</td> <td>ttles; ed; fine t</td> <td>م ه</td> <td></td>	2		1			0		273.	110-		_ medium den:	se; moist; subangular;	poorly grad	ttles; ed; fine t	م ه	
SS A O 7/14-13 SS F O 7/14-13 SS O 9/16-15-22 270.1. SS O 9/16-15-22 270.1. SS O 9/16-15-22 270.1. SS O 9/16-15-22 270.1. SS O 9/16-15-22 268.6. SS O 12-15-21 267.1. CLAYEY SAND CLAY (CLAY (CLAY) (CLAY) (Law (CLAY) with medium parained. same as above; light red with white ends and cones; medium parained. same as above; light red with white ends and medium red cones, fine to needium grained. same as above; light red with white flexks and medium red cones, fine to needium grained. same as above; light red with white flexks and medium red cones, fine to needium grained. same as above; light red with white flexks and medium red cones, fine to needium grained. same as above; light red with white flexks and medium red cones, fine to needium grained. same as above; silty in places, sing same as above; silty in places, sing same as above; silty in places, same as above; silty in places, sing same das above; silty in places, sing same as above; silty in places, sing same das above; silty in places, sing same as above; silty in places, same a					1	;	9-9-15	1			CLAYEY S/	AND (SC); light red v	vith yellowis	h red,		
SS A O 10:15:22 270.1. SS A O 9:14:19 268.6. SS A O 12:15:21 267.1. SS A O 12:15:21 267.1. SS A O 12:15:21 267.1. SS A O 10:14:16 267.1. SS A O 10:12:17 265.6. SS A O 10:12:17 262.6. SS A O 10:12:17 259.6. SS A O 11:13:16				:	•	0	7-14-13	5 271.	0_		same as aboy	poorly graded; fine to record with l	medium gra	ined ind white		
S S			4	L,	, ;	; ($\phi_{10-15-2}$	270.	1_	Y	LEAN CLA	WITH SAND (CL)	light brown	ish red,		
SS 0 12:15:21 267.1 267			1	t ;	1	: 1		268.	6_	Ľ	brownish yel	low, and gray; hard; on medium grained	lamp; mediu	m plastic		
SS A O 12:15:21 7 A O 10:12:17 SS A O 10:12:17 9 SS A O 10:12:17 9 SS A O 10:12:17 9 SS A O 10:12:17 10 10:12:17 262.6 20 SILTY SAND (SC): light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white flecks and medium grained same as above; light red with white and brownish yellow with ight red and medium grained same as above; light prace light product graded; fine to lower medium grained same as above; light product smedum red with white and brownish yellow with light red and light brown zones; dense; whith white and brownish yellow with light red and light brown zones; dense; whith white and light brown zones; dense; whith grained; light red with white and light brown zones; dense; whithe and light brown zones; dense; whithe and ligh					1 		9-14-19			-1//	SANDY LEA medium brow	AN CLAY (CL) with whish yellow with me	clayey sand : dium red zor	zones; nes; hard		
SS A O 10-14-16 265.6. point graded: fine to medium grained while flexs and medium yellowish brown zones; medium dense; fine to lower medium grained in trace mica SS A O 10-12-17 264.1 same as above; light red vin while flexs and medium red medium grained same as above; light red, in while flexs, and medium red medium grained same as above; light red, in while flexs, and medium red medium grained same as above; light red, in while flexs, and medium red medium grained same as above; light red, in while flexs, medium red medium grained same as above; silv in places, medium red medium grained same as above; silv in places, medium red with while earl brownish yellow zones SS A O 10-12-15 258.1 257.6 SS A O 10-12-15 258.1 257.1 SS A O 11-13-16 258.1 255.1 SS A O 11-13-16 256.6 same as above; light red with while wisps; dense SS A O 112-19-22 253.6 30 POORLY GRADED SAND WITH CLAY (SP-SC); some areas the claw; light red and light frown xones; dense; wet; subangular; poorly graded; medium grained areas trace claw; light red and light frow xones and dark with light red and light forw xones dense; dense; damp; subangular; woorly graded; medium grained areas trace claw; light red with light red and light forwan xones; dense; wet; dushagular; woorly graded; mediu			; 🔺	1	; O	1	12-15-2	T 267.	1_	\forall	damp: mediu CLAYEY SA	im plasticity; sand is I AND (SC); light brow	nish yellow	m graine with whi	te	
8 0 10-12-17 264.1. same as above; light red; no mica observed 9 A 0 10-12-17 262.6. 20 SS A 0 10-13-17 262.6. 20 SS A 0 9.14-16 20.1.1. SILTY SAND (SM) some areas are clayey; medium red with brownsh yellow, brown, and white bands; medium dense; damp; subangular; poorly graded; fine to lower medium grained SS A 0 10-12-15 259.6. SS A 0 10-12-15 258.1. SS A 0 11-13-16 258.1. SS A 0 13-15-17 256.6. SS A 0 12-19-22 255.1. SS A 0 12-19-22 253.6. SS A 0 17-24-29 253.6. SS A 0 12-17-19 250.6. SS A 0 12-17-19 250.6. SS A 0 12-17-19 250.6. SS A 0 12-17-19 250.6. <td< td=""><td></td><td></td><td></td><td></td><td>0</td><td>:</td><td>10-14-1</td><td>265.</td><td>6_</td><td>H</td><td>poorly grade</td><td>d: fine to medium gra</td><td>ined</td><td></td><td>·</td><td></td></td<>					0	:	10-14-1	265.	6_	H	poorly grade	d: fine to medium gra	ined		·	
33 0 10-12-17 262.6 20 20 Sill TY SAND (SM) some areas are clayey, medium red with brown, and white bands; medium dense; damp; subangular; poorly graded; fine to lower medium grained 10 0 9-14-16 259.6 Sill TY SAND (SC); medium red; medium dense; damp; subangular; poorly graded; fine to lower medium grained 11 0 10-12-15 259.6 subangular; poorly graded; fine to lower medium grained 12 258.1 258.1 256.6 same as above; silty in places, medium red with white and brownish pellow zones 13 0 11-13-16 256.6 same as above; silty in places, medium red and light red zones; fine to medium grained 14 0 12-19-22 255.1 POORLLY GRADED SAND WITH CLAY (SP-SC); some areas trace clay; light brown sinh gellow with light red and light red sinh fown zones; dense; wet; subangular; poorly graded; medium grained 15 AO 17-24-29 252.1 252.1 16 AO 12-17-19 250.6 30 17 AO 12-17-19 250.6 same as above; light red with very light orange and white zones 18 O 12-17-19 250.6 same as above; light red with very light orange and white zones 18 O				,	1			264.	1_	\mathbb{Z}	yellowish bro medium grai	own zones; medium d ned: trace mica	ense; fine to	lower		
SS Io-13-17 202.0 I0 Io-13-17 202.0 SS Io-13-17 261.1 SS Io-12-15 261.1 SS Io-12-15 259.6 SS Io-12-15 259.6 SS Io-12-15 258.1 SS Io-12-15 258.1 SS Io-12-15 258.1 SS Io-12-17 256.6 SS Io-12-19-22 255.1 SS Io-12-19-22 253.6 SS Io-12-19-22 253.6 SS Io-17-24-29 253.6 SS Io-17-24-29 253.6 SS Io-12-17-19 250.6 SS Io-17-24-29 253.6 I1 Io-12-17 250.6 SS Io-17-24-29 253.6 I0 Io-17-24-29 250.6 SS Io-17-19 250.6 SS Io-17-19 250.6 SS Io-12-17-19 250.6 SS Io-12-17-19 250.6 IS-20-21					:	Ŷ	10-12-1		20-	V	same as abov	ve; light red; no mica	observed			
SS A O 9-14-16 261.1 dense; damp; subangular; poorly graded; fine to lower SS A O 10-12-15 259.6 subangular; poorly graded; fine to lower medium dense; damp; subangular; poorly graded; fine to lower medium grained SS A O 10-12-15 258.1 258.1 255.1 I3 O 11-13-16 256.6 Same as above; sity in places; medium red with white and brownish yellow zones SS A O 12-19-22 same as above; with white wisps; dense 14 A O 12-19-22 253.6 16 IT-24-29 252.1 POORLY GRADED SAND WiTH CLAY (SP-SC); some areas trace clay; light brownish yellow with light red and light brown zones; dense; wet; subangular; poorly graded; medium grained SS A O 12-17-19 252.1 30 12-17-19 250.6 30 POORLY GRADED SAND (SP) trace clay; some areas and dark yellowish brown wisps; very dense; damp; subangular; poorly graded; medium grained SS A O 12-17-19 250.6 Some as above; light red with very light orange and white SS A O 12-17-19 249.1 CLAYEY SAND (SC) some zones and white </td <td></td> <td></td> <td>.</td> <td></td> <td>; O</td> <td>:</td> <td>10-13-1</td> <td>7 262.</td> <td>₽ ¯</td> <td>K</td> <td>SILTY SAN</td> <td>D (SM) some areas an</td> <td>e clayey; me</td> <td>dium red</td> <td>j</td> <td></td>			.		; O	:	10-13-1	7 262.	₽ ¯	K	SILTY SAN	D (SM) some areas an	e clayey; me	dium red	j	
SS A O 10-12-15 259.6. SS A O 11-13-16 258.1. 25 I3 A O 11-13-16 256.6. same as above; slight nplaces; medium red, medium grained SS A O 13-15-17 256.6. same as above; slight nplaces; medium red, medium grained SS A O 12-19-22 255.1. same as above; slight nplaces; medium red, medium grained SS A O 12-19-22 255.1. same as above; slight nplaces; medium red, medium grained SS A O 12-19-22 253.6. same as above; slight brownish yellow with light red and light brown zones; dense; wet; subangular; poorly graded; medium grained SS A O 12-17-19 250.6. SS A O 12-17-19 250.6. SS A O 12-17-19 249.1. SS A O 12-17-19 249.1. SS A O 15-20-21 249.1. 249.1.					, O		9-14-14		1_	1.1.	dense; damp	; subangular; poorly g				
SS 10-12-15 same as above; silty in places; medium red with white and brownish yellow zones SS 11-13-16 258.1 25 I3 0 13-15-17 256.6 SS 13-15-17 255.1 same as above; silty in places; medium red with white and brown with light red zones; fine to medium grained SS 0 13-15-17 256.6 SS 12-19-22 253.6 same as above; with white wisps; dense 15 253.6 253.6 POORLY GRADED SAND WITH CLAY (SP-SC); some areas trace clay; light brown zones; dense; wet; subangular, poorly graded; medium grained 16 0 17-24-29 30 SS 16 20-31-21 30 SS 12-17-19 250.6 250.6 SS 18 0 12-17-19 250.6 SS 18 0 12-17-19 249.1 SS 10 15-20-21 249.1 249.1			•		1	:	2-14-10		6	$\langle \rangle$	CLAYEY SA	AND (SC); medium re poorly graded: fine to	lower mediu	im graine	ed	
SS 13 11-13-16 258.1 25 same as above; light yellowish brown with light red zones; fine to medium grained SS 14 0 13-15-17 255.1 same as above; with white wisps; dense SS 15 0 12-19-22 253.6 reas trace clay; light brownish yellow with light red and light brown zones; dense; wet; subangular; poorly graded; POORLY GRADED SAND (SP) trace clay; some areas with clay; light red with light red dish brown zones and dark yellowish brown wisps; usingular; poorly graded; medium grained SS 17 0 12-17-19 250.6 SS 18 0 12-17-19 250.6 SS 18 0 15-20-21 249.1 SS 0 15-20-21 249.1			` , ▲	:	i o	:	10-12-1	5		$\overline{\mathcal{V}}$	same as abov	ve; silty in places; me	lium red wit	h white a	Ind	
SS 13-15-17 256.6 I4 I3-15-17 255.1 SS 12-19-22 255.1 I5 I2-19-22 253.6 I6 I7-24-29 252.1 I6 I7-24-29 252.1 SS I2-19-22 252.1 I6 I2-19-22 252.1 SS I2-19-22 252.1 I6 I2-19-22 252.1 SS I2-17-19 250.6 I7 I2-17-19 250.6 I8 I2-17-19 250.6 I8 I2-17-19 249.1 SS I2-17-19 249.1 I8 I2-17-19 249.1	SS	• •		<u>.</u> , с	> ¦	1	11-13-1	77	- ZJ		same as abov	ve; light yellowish bro	wn with ligh	t red zor	ies;	
SS 14 14 15 15 15 15 15 15 15 15 15 16 16 16 17 16 17 16 17 16 17 16 17 17 17 17 17 17 17 18 18 18 18 18 18 18 18 19 10 117 12 19 12 12 12 12 12 12 12 12 12 12				•	0	•	12 16 1	256.	6_	¥4			lense			
SS 12-19-22 15 15 15 17-24-29 16 17-24-29 16 17-24-29 16 20-31-21 252.1 253.6 17 20-31-21 17 250.6 18 0 18 0 18 0 18 0 18 0 18 0 18 0 18 0 19 249.1 10 15-20-21 10 15-20-21 10 15-20-21 10 15-20-21 10 15-20-21 10 15-20-21 11 15-20-21 12 15-20-21 140 15-20-21 15 15-20-21 15 15-20-21 15 15-20-21 15 15-20-21 15 15-20-21 15 15-20-21 15 15-20-21 15				1	1	1 1	12-12-1			V						
SS 17-24-29 253.6 16 17-24-29 253.6 16 17-24-29 252.1 30 Hight brown zones; dense; wet; subangular; poorly graded; medium grained SS 0 20-31-21 250.6 250.6 with clay; light red with light reddish brown zones; dense; wet; subangular; poorly graded; medium grained SS 12-17-19 250.6 same as above; light red with very light orange and white gellets; 18 0 15-20-21 249.1 CLA YEY SAND (SC) some zones are less clayey; light red with light red zones and white pellets; SS 0 15-20-21 249.1 Well State Well State			, ; ;	≜	; 0		12-19-2	2	1	T	areas trace c	lay; light brownish ye	llow with lig	ht red an	d	
16 0 20-31-21 252.1 90 OORLY GRADED SAND (SP) trace clay; some areas with clay; light red with light redishs brown zones and dark yellowish brown zones and dark yellowish brown zones; using using using the clay; light red with light redish brown zones and white zones are as above; light red with very light orange and white zones SS 12-17-19 250.6 SS CLAYEY SAND (SC) some zones are less clayey; light red with light red zones and white pellets; dense; damp; subangular; poorly graded; fine to medium SS 15-20-21 249.1 Very Sand (SC) some zones and white pellets; dense; damp; subangular; poorly graded; fine to medium			1	4	φ	:	17-24-2	9 253.	7]-14	light brown a medium grai	zones; dense; wet; sub ned	angular; poc	orly grade	ed;	
17 250.6 SS 18 12-17-19 SS 12-17-19 18 249.1 SS 15-20-21 249.1 249.1 Units 15-20-21 249.1 249.1	16		1 1			; ወ		252.	1		with clay: lig	the red with light redd	ish brown zo	nes and	s dark	
SS 18 Image: SS 18 Image: Image: SS 15-20-21 Image:			•	1		1	20-31-2				boorly grade	d: medium grained				
SS 0 15-20-21 249.1 reddish yellow with light red zones and white pellets; dense; damp; subangular; poorly graded; fine to medium			▲	i.	1		12-17-1		°-	77	\zones					
			1	.	1	1	15-20-2	249.	1_	H	🗋 reddish yello	w with light red zone	s and white p	ellets;	~	
										V/	11					10.



G	FO.	TECHN		IOG	PROJ				JOB NO.		ET NO.	HOLE NO.
							Nor	theast Expansion	NEX	2	OF 4	FB-17
SAMP. LTPE AND NO. SAMPLE	O RE	VALUE (SP ECOVERY 9 T. LIMITS 9	%	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION		CHARA	LEVELS, CTER OF IG AND ATORY
10	<u>20</u>		<u>080 0</u>					grained				
19 SS 20	1 		1 f 1	14-25-29	247.6-	-	Í	same as above; medium yellowish brow vellowish brown zones and white wispy POORLY GRADED SAND WITH CL	vn with light striations: mois	/		
SS 21	1 1 1	○▲		18-23-28	246.1_	•	10	areas trace clay; medium brownish yello pods; very dense; damp; subangular; po	ow with dark bro	own		
SS 22	1 1 1	≜ O		19-22-25	244.6_	-	H A	same as above; clayey in places; medium moist	m yellowish bro	wn;		
S 3	1 1 1	1		15-27-36	243.1_	40	ľ	same as above; dense; wet same as above; clayey in places; very de	ense; moist			
S			¢	19-20-25	241.6_	-	8	same as above; borderline clayey sand;	dense			
24 5S			- -	14-14-20	240.1_	-		CLAYEY SAND (SC); medium brown				
25 SS	1 1 1		i oʻ	14-18-16	238.6_	45-	\square	yellowish brown zones and wispy white moist: subangular; poorly graded; fine t same as above; medium red	o medium grain	ed		
6 S	1 1 1		φ	11-20-26	237.1_		K	POORLY GRADED SAND WITH CL	AY (SP-SC) son	ne		
7 S	1		ģ	22-26-27	235.6_	-	H	areas clayey; medium reddish brown; ve subangular: poorly graded: fine to medi same as above; light reddish brown with	um grained			
8 S	(1	¢ ▲	1 F 1 T	21-24-31	234.I_	-	10	moist; poorly graded same as above				
9 S	1 1 1			23-27-28	232.6_	50	ЦЦ	POORLY GRADED SAND (SP) trace	clay: some areas			
0 S	o			20-24-29	231.1_	-		with clay; light brown with light brown white mottles; very dense; damp; suban graded; fine to medium grained	ish yellow and			
1 S	1 1	¢▲	1 I 1 I 1 1	18-21-25	229.6_	-		same as above; light brownish yellow same as above; some zones with clay; d	ense			
2 S	1 1 1	Å 0	1 1 1 1 1 1	12-21-19	228.1_	- 55 -		POORLY GRADED SAND WITH CL		ne.		
3 3 S	1	▲ 0		7-18-15	226.6_	-	I A	areas trace clay; medium reddish yellow subangular: poorly graded: fine to medi same as above; light brownish yellow; t	, dense; moist; um grained			
4 S	1 1 1		· ·	14-17-22	225.I_	-	10	same as above; some zones clayey; med				
s s	1 1 1	0	i i i i A	18-27-34	223.6_	-	1	brown; fine to lower coarse grained same as above; very dense				
6	1 1 1			21-19-25	222. I_	60 -	10	same as above; dense				
S 7	, , 1 1		, , , , ,		220.6_	-	ß	same as above; medium brownish yello	w fine to modi-			
S 8	1 1		1 1 1 1 1 1	19-22-26	219.1_	-	10	grained; trace lower coarse	w, mie to mediu			
S 9			1 1 1 1 1 1	14-17-21	-217.6	65 <u></u> –	1	same as above; light brown				
S 0				15-16-15	216.1_	-	10	same as above; some zones are clayey s brownish yellow				
S 1		1		4-4-6	214.6_	-		SANDY LEAN CLAY (CL) with inter- lean clay; It brownish yellow with med zones; stiff; wet; med plasticity; sand is	reddish brown fine to med	nd		
S 2		ł Ł T	1 1 1 1 1 1	3-4-6	213.1	-	Ø	grained; black staining (Mn?); trace hea quartz pebbles SANDY FAT CLAY (CH) some zones	are lean clay;	_/		
S 3	▲ Ŭ 	5 6 1		4-4-6	211.6	70-		interlaminated cse sand; med yellowish reddish brown and white zones; stiff; we sand is fine to med grained with some c	brown with mec et; high plasticity	i, ∏		
S 4	,	1 1 1	• • • • • • • • • • • • • • • • • • •	0 5-8-9	211.0_	-		staining (Mn?): trace heavies CLAYEY SAND (SC) with lean clay pu brown with It brownish yellow zones; lo	ods; med yellow	ish		
S 5	▲ i	1 L 8		6-5-6	208.6	-		subangular; poorly graded; fine to lwr n heavies: black staining (Mn?) same as above; interbedded It brownish	ned grained; trac	/[]		
		۱ ۱۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰۰			208.0_			anie as above, incrueided it biowinish	Jonow Ican ciaj		HOLE NO	
		N; ST = SHEL ' PISTON; PB		•				FINAL LOG				B-17



Ģ	GEOTECHNICAL L	.OG	ROJECT	Nor	theast Expansion	IOB NO. NEX	1	et no. of 4	HOLE NO. FB-1
AND NO. SAMPLE	▲ N-VALUE (SPT) O RECOVERY % + ATT. LIMITS %	BLOW COUNT ELEVATION	DEPTHINFT	GRAPHICS	DESCRIPTION AND CLASSI	FICATION			LEVELS, CTER OF IG AND ATORY
SS 46 5S 47 5S 47 5S 48		8-14-23	7.1 5.6_ ·		and med brownish yellow sand; med brow v It yellow and dk reddish brown laminae to med grained: clay content varies widel same as above; with It brownish yellow k med reddish yellow with dk brown zones black staining (Mn?) LEAN CLAY (CL); It brownish yellow w	; med dense; fi y ean clay lamina ; moist; heavy	ne 🛛		
S 9 S		8-14-16 204 10-18-25	80		brown and black fracture coatings (Mn?); plasticity: sand is fine grained and sparse POORLY GRADED SAND WITH CLA' zones are clayey; It brownish yellow clay med yellowish brown with v It yellow zor	; v stiff; wet; m Y (SP-SC) som at top of sampl nes; dense; wet;	e e:		
0 S 1		14-20-20 199			subangular; poorly graded; fine to med gu pollets (Mn?); trace heavies same as above; med dense same as above; lt vellowish brown same as above; dense				
S 2 S 3	▲ 0 ▲ 0	12-18-17 14-22-21 100	_ 65 _		POORLY GRADED SAND WITH SILT yellow clay wisps; It yellowish brown; de subangular; poorly graded; fine to med gu black (Mn?) and dk brown staining same as above with white streaks	nse; wet;	- 11		
5 - 1 5		13-16-21 13-16-21 19: 17-16-27	-		same as above with some clayey zones same as above CLAYEY SAND (SC); It reddish brown; subangular; well graded; fine to lwr cse g	dense; wet;	one		
5 5 5		13-20-18 192 10-10-7	90-		within interval is Mn? same as above; some zones are sand with with white zones; Mn? staining same as above; interbedded white clayey:	clay; It brown			
7 3 3	A 0	4-6-13			brown with white zones; med dense; poor med grained POORLY GRADED SAND WITH CLA' zones are clayey sand; It reddish brown w med dense; wet; subangular; poorly grade	ly graded; fine Y (SP-SC) som ith white zones	to e ;		
	▲ O O ▲	13-20-21 16-23-22	7.6_ 95	N N	grained; trace lwr cse same as above; some zones are sandy clay It vellow zones: dense; Mn? staining POORLY GRADED SAND (SP) trace cl dense; wet; subrounded; poorly graded; m	av: It brown:			
		9-10-15 12-13-16 184	5.1 4.6		trace heavies WELL GRADED SAND WITH CLAY (interval is sand trace clay, It brown with v dense; wet; subrounded; well graded; trac coarse grained	white zones; me e heavies; fine	2 20 20		
		in-1/15 in-1/1 in 181 10 in-1/2 in-4	^{3.1} - 100-		same as above; med brown and it brown to brown mottles; subangular; fine to cse gra pellets (Mn?) CLAYEY SAND (SC) clay content varies; It brown and white zones and dk brown w wet; subangular; poorly graded; fine to m	ained; black s; med brown w risps; v loose;	/ith	soft zone	location of @ 100 ft. rilling fluid
		3-3-2			same as above; few interlaminated It yello visps; It reddish brown with It brown and loose; trace heavies same as above; med reddish brown with v	wish brown cla white zones;	- / 1		
			105-		laminae; fine grained same as above; with silty zones; white, v brown; v loose; v fine to lwr med grained	It green, and It weathered she	:11	Overdrill	ed .
		7-6-8] -		fragments?; silicified zone at top of interv same as above; interlayered with sand wit It brown with v lt green zone at top of inte fine to med grained; pelecybod fragments	al; trace heavie th clay; white an erval; med dens	:s ndi ;e;		
		5-9-9 19-36-32 172	2.1	8	WELL GRADED SAND WITH CLAY (clayey sand; it brown and it yellow with v bands; med dense; wet; subangular; well cse grained; trace heavies; pelecypod frag POORLY GRADED SAND (SP) trace cl	vhite clayey san graded; fine to ment ay; It brown wi	id Iwr th		
		15-26-24 9-14-13 169			v lt brown and v lt green zones; v dense; v poorly graded; fine to med grained; abund fragments: calcareous nodules SILTY SAND (SM); lt yellowish brown v zones; dense; wet; subangular; poorly gra	dant heavies; sh with white clave	well	Circulati	on good bu
	IT SPOON; ST = SHELBY TUBE; TIONARY PISTON; PB = PITCHER	SITE		<u>1:1-1</u>	FINAL LOG			HOLE NO.	B-17



	20		TC	പ		AL L	00	PROJ				JOB NO.		ET NO.	HOLE NO.
	זכ	<u>=0</u>	1 C'			AL L				Noi	theast Expansion	NEX	4	OF 4	FB-17
SAMP. TYPE AND NO. SAMPLE) R	ECO\	JE (SI /ERY MITS	%		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION			LEVELS, CTER OF IG AND ATORY
-		2() 4	1	<u>60</u>	80	ļ				lasternous adular releaned frame			continui	ng to lose
71 SS 72	•			· O	4 1 1 4	1 1 1 1 1	3/26 in	167.6- 165.4	-		calcareous nodules: pelecypod fragmer POORLY GRADED SAND WITH SII brown and It yellowish brown; med de poorly graded: fine grained: trace heav same as above; It brown; v loose; v fin	nse; wet; subangu ies	- 1	drilling f Rod droj 115.5-11	luid.
SS 73		1 1 1			¦0 ¦) 1 (8-14-24	163.6	-		mottle SILTY SAND (SM); v lt yellowish bro mottles and lt green zones; dense; wet; graded; v fine grained; trace heavies	wn with orange subangular, poor	iy	Lost ove of water 116.67-1	r 1000 gallon from 22 ft.
SS 74			0	1 1 1	2 2 1	1 1 1	10-27-35	162.1_	120-		same as above; borderline sand with si brown and v lt brown; some zones hav dense	e it orange mottle	es; v		
SS 75 SS	а. а.		0		¦ ▲	1 1 1 1	12-20-30	160.6_	-		same as above; v lt brown to lt brown; POORLY GRADED SAND (SP) trace		vith		
33 76 SS		: 	0	6 1 1		1 1 1	15-30-32	159.1_	-		white zones; v dense; wet; subangular; fine grained: trace heavies same as above	poorly graded; v		Lost 100	0 gallons of
77 SS 78	4	⊾ ¦		1 1 1	t † 	÷	8-5-4	157.6_	125 -		SILTY SAND (SM); It greenish brown subangular; poorly graded; v fine grain	; med dense; wet	;	134.5 fee	ewwn 124 an et.
78 SS 79	•	 		1 1 1	1 1 1	f	9 in-1/3 in		-		same as above; with white clay wisps;				
SS 80		, 1 1 1		1	 	۰ ر ۱	WR/12 in-7	154.6_ 153.1	-	$\overline{/}$	CLAYEY SAND (SC) some zones are brown with v lt gray zones; loose; wet; graded; v fine grained	silty; It greenish subangular; poor	1y		
SS 81		1 1 1		1 1 1	1 	1	fn-WH/3 in WR/6 in-4-8	-5/3 in	130-		same as above	t omnan mottle			
SS 82 SS		_ ¦ ▲ ¦		i 1 1	1 1 1		3-5-7	150.1_	-		same as above; It yellowish brown with med dense; silicified turritella shells; tr same as above; It brown with It orange				
83 SS		1 		1 1 1	1 1 1	i i i i	4-8-9	148.6_	- 135 —	β	same as above			Continui fluid.	ng to lose
84 SS 85		1 1 1	0	1	1 1 1	4 1 1	8-14-25	147.1_	-		POORLY GRADED SAND WITH SII zones are same as above; it greenish br	own: dense: wet:		india.	
SS 86		1 1 1 1			1	0	3-12-38	145.6_ 144.1	-		subangular; poorly graded; fine grained shells: trace heavies CLAYEY SAND (SC) with wispy It gr gravish brown with It orange mottles; d	eenish gray clay; lense: wet:	ħ		
SS 87		; ;	. .	i 1 1	1 		5-7-8 WR/3 in	142.6_	- 140 -		subangular; poorly graded; fine to med chips and shells same as above; some zones silty; It gre dense; v fine grained; silicified nodules	grained; silicified			
SS 88 SS		1	▲	\$ 1 1	T T F	- -	2/3 in-8-18 4-13-12	141.1_	-	4	<u>same as above; sandy clay in places; w</u>	hite and dk ed: clay content	/ 		
89 SS				1 1	 	(9-12-16	139.6_	-	\square	varies, some material calcareous mud? same as above; with interlaminated It g green and dk reddish orange with white clay laminae and dk green at tip of inter	reen clays; med			
90				, , , ,	1 f ł	1 1 1 1		138.1_	145 -	//	same as above; intermixed with lean cl fine grained; abundant mica; 'green cla Total depth of boring 145 feet.	ay; dk greenish g	ray;	Hole cav weekend to be clea	ed in over 4/18,19. Ha
		1		1 1 1	1 1 1	1 1 1								before gi Hole aba	outing. Indoned with
		1		1 1 1 1	 	1 1 1 1								grout mi	x per 3Q5.
		, 1 1 1) 		 									
		1		1 1 1 1	1 1 1 1	1 1 1 1									
S = SPLI							SITE				FINAL LOG			HOLE NO	B-17



GEOTECHNI		PROJ					JOB I		SHEET NO.	HOLE NO.
		1		Noi	theast Ex	pansion	ľ	IEX	1 OF 5	FB-18
SITE		COORDINAT	ES	N T	50221 E	66121		ANGLE F	ROM HORIZO	INTAL
APSF-NE BEGUN COMPLETED DRIL	(FR				79331 E	DDIDI HOLE SIZE	SAMPLE H		90 VEIGHT/FALL	TOTAL DEPTH
4/20/98 4/27/98					g 1500	3 7/8 in		140 lb/3		159.3
GROUND EL. DEPTH/EL. GRO	B Cunningha	LOGGED BY:	<u> </u>	111113	51300	5 //010			/ v m	157.5
290.1 ¥ / ★ /							N. Kid	d/SAIC	2	
			1			<u> </u>	****			
H N-VALUE (SPT) C N RECOVERY % C N N VALUE (SPT) C RECOVERY % C N N VALUE (SPT) C N N VALUE (SPT) C N N VALUE (SPT) C N N VALUE (SPT)	BLOW	<u> </u>	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFIC	ATION	CHAR DRILL	R LEVELS, ACTER OF ING AND RATORY
20 40 60	80	290.1		$\left - \right $						uger to 7 feet to
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	5-7- 6-13 0 11-15 0 12-14 0 12-13 0 10-12 	-20 281.6. -23 280.1. 17 278.6. 17 277.1. 23 277.1. 16 275.6. 271.1. 272.6. -7 271.1. 8 269.6. -7 266.6. -7 265.1. -6 263.6. -7 263.6. -8 260.6. -7 265.1. -7 263.6. -8 269.1. -7 259.1. -7 257.6. -9 259.1. -16 257.6. -17 257.6.			brown; mediu fine to mediu same as abov dense CLAYEY SA subangular; p same as abov POORLY GF medium redd graded; fine 1 CLAYEY SA subangular; p same as abov SILTY SANI medium dens grained; frace CLAYEY SA dense; moist; grained with SANDY LEA subangular; p same as abov POORLY GF medium yelle dense; moist; medium grained; trace same as abov POORLY GF medium grained; trace same as abov to medium grained; CLAYEY SA wet; subangular; p same as abov poorLY GF medium grained; trace same as abov to medium grained; trace poorLY GF	ADED SAND WITH ish brown; dense; moi o medium grained ND (SC); medium re woorly graded; fine to n ve; trace mica D (SM); medium red v e; moist; subangular; e mica: trace heavies ND (SC); medium red subangular; poorly gr lower coarse grains AN CLAY (CL); medium re woorly graded; fine to n ve; trace coarse grains CADED SAND WITH over trace mica ND (SC); medium ye red; trace mica ND (SC); medium ye lar; poorly graded; fine a mica ve; medium brown; median a mica ND (SC); medium ye lar; poorly graded; fine a mica ND (SC); medium ye lar; poorly graded; fine a mica ND (SC); medium ye subangular; poorly graded; fine subangular; poorly grade; fine	ngular; poo les with light bid d; dense; da nedium gra CLAY (SF st; subangu d; medium gra vith light br poorly grad ddish browi aded; fine t dish browi aded; fine t cLAY (SF red mottle aded; fine t llowish brow aded; fine t	rly graded rown zone mp; ined -SC); lar; poorly dense; moi ined own wisps ed; fine r; medium o medium brown; ver coarse dense; moi ined -SC); s; medium o lower wn; loose; n; medium s; moist; fin brown; ver coarse n; medium prown; ver coarse n; moist; fin prown; ver coarse n; moist; fin prown; ver coarse n; moist; fin prown; ver coarse n; moist; fin prown; ver coarse n; medium prown; ver coarse n; medium prown; ver coarse n; medium prown; ver coarse n; medium prown; ver coarse n; m;	st;	or underground
SS = SPLIT SPOON; ST = SHELBY	TUBE; SI	TE							HOLE N	5. F B-18
PS = STATIONARY PISTON; PB = 1	PITCHER				FINA	L LOG				.D-10



GEOTECHNICA	L LOG	PROJE		Nor	theast Expansion	JOB NO. NEX		ET NO. OF 5	HOLE NO. FB-18
W N-VALUE (SPT) O RECOVERY % H O RECOVERY % + ATT. LIMITS %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION		-	LEVELS, CTER OF IG AND ATORY
	8-14-14	254.6-		Z	CLAYEY SAND (SC); light yellowish medium red bands; medium dense; moi		ſ		
SS 20	8-14-14	253.1_	-	\square	poorly graded: fine to medium grained same as above; light brownish yellow w	· •			
SS 21 ℃	10-13-15		-	\square	and white wisps: trace heavies same as above; some zones are sand with brownish yellow with light orange band	-			
SS O	11-19-20	251.6_	-	ΓØ	POORLY GRADED SAND WITH CLA	A Y (SP-SC) som	ie /		
22 SS ○ ▲	17-24-29	250.1_	40-	1 g	zones are clayey; light yellowish brown and white wisps; dense; moist; subangu fine to medium grained; some zones are	lar; poorly grade wet	^{id;} /		
23		248.6_	-	Ľ	same as above; light red and light brown white wisps; very dense	nish yellow with			
SS 24	17-30-27	247.1	-		POORLY GRADED SAND (SP) trace of with clay; medium red with light brown and white wisps; very dense; wet; suban	ish yellow zones	5		
SS 10 ▲	20-17-24		-		graded: fine to medium grained; trace of same as above; dense	barse grains			
SS	22-22-31	245.6_	45-	И	POORLY GRADED SAND WITH CLA				
26 SS ↓ ▲ ○	13-22-23	244.1_	-	2	brownish yellow and light red with whit moist; subangular; poorly graded; fine to trace mica				
27		242.6_	-	И	same as above; dense				
SS 28	14-14-20		-	\square	CLAYEY SAND (SC) borderline sand and light brownish yellow; dense; moist	; subangular;	ed		
SS ▲ ○	16-18-18	241.I_	-		poorly graded: fine to medium grained: POORLY GRADED SAND (SP) trace (the interval is sand with clay (as above);	clay: upper part (of		
<u>SS</u> ▲①	10-13-20	239.6_	50	//	with light red and light brownish yellow wisps; dense; wet; subrounded; poorly g	zones and white raded; fine to	• /		
30	20.27.20	238.1_	_	\square	medium grained: trace mica: trace heaving CLAYEY SAND (SC); light brownish y subangular: poorly graded. fine to mediu	es ellow; dense; w	et;		
31	20-26-30	236.6_	-		POORLY GRADED SAND (SP) trace of brown; very dense; wet; subrounded; po	clay: medium			
SS 32	17-14-16		_	Ŋ	Medium to lower coarse grained POORLY GRADED SAND WITH CLA	Y (SP-SC);			
SS 0	11-13-15	235.1_	55-	\mathcal{A}	medium brown with light red zones; me subrounded; poorly graded; medium to	dium dense; wet lower coarse	<i>، ب</i>		
33 SS • •	10-9-12	233.6_	-	4	cLAYEY SAND (SC); medium red; fine to medium red; fine	edium dense; we	т, к,		
33		232.1_	-		spots same as above; medium yellowish brow				
SS 35	12-16-22	220 6	-	1	Zones and white wisps; trace heavies POORLY GRADED SAND WITH CLA medium brown; dense; moist; subangula	Y (SP-SC);			
SS 36	14-19-25	230.6_	60 —	Ø	fine to medium grained; trace heavies same as above	ar, poorty gradee	·		
SS O A	16-20-22	229.1_	-	4	POORLY GRADED SAND (SP) trace	clay; some zones			
37 O 🔺	16-17-19	227.6_	_		with clay; light brown; dense; wet; subro graded; fine to lower coarse grained same as above; medium yellowish brow				
SS 38	10-17-19	226.1	-		brown bands; moist; subangular; fine to trace coarse grains: trace heavies	medium grained	1;		
SS 39	14-15-22		. 65-		same as above; wet		~		
SS O A	20-22-27	- 224.6_	-		same as above				
40 SS ▲ O	16-14-18	223.1_	-		POORLY GRADED SAND WITH CLA	AY (SP-SC);			
41		221.6_	-		medium brownish yellow; dense; wet; su graded: fine to medium grained: trace co	<u>oarse: trace heav</u>	ries		
SS 42	12-13-18	220.1	-		same as above; light brownish yellow; n (Mn?)	noisi, diack mot			
SS 43	16-19-23		70-	И	same as above; some zones trace clay; v	vet			
SS 🔊	16-16-21	218.6_	-	ŀΥ	POORLY GRADED SAND (SP) some medium brown with white wisps; dense	zones with clay;			
44 SS ▲ O	12-10-13	217.1	-		poorly graded; fine to medium grained; heavies	trace coarse; tra	ce		
45		215.6_	-	1	WELL GRADED SAND WITH CLAY content varies widely from trace clay to	(SW-SC) clay clayey in places	; ,		
SS = SPLIT SPOON; ST = SHELBY TUBE		1		<u>. 7</u>	<u></u>			HOLE NO	
PS = STATIONARY PISTON; PB = PITCH	ER				FINAL LOG			<u> </u>	B-18



G	GEC	DTE	CHI	NICA	AL L	.OG	PROJ		Nor	theast Expansion	JOB NO. NEX	1	ET NO. OF 5	HOLE NO. FB-1
AND NO. SAMPLE	0	N-VAL RECO' ATT. L	VERY	%		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF IG AND ATORY
SS		20 -	40	<u>60 8</u>	30	7-9-11			N:	medium brown with white and very ligh	it yellow zones;	T		
46 SS	4	≜ i	i 1	0		7-8-9	214.1_		1	medium dense; wet; subangular; well gu grained; black mottles (Mn?): trace hear same as above; trace clay in places; med	vies	urse /		
47		Å	1	1		7-9-10	212.6_	•		same as above; trace clay in places; med subrounded POORLY GRADED SAND WITH CL				
SS 48					1		211.1_	-		sand at base of interval; med brownish y clay balls; med dense; wet; subangular;	vellow with it tar			
SS 49		. .	1 1	1	4 (010-12-13	2	-		to med grained: trace cse LEAN CLAY (CL) trace sand; It brown		- 11		
SS			4 1	1 1 1	¦ v	HH/6 in-10-1	209.6_ 7	80 -	¥4	orange wisps; v stiff; wet; med plasticity grained; black zones (lignite?); zones of	r: sand is fine			
50			i I		1		208.1_		\mathcal{V}	Sand LEAN CLAY WITH SAND (CL) sandy	lean clay in pla			
SS 51		1	1	; 0	1	10-13-12		_	10	med brown with white clay laminae; v s plasticity; sand is fine to cse grained		_		
ss	4	N			ģ	8-8-9	206.6_	-	H	CLAYEY SAND (SC); med yellowish I yellow and white streaks; med dense; w	prown with It et; subangular; v	/ell		
52		l l	' \$	1	:	10-16-24	205.1_	85 -	11	For the second s	AY (SP-SC) som	، ال		
SS 53		1	, , ,	, , ,	* *	10-10-24	203.6_	-	11	subangular; poorly graded; fine to med ; heavies	grained; trace			
SS 54	0	1	≜	1	,	13-20-22	205.0	-		same as above; med yellowish brown w	ith white clayey	[
SS		A	i i	¦ o	: :	11-10-10	202.1_	-		same as above; some clayey zones; it br				
55		4	:	:			200.6_	-	10	POORLY GRADED SAND (SP) trace It brownish yellow wisps; dense; wet; su	ibangular; poorly	בו י		
IS 6		1		: :	· ·	8-6-7		90 —	\square	Igraded: fine to med grained: trace heavi POORLY GRADED SAND WITH CLA	es \Y (SP-SC) som	_ _/		
s			1 1	:	0	6-10-17	199.1_	-		clayey zones; It brown; med dense; wet; graded: fine to med grained; trace heavi	es	<u>""</u> [
57			, O	; ;	: 1	11-13-15	197.6_	-	4	CLAYEY SAND (SC) interlayered sand brownish yellow; med dense; wet; subar graded; fine to med grained	igular; poorly			
SS 58		1 1	1 1 1	, , , _		11-13-13	196.1_	-		isame as above it brownish vellow and i	t brown with wh	ite /		
SS 59		. I. . I.	: 1	0	1 1	6-8-6	.,	-	ГИ	and it yellow wisps: trace heavies same as above; with interlaminated clay brownish yellow with it tan clay wisps	; med brown and	Πī		
ss		Å	1	1 1 1	0	5-5-14	194.6_	95	И	brownish yellow with It tan clay wisps POORLY GRADED SAND WITH CL/ clayey zones; It brownish yellow; med d	ense; wet;	- 71		
50			1	0	t 1		193.1	_	\square	Subangular: poorly graded: fine to med CLAYEY SAND (SC); It brown and it	grained vellowish brown			
SS 51		-	1	:	•	10-12-14	101.6	-		with reddish brown zones, med dense, w poorly graded: fine to med grained: blac POORLY GRADED SAND WITH CLA	vet; subangular; k wisps (Mn?)	_/		
SS		Á.	1	1	:	6-9-11	191.6_	-		clayey zone; It brown with a lt reddish b dense; wet; subangular; poorly graded; f	rown zone; mea			
52 SS		Å		•	<u>.</u>	6-7-13	190.1_	100 -	4	trace heavies	clay zones; It			
3		i F	•	;	:		188.6	-	\mathcal{V}	brown with it brownish yellow zones; m subangular; poorly graded; fine to med	ed dense; wet;			
S 4		1	1 	¦O ¦	•	10-15-17]	-	И	same as above; med yellowish brown w	-	-//		
ss		1	ļo	.	•	18-30-34	187.1_	-	РЧ	vones: black pellets (Mn?) POORLY GRADED SAND WITH CLA	AY (SP-SC) som	e /		
55		1	lo	1	* 2	18-29-42	185.6_	-		clayey zones; It brown and It yellowish I subangular: poorly graded: fine to med a POORLY GRADED SAND (SP) trace	prained: trace cs	e / I		
SS 56			1	1	;·· -	10-29-42	 184.1	t05		dense; wet; rounded; poorly graded; find trace heavies	e to med grained	: /		
SS 67		0	1	N.	•	19-23-34	104.1	-		same as above with few It orange clay p		- / 1		
ss		1 1 1 -	φ▲	:	:	10-22-26	182.6_	-		same as above with some med brown zo				
58		1	10	(;	•		181.1_			same as above; dense; subrounded; abu				
SS 69		1		1	• • •	16-21-29	100 4	110-		same as above; with it orange clay pods subangular; trace heavies	; v dense;			
SS		0	¦ ▲	1	2 -	15-25-26	179.6_		ŀ	same as above	<u></u>			
70 55			ø	•	•	11-18-19	178.1_	-		POORLY GRADED SAND WITH CL	AY (SP-SC) cla	vev		
SS 71			, 1 1		- + +		176.6_	-	19	sand at base of sample; it brown and it i	prownish yellow; fine to lwr cse			
SS 72		≜	1	4	. (₽ 8-11-15		-	П	grained: trace heavies: black wisps (Mn same as above; interbedded clayey sand	?)			
	T 900				0		175.1		ĽИ				HOLE NO.	
				B = PITC						FINAL LOG			F	B-18



	GEOTECHNICAL L	OG	PROJE		Nor	thoost Expansion	JOB NO. NEX		ET NO. OF 5	HOLE NO. FB-18
			<u> </u>		Nor	theast Expansion	<u>NEA</u>	4	01 5	<u>FD-10</u>
SAMP. TYPE AND NO. SAMDIE	- + ATT. LIIVITS %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND NTORY
SS 73		10-12-13				med dense; fine to med grained; black s CLAYEY SAND (SC) with sandy clay	taining (Mn?) bands: It brown	\square		
SS	▲ O	8-20-14	173.6_	-		with v It greenish brown bands; med der subangular; well graded; fine to cse grai are subrounded to rounded	nse; wet;	is /		
74 SS	▲	7-14-20	172.1_	-		SANDY LEAN CLAY (CL) with clayes \reddish brown with v It brown zones; ha	y sand zones; me ard; wet; med	a 		
75 SS		7-14-22	170.6_	- 120	\mathcal{A}	blasticity: fine to med grained: trace mid CLAYEY SAND (SC); It reddish brown zones: dense: wet; subangular: poorly gu	a with v lt brown aded: fine graine	ed / I		
76 SS	▲ 0	12-16-25	169.1_	-	A	same as above; med yellowish brown w fine to lwr med grained with Mn stainin same as above; with some silty sand lay	g ers; med reddish			
77			167.6_	-	2	brown with It brown zones; trace clay right	p-ups			
SS	▲ O	8-17-26		-		SILTY SAND (SM); med yellowish bro	wn; dense; wet;			
78 SS	•	18-43-48	164.8_	125 -		subangular; poorly graded; fine to lwr cs POORLY GRADED SAND WITH SIL	r (SP-SM); med			
79 SS		23-30-43	163.3_	-		yellowish brown; v dense; wet; subangu fine to lwr med grained CLAYEY SAND (SC); med yellowish b	brown and It	a;		
80 SS	▲ O	26-27-31	161.8_	-	4	greenish gray with brownish orange mot moist; subangular; poorly graded; fine to POORLY GRADED SAND WITH CLA	itles; v dense; <u>o lwr med graine</u> VY (SP-SC); med	d		
81 SS	0 🔺	13-32-50	160.3_	130-	Å	yellowish brown with some It yellowish dense; wet; subangular; poorly graded; f	gray zones; v ine to lwr med	7		
82 SS	OA		158.8_	-	A	CLAYEY SAND (SC); med yellowish t greenish gray zones; v dense; wet; subar graded: v fine to fine grained	rown with some igular; poorly	π 		
83			157.3_	-	4	same as above; with some it gray zones	C (SP-SM): It			
SS 84			155.8_	4		greenish brown and It grayish brown; de subangular; poorly graded; v fine to fine	nse; wet; grained			
SS 85		9-11-23	154.1	135 -		SILTY SAND (SM); med yellowish bro brown; dense; wet; subangular; poorly g fine grained	raded; v fine to			
SS 86		26-35-47	152.6			same as above; med brown to orangish t fine to lwr med grained	prown; v dense; v	,		
SS 87		37-37-42	151.1	1		same as above; med yellowish brown wi zones; v fine to fine grained	th some it gray			
SS 88		26-23-30	-]	140-		POORLY GRADED SAND (SP) trace s sand layer at 140 ft; med yellowish brow subangular; poorly graded; fine to lwr m	n; v dense; wet;	'		
SS 89		16-23-29	149.6_	-	$\overline{/}$	CLAYEY SAND (SC); med yellowish t wet; subangular; poorly graded; v fine to	rown; v dense;			
SS 90	▲ ⊙	19-20-30	148.1_			POORLY GRADED SAND WITH SIL zones have clay; It reddish brown with w	vhite bands; dens	ie;		
SS 91		16-18-22	146.6_			wet; subangular; poorly graded; fine gra trace heavies same as above; It reddish brown with It	ined; trace mica;	- A		
SS 92	• • • • • • • • • • • • • • • • • • •	13-39-43	145.1_	145 -		zones; med dense same as above; some zones are silty; It r It brown zones; v dense				
92 SS 93		18-13-25	143.6_	1		CLAYEY SAND (SC) some zones have reddish brown; dense; wet; subangular;	less clay; It poorly graded: fi	ne		
SS	▲ O	15-21-33	142.1_	-	4	properties and the second seco	silt: It vellowish			
94 SS		12-8-14	140.6_	150-		grained: trace mica; trace heavies CLAYEY SAND (SC); med brownish r wisps; med dense; wet; subangular; poo	ed with v lt greer	1		
95 SS		6-9-11	139.1_	-	A	lwr med grained; trace mica: trace heavi same as above; med brownish yellow wi	es			
96 SS		7-9-13	137.6_	-	A	brown zones and v lt green clay wisps same as above; clayey at base of sample	; med reddish			
97 SS		10-16-19	136.1_	-		brown with v lt green wisps; occasional LEAN CLAY WITH SAND (CL) with i	rounded cse grai			
	IT SPOON; ST = SHELBY TUBE;	SITE							HOLE NO.	
PS = STA	TIONARY PISTON; PB = PITCHER					FINAL LOG			Ľ.	<u>B-18</u>



GEOTE	CHNICAL L	OG	PROJE				JOB NO. NEX	1	ET NO. OF 5	HOLE NO. FB-18	
MAL O RECOV	je (SPT) 'Ery %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	Theast Expansion	<u>, , , , , , , , , , , , , , , , , , , </u>	_ 5	NOTES ON: WATER LEVELS CHARACTER O DRILLING AND LABORATORY TESTING		
20 4 <u>98</u> SS 99 SS 100 SS 101	49	-41-50/5.51 41-50/4 in	134.6- 133.1_ 131.6_ 130.8_			sand; v It green with med and dk orang med plasticity: sand is fine to lwr med f SANDY LEAN CLAY (CL); med red orange zones and v It green wisps; hard plasticity: sand is fine to cse grained CLAYEY SAND (SC) sandy lean clay med reddish brown with It yellow and d It green clay wisps; v dense; wet; suban graded; fine to med grained WELL GRADED SAND (SW) trace cli yellow and orange with med to dk oranj wet; subrounded; well graded; fine to cse Congaree Total depth of boring 159.33.	e zones; hard; we <u>trained: trace midi</u> is h brown with d ; wet; med at top of sample; k orange zones a gular; poorly ay to clayey; lt ge zones; v dense se grained; proba	et; <u>ca</u> k und s; ble	Hole aba grout mi	ndoned with c per 3Q5.	
							•				
			-					-			
S = SPLIT SPOON; ST	= SHELBY TUBE;	SITE					х.		HOLE NO	B-18	



G				PROJE		_			JOB I		SHEET NO		
		INICAL				Nor	theast Ex	pansion	<u> </u>	IEX	1 OF		
SITE	. = -		coc	RDINATI	ES			E 40.90		ANGLE	FROM HOP		
	APSI			10				54979 HOLE SIZE			WEIGHT/F/	90 ALL TOTAL DEP	TU
BEGUN	COMPLETED												
4/27/98			Rizer/Graves		Fa	iling	g 1500	3 7/8 in		140 lb/.	SV IN	144.5	
GROUND EL		L. GROUND WAT	ICR LOGG	-D 84:					NI 1714	JICAT	~		
273.6	¥ / ¥ /								N. Kid	d/SAI	<u> </u>		-
P. TYPI ID NO.	▲ N-VALUE O RECOVEF + ATT. LIMIT	ry % rs %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFIC	ATION	WA CH DR LAB	TES ON: TER LEVELS, ARACTER OF ILLING AND BORATORY STING	
- -	20 40	60 80		273.6		$\left \right $					Har	d auger to 7 feet	to
SS II			6-10-14 7-8-13 11-16-25 15-31-29 17-27-25 12-16-17 7-14-23 11-13-16 11-14-19 9-14-15 7-11-12	265.1_ 263.6_ 262.1_ 259.1_ 257.6_ 254.6_ 253.1_ 248.1_ 243.1_			grained same as abow and white mo same as abow purple bands; same as abow zones and lig same as abow dense same as abow same as abow same as abow same as abow same as abow prownish yell POORLY GF areas are clay bands and wh poorly graded	e; medium yellow with ht gray mottles e; light brownish yell e; with light red e; medium dense; mo e; with zones of sand	ed, and ligh red with lig ned with lig h light to m ow with wh ist ist ist ist (CLAY (SI low with lig nose; moist; ned	it orange ht yellow ht reddish iedium red ite wisps; ight P-SC) som ght brown subangula	che inte	ck for rferences.	
SS	i i I▲ i	0	7-10-14		.		same as abov	e; with two bands of	clayey sand	; various			
ļ	I 1	I I I	SITE			IИ					HO	E NO.	<u> </u>
ŧ	SPOON; ST = S DNARY PISTON	HELBY TUBE; ; PB = PITCHER	0112				FINA	L LOG				FB-19	



Ģ	GEOTECHNIC/	AL LOG	PROJ		Nor	theast Expansion	JOB NO. S NEX	HEET NO. 2 OF 4	HOLE NO. FB-19
SAMP. TYPE AND NO. SAMPLE		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLA	SSIFICATION	NOTES WATER CHARA DRILLIN LABOR TESTIN	LEVELS, CTER OF IG AND ATORY
12 SS 13		6-11-11	238.1- 233.1_	- - - 40-		shades of yellowish brown; wet CLAYEY SAND (SC); light brownis dense; moist; subangular; poorly grad grained; black wisps (Mn?); trace mic	h yellow; medium ed; fine to coarse a		
SS 14		11-16-24	228.1_	- - 45 —		POORLY GRADED SAND (SP) trac with clay; light brown; dense; moist; graded; fine to medium grained with trace heavies	subangular: poorly	_	
SS 15	▲ 0	9-14-18	223.1_	- 50 - -		same as above; clay content varies fro light brown with light yellow pods; m	m trace to clayey; edium grained		
SS 16	▲ O	11-12-14	218.1_	55-		POORLY GRADED SAND WITH Si brown with very light brown zones; m subangular; poorly graded; fine to me coarse; some zones are wet	edium dense; moist;		
SS 17		16-17-23	213.1_	- 60 -	ку.ч	WELL GRADED SAND WITH CLA brown; dense; moist; subrounded; wel coarse grained; trace heavies; some zo	Y (SW-SC); light I graded; fine to ones are wet		
SS 18.		0 7-9-13	208.1 <u>́</u>	- 65 -		SANDY LEAN CLAY (CL); light yel reddish brown zones; very stiff; moist sand is fine to medium grained with so trace heavies	medium plasticity:		
SS 19		0 4-6-19	203.1_	- 70 -		CLAYEY SAND (SC); light yellowisi dense; wet; subangular; poorly graded grained; trace heavies; top 0.4' of this as the last sample (tan clay); contact is	h brown; medium ; fine to medium spoon was the same s sharp		
SS		13-15-16		1		POORLY GRADED SAND (SP) trac	e clay; light brown;		
	F SPOON; ST = SHELBY TUE				السيتي	FINAL LOG		HOLE NO.	B-19



	GEO	TEC	<u>, п</u>			00	PROJ		<u></u>		JOB NO.		ET NO.	HOLE NO.
						<u></u>		r -	Noi	theast Expansion	NEX	3	OF 4	FB-19
SAMP. TYPE AND NO. SAMDLE		-VALU ECOV TT. LIN	ERY 9 MITS 9	% %	80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF IG AND ATORY
20			<u> </u>	1			198.1-			dense; wet; subangular; poorly graded; f grained; trace heavies	fine to medium			
SS 21				1 1 1 1 1 1 1 1 1 1 1 1 1 1		5-6-14	193.1_	80-		POORLY GRADED SAND WITH CLA zones are clayey; light yellowish brown medium dense; wet; subangular; poorly medium grained; black zones (Mn?)	AY (SP-SC) som with white wisps graded; fine to	e .		
		: ; ;		1 1 1	1	0 in-1/2 ir	2			same as above; white zones are clayey s	and light brown	sh		
SS 22		1 		1 1	1		1881	85-		yellow with light yellow and white zone: heavies	s; very loose; trac	ж		
SS 23		1 1 1		1 1 4	1	in-3/6 in-1	14 in-3 186.6		$\langle \rangle$	CLAYEY SAND (SC); light yellow with zones; very loose; wet; subangular; poor medium grained: trace heavies	rly graded; fine to)		
SS 24		 !		1 { {	1 (1	3-4-13	185.1_			same as above; interbedded sand with cl clay; light yellow; medium dense; fine to black wisps (Mn?)	ay and sandy lease coarse grained;	n		
		1 1 1		4 4 1	† : :		105.1_		ŕ	black wisps (will?)				
		 		1 1 1	1 1 1			90-						
SS 25		0		1 1 1 1 1 1 1 1 1 1 1		18-42-50	180.1_	- 95 –		POORLY GRADED SAND (SP) trace (with a light reddish brown wisp; very de subangular; poorly graded; fine to medin heavies	ense; wet;			
SS 26				1 1 1 1 1 1 1 1 1 1 1 1		9-9-11	175.1_	- - 100		CLAYEY SAND (SC); light reddish bro brown zones; medium dense; wet; subar graded; fine to medium grained; trace he	igular; poorly	ht		
SS 27		, 		0	1 1 1 1 1	10-13-25	170.1_	-		same as above; light reddish brown with yellow clay wisps; dense; black pellets (n very light green Mn?)	ish		
		; 		1 1 1 1				105 -						
SS 28			▲	0	i ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	9-20-22	165.1_	- - 110-		POORLY GRADED SAND (SP) trace of contain more clay; light brown with ligh dense; wet; subrounded; poorly graded; medium grained; trace heavies	t vellow wisps:	s		
SS 29				, , , , , , , , , , , , , , , , , , ,	•	11-9-27	160.1_	-		POORLY GRADED SAND WITH CL4 intermixed with clayey sand; medium ye light brown zones and light yellow clay subangular; poorly graded; fine grained;	ellowish red with wisps: dense; we	t;		
SS = SPL PS = STA		-				SITE				FINAL LOG		1	HOLE NO	B-19
r3 = 51/			UN, PB											



G	GEOTECHNI	CAL LO	G PRO.		Noi	theast Expansion	JOB NO. NEX		et no. Of 4	HOLE NO. FB-19
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60		COUNT COUNT ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND ATORY
SS 30)-50/4 in 155.3	-		POORLY GRADED SAND (SP) trace bands are sand with clay; light brown w yellowish red wispy bands; very dense; poorly graded; fine grained; trace heaving	ith medium wet; subrounded;			
SS 31 SS 32			0-5-4 	-		SILTY SAND (SM) some zones are sar yellowish red; loose; wet; subangular; p grained; black speckles (Mn?); trace het turritella shell CLAYEY SAND (SC) some zones app yellowish red with v lt green clay wisps; subangular; poorly graded; fine grained	oorly graded; fine avies; silicified			
SS 33		•	-7-7 143.1	130-		same as above				
SS 34		6 .	8-15 138.1	135-		SILTY SAND (SM); light greenish brov wet; subangular; poorly graded; fine gra (Mn?); trace heavies; trace mica	wn; medium dens ined; black zones	ie; s		
\$\$ 35) 9-	20-40	- 140	D	CLAYEY SAND (SC); medium reddist light green wisps; very dense; wet; suba graded; fine to coarse grained	a brown with very ngular; well	, ,		
<u>SS</u> 36			<u>x076"</u> 129.1		* •••	WELL GRADED SAND (SW) trace cla very dense; wet; subrounded; well grade grained: trace heavies; trace mica Total depth of boring 144.5 feet	ny; light brown; cd; fine to mediur	n	Hole aba grout min	ndoned with c per 3Q5.
	T SPOON; ST = SHELBY TIONARY PISTON; PB =		SITE			FINAL LOG			HOLE NO.	B-19



G	FC	TF	СНИ		AL L	OG	PROJ		NT.	(1	•	JOB		SHEET NO		HOLE NO.
SITE							OORDINAT		Noi	theast Ex	pansion	1		1 OF		FB-20
		АР	SF-N	NE					Ν	78642 E	55518				0	
BEGUN	C	OMPLE			R		C	RILL MA			HOLE SIZE	SAMPLE I	AMMER 1	WEIGHT/FA		TOTAL DEPTH
4/29/98		5/13/				rbitt/Grav	ves	Fa	ilin	g 1500	3 7/8 in		140 lb/.	30 in		112.7
GROUND E			H/EL. C	GROUN	ID WATE	ER LOG	GED BY:				6	n (1				
301.4	4	♀ / ¥ /				<u></u>		1	<u> </u>		С.	Rotham	mer/w	<u>/SRC</u>		<u></u>
SAMP. TYPE AND NO. SAMPLE	0 F + <i>F</i>	N-VALU RECOV ATT. LI	/ERY MITS	%	80	BLOW	ELEVATION IN FEET 301'4	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CI	_ASSIFIC	ATION	WA CH/ DRI LAB	RAC	LEVELS, CTER OF G AND TORY
┝───┼┼	4	<u>1</u>	<u>, 1</u>	1	1									Han	d aug	er to 6 feet to
SS 1 SS 2 SS 3 SS 4 SS 5 SS 6 SS 7 SS 8 SS 9 SS 10 SS 11 SS 10 SS 11 SS 11 SS 12 SS 13 SS 14 SS 15 SS 16 SS 17 SS 18 SS 19				······································		9-11-14 7-10-15 9-21-31 18-31-40 24-17-14 6-12-16 6-11-19 10-14-30 10-15-17 7-12-17 12-23-20 12-18-17 11-15-22 15-19-21 12-14-18 10-18-21 17-19-21 11-14-16 10-17-21	293.9 292.4 290.9 289.4 287.9 286.4 283.4 281.9 280.4 278.9 277.4 277.9 277.4 275.9 274.4 272.9 274.4 272.9 271.4 269.9 268.4 266.9			medium dens: medium grain CLAYEY SA tan; medium grain CLAYEY SA as above CLAYEY SA very dense; n medium grain CLAYEY SA very dense; n medium grain CLAYEY SA very dense; n medium grain CLAYEY SA very stiff; mod CLAYEY SA yellow, orang subangular. Y SILTY SANI dense; wet; si sand same as abov same as abov poorRLY GF medium brov graded: fine 1 CLAYEY SA dense; wet; si grained POORLY GF medium brov subangular. T SILTY SANI yellow; band fine to very fi same as abov same as abov	ND WITH GRAVEL ND (SC); dark brow noist; subangular; poc need. lithic fragments: ND WITH GRAVEL ellow; dense; moist; : mg rained. T CLAY (CH); mediu ist; high plasticity ND WITH GRAVEL e, and purple; mediu well graded: fine to co O(SM) with clay; medium e; reddish brown with re; medium dense e; dense e; dense RADED SAND WITH wish red; dense; wel; o medium grained ND (SC); medium brow divangular; poorly gra tADED SAND WITH wish red; dense; wel; o medium grained ND (SC); medium brow divangular; poorly gra tADED SAND WITH wish red; yellow, and coorly graded: fine to D (SM); medium brow di; dense; moist; subzine grained e; light brown with y well graded; fine to m re; with clay; medium range; some mottling woorly graded	oorly graded wish brown ular; poorly . (SC); very nish yellow orly graded; . (SC); med subangular; m purple w . (SC); med m dense; we varse grained dium reddis ded; fine to h yellow H SILT (SP- subangular rownish red, w angular; poor n and red ellow and on medium grai	t; fine to and red wi graded; fin dense; san with tan; fine to ium purple well grade ith white; ium white, ium white, it, h brown; medium SM); sse; wet; jined rly graded range; ned vellow.	chec inter swit	k foř feren	underground ces and then mud rotary.
SS = SPLIT	500			RV TI		SITE		1						HOLE	NO.	
PS = STATI							<u></u>	<u>. </u>		FINA	L LOG				F	B-20



(GEO	OTEC	CHN			OG	PROJE		Nor	rtheast Expansion	JOB NO. NEX	SHEET NO.	HOLE NO. 3 FB-2
AND NO.	0	N-VALU RECOV ATT. LII	ERY	%	-	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	IFICATION	WAT CHAI DRIL	ES ON: ER LEVELS, RACTER OF LING AND DRATORY TING
s		20 4	<u>0 </u>	<u>50 ε</u>	<u>so</u>	16-18-28			.	same as above; dark brownish red with v	white and yellow		
0 S		.i ▲i			i o	10-16-18	265.4_	-		same as above; with clay; dark red with	yellow		
1 S 2				0	 	14-14-19	263.9_	-		same as above; dark red, white, and yell	ow .		
s			•	1 1 1	0	9-19-22	262.4_	-		same as above			
3 S				0	F F E	15-16-16	260.9_	40-		same as above; medium brownish yellow	with red and		
4 S			▲	1 1 1	0	12-19-25	259.4_	-		white CLAYEY SAND (SC); medium brownis white; dense; moist; subangular; poorly j	sh yellow with		
5 S 6				1	0	9-16-19	257.9_	-	4	medium grained SILTY SAND (SM) with clay; medium of and yellow: mottled; dense; moist; suban	dark red, white,		
57			L	0	, , ,	14-15-26	256.4_	45 -	$\overline{/}$	graded: fine to medium grained CLAYEY SAND (SC); medium dark rec yellow; mottled; dense; moist; subangula	I, white, and	;	
5		1 1 1 1 1 1	•	0	1 1 1	20-22-26	254.9_ 253.4_	-		fine to medium grained same as above; dark red; wet; trace coars	se sand		
<u> </u>				ጋ 	1 4 1	19-30-26	253.4	-		SILTY SAND (SM); dark red, white, yel very dense; wet; subangular; poorly grad grained, trace coarse sand	ed; fine to media	ım	
; ;		1 1 1	a	- - - -		12-20-27	250.4	50 —		POORLY GRADED GRAVEL WITH S medium red, yellow, and tan; dense; wet poorly graded; fine to coarse grained	; subangular;		
3			0		; ; ;	6-15-25	248.9	-		POORLY GRADED SAND WITH SILT medium reddish brown with yellow; den subrounded; poorly graded; fine to mediu	se: wet:		
5 2			0	0	;	10-10-6	247.4	-		CLAYEY SAND (SC); medium brownis vellow: mottled: medium dense; moist; s	h white and		
è.			0	: : :	: : :	8-10-10	245.9	55-		SILTY SAND (SM) with clay; medium I medium dense; moist; subangular; well g	prownish red; graded; fine to		
5			×	1 1 -	t 4 -	6-10-12	244.4_	-		medium grained same as above; medium brownish yellow WELL GRADED SAND WITH SILT (S			
5			-	- - -	; ; ; ;	6-6-8	242.9_	-		well GRADED SAND with Sill (3 orange; dense; wet; subrounded; well gra grained CLAYEY SAND (SC); medium brownis	ided; fine to coar	rse	
S S				1 1 1	, 0	3-8-13	241.4_	- 60 —	4	white; medium dense; wet; subangular; v coarse grained SILTY SAND (SM) with clay; medium I	vell graded; fine		
5 7 5				1 1 1	. (16-20-18	239.9_	-		medium dense; wet; subangular; well gra grained POORLY GRADED SAND WITH SILT	ided; fine to coal	rse	
3 S	þ			: : :	1 : 1	19-21-26	238.4_	-		medium brownish orange; dense; wet; ar graded; fine to coarse grained no recovery	ngular; poorly	Catch	er broken
5		0	▲	1 1	1	12-20-22	236.9_	65		SILTY SAND (SM); medium orange; de	nse; moist;		
) S	••••		-	1 . 4 4	1., 1. 1.	10-11-24	235.4_	-		subangular; poorly graded; fine to mediu CLAYEY SAND (SC); medium brownis	sh orange; dense		
3		0			 	17-28-34	233.9_	-	4	moist; subangular, poorly graded; fine to SILTY SAND (SM) with clay; medium with cite and ubits years dense; wet sul	prownish orange		
2		0	•	1 1 1	1 1 1	10-26-28	232.4_	-		with pink and white; very dense; wet; sul graded: fine to coarse grained. lenses of POORLY GRADED SAND WITH SILT medium brownish orange with medium i	INP+NMIT	1	
3 S 4			>	1 1 1	1 1 1	10-11-21	230.9_	70		medium brownish orange with medium j wet; subangular; poorly graded; medium SILTY SAND (SM); medium brownish subangular; poorly graded; fine to mediu	orange; dense; w	ed vet;	
S 5	þ			1 1 1	1	21-24-12	229.4_	-	<u>i</u>	по гесоvегу			
5				1 	0	13-13-13	227.9_	-		CLAYEY SAND (SC); medium brownis dense; moist; subangular; well graded; fi	sh orange; mediu ne to coarse	ım	
	IT SPO	DON: ST	= SHEL	.BY TUE			226.4		νΔ	FINAL LOG		HOLE	^{NO.} FB-20



	GEOTECHNICAL	LOG	PROJE		Noi	theast Expansion	JOB NO. NEX	SHEET NO	
SAMP. TYPE AND NO.	▲ N-VALUE (SPT) ○ RECOVERY % ↓ ATT. LIMITS %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION	WA CH DR LAI	TES ON: TER LEVELS, ARACTER OF ILLING AND BORATORY STING
SS 47	20 40 60 80	6-10-10	224.9	-		grained, trace gravel same as above; with silt; medium brow black; wet; lithic fragment; Mn present	nish yellow with		
SS 48		⁽¹²⁻²¹⁻²²⁾	223.4	-		SANDY LEAN CLAY (CL); medium with white, black, and brown; mottled; medium plasticity: Mn present	brownish yellow hard; moist;		
SS 49		7-10-15	221.9	-		same as above; with orange and tan zo of fat clay	nes; very stiff; le	nses	
SS 50		Ф19-16-10		80 —		FAT CLAY (CH); light yellowish brow streaks; very stiff; moist; high plasticity			
SS 51		Ф <u>10-17-21</u>	220.4_	-		CLAYEY SAND (SC); medium yellow black, white, and brown; mottled; dens	e: moist;		
SS 52		13-19-22	218.9_	-	\mathcal{D}	subangular; poorly graded; fine to med present, clay lenses same as above; with silt; wet	ium grained, Mn		
SS 53	▲ O	17-19-22	217.4_	-	ľA	SILTY SAND (SM) with clay; mediun dense; wet; subangular; poorly graded;	yellowish brown fine to medium	n;	
SS 54	A O I	10-15-20	215.9_	85 -		grained CLAYEY SAND (SC), medium yellow wet; subangular; poorly graded; fine to	vish brown; dens medium grained	e;	
SS 55		18-7-10	214.4_	-	KA	POORLY GRADED SAND WITH CL medium brownish orange; medium der	AY (SP-SC);		
SS 56	O▲	14-24-36	212.9_	-		poorly graded; fine to medium grained WELL GRADED SAND WITH CLAY brownish orange; very dense; wet; suba	trace gravel (SW-SC); medi	um	
SS 57		29-15-14	211.4_	90 —	.7	fine to coarse grained POORLY GRADED SAND WITH SII brown with tan; medium dense; wet; su	T (SP-SM); ligh	t	
SS		10-19-23	209.9_	-		graded: fine to medium grained POORLY GRADED SAND (SP) trace dense; moist; subangular; poorly grade	silt: light brown		
58 SS	O ▲	10-16-15	208.4_	-		grained, trace coarse sand SILTY SAND (SM); brownish orange; subangular; poorly graded; fine to med	dense: moist:		
59 SS		0 19-25-31	206.9_	- 95 —		same as above (top 0.6 ft.); remaining brown fat clay with sand (CH), hard, n	portion is yellow	ish ity	
60 SS	▲O	16-18-21	205.4_	-		same as above; medium brownish oran Mn present		-	
61 SS		0 8-13-25	203.9_	-		CLAYEY SAND WITH GRAVEL (SC dense; moist; subangular; well graded;			
62 SS		4-9-19	202.4_	-		clay layer at 100.0 ft; medium yellowis	gravish brown I	ean	
63 SS	▲ O	15-16-19	200.8_	100-	A	_ dense; wet; subangular; poorly graded;	fine to medium	/ Loa / (5/6	s circulation /98).
64 SS	A O	17-18-19	199.3_	-	4	same as above; medium yellowish brow dense; some Mn staining POORLY GRADED SAND (SP) trace	clay; medium		t circulation on
65 SS		12-12-15	197.8_	-		gravish brown; dense; wet; subangular to medium grained same as above; trace silt; medium dens		5/12 atte	2/98 while mpting to redrill feet for
66 SS		9-14-15	196.3_	. 105 -		staining POORLY GRADED SAND WITH SI	T (SP-SM);	geo	physical logging
67 SS		10-9-9	194.8_	-	$\left \cdot \right\rangle$	medium grayish brown; medium dense poorly graded: fine to medium grained POORLY GRADED SAND WITH CL	: trace Mn stainir AY (SP-SC);	ng	
68 SS		-1-2-1	193.3_			medium grayish brown; medium dense poorly graded; fine to medium grained LEAN CLAY WITH SAND (CL); ligh	t gravish white, l		
69 SS	0	WR/37 in	191.8_	- 110-		brown, and black; soft; wet; medium p fraction is very fine to fine grained CLAYEY SAND (SC); medium grayis	lasticity; sand	Los ose; cou	t circulation and d not regain.
70						wet; subangular; poorly graded; fine to	medium grained	into	nped two mud tu hole with 500 ons water will ta
			188.7_	-		Total depth of boring 112.7 fet.		(5/7 Hol	more spoon 1/98). e abandoned wit
								gro	ut mix per 3Q5.
SS = SPI	LIT SPOON: ST = SHELBY TUBE;	SITE		L	I	i		HOL	E NO. FB-20



	6		OT			CAL L	00	PROJ					JOB 1		SHEET N		HOLE NO.
	<u> </u>			ECH						No	theast Ex	pansion	ľ	IEX	1 OF		FB-20A
SITE							C	COORDINAT	ES					ANGLE	FROM HOP		TAL .
0500				APSF		60		10		N	78642 E	55518 HOLE SIZE	SAMDIE 1		WEIGHT/F/	90	TOTAL DEPTH
BEGUN				PLETED	DRILL												
4/29 GROUI		-		3/98		J Co UND WATE	rbitt/Gra	GGED BY:	ra	IIIn	g 1500	3 7/8 in		140 lb/.	50 m		120.0
	01.		Ŧ	/	. 600			002001.				C	Rotham	mer/W	VSRC		
							T	T	Î.		<u></u>						
1			N-VA	ALUE (SPT)				-								
مرجا	Щ						>=	N N	L Z	S					WA NO	TES (DN: LEVELS,
	ЧD	0	REC	OVER	Υ%		BLOW	FEE	Ē	E	DESC	RIPTION AND CL	ASSIFIC	ATION	CH	ARAC	TER OF
SAMP. TYPE AND NO.	SA	+	ATT.	LIMIT	s %		δ ^m	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS					LAE	30RA	G AND TORY
ŝ								ι ω		Ŭ					TES	STINC	\$
	\square		20	40	60	80		301.4	ļ								
) I	1	1 4	T I			-						che	ck for	er to 6 feet to underground ces. Then mud rotary.
			i I	1	:	1			-						swi	tch to	mud rotary.
			1	, 1					-								rill to 106.5 gin sampling.
			:	:					-						feet	to be	gin sampling.
			1	1	•				5-								
									-								
			i i	•	•	1			-								
			1 ·	: 1	•	1			-								
			1	*		1			-								
			1	1	1	1			10-								
			1	:		1			-								
			i			1 1											
			:			1			_								
			1						15-								
				•													
									-								
			1	:	:	1			-								
			:			4 9			-								
			:	:	;	5 1			20-								
			•	•		1			-								
			:			6			-								
			•	•	÷	1			-								
					;	i I			-								
			1						25-								
			6 1			1		1									
			•			1		ł									
				; T	1	T Ú					·						
			1	1		F F			30-								
									-								
				:		1			-								
			÷	•	-				-								
			1	1 1	1	1			-								
			с 1	:	:	5 5			35 -								
			k L	1	•	1 t			-								
			+	;		1			-								
			e e			1			-								
			1	1	:	1			-								
SS = SI	PLIT	r sp	OON;	ST = SH	ELBY 1	TUBE;	SITE					~ ~ ~				ENO.	20.4
PS = \$1	TAT	ION	ARY P	ISTON;	PB = P	ITCHER					FINAI	LOG				гB	-20A



~	> r	-07	E ~'		- <u> </u>	00	PROJ				JOB NO.	1	ET NO.	HOLE NO.
G	> t	:01	EUI			.00			Nort	heast Expansion	NEX	2	OF 3	FB-20
AND NO. SAMPLE		▲ N-V ⊃ REC + ATT	OVEF	RY %		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION		NOTES WATER CHARA DRILLIN LABOR TESTIN	ON: LEVELS, CTER OF IG AND ATORY G
		20	40	60	80									
		1	:	1	4									
		, , ,	;	:	•									
		+ 	i 1 1		•									
		I I I		·	1			45-						
		1		:	1			-						
		r t		1	+ + 			-						
		i i	1	1 1 1	r i I			50-						
		1 1 1	:	: : :	1 1 1			- 30						
		1			1			-						
				÷	1									
		1	:					55-						
		•	1 1 1	•	: : ;									
		: ; ;	•	:	*			-				ĺ		
		:		•	•			60-						
			,					- 00					Adding	luick gel.
		:		:	•			-						[····· 8···
		•						-						
		:			:			65-						
		•			•			-						
		•						-						
		;			•			70-						
		•	,		:			-						
		:			1 1			-						
.			•	:			· - ·-	-						
		1			•			75-						
			:		:			-						
		:	•		:			-						
		1 1 1	; ; ;	: ! !	1 1 1			80-						
		4 4	•	i I	1 1 1			-						
		: • :		:	1			-						
		; ;	:	:	1									
		, , 		, , 				85-			·		HOLE NO	
= SPLIT					rube; Itcher	SITE				FINAL LOG			FF	8-20A



-

G	G	E	от	E	СН	NI	CA	LL	OG	PROJ		Noi	rtheast Expansion	JOB NO. NEX		ET NO. OF 3	HOLE NO. FB-20A
SAMP. TYPE AND NO. SAMPLE			REC ATT	cov . Lii	ER) MITS	S %			BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION	<u></u>		LEVELS, CTER OF IG AND ATORY
SS 1 SS 2 SS 3 SS 4 SS 5 SS 6 SS 7 SS 8 SS 9 9				4					18-48-45 17-20-22 17-21-30 9-10-12 8-10-13 16-25-25 910-12-14 4-16-21 13-14-13	193.4_ 191.9_ 190.4_ 188.9_ 187.4_ 185.9_ 184.4_ 182.9_	90 		POORLY GRADED SAND WITH SIL medium yellowish brown; very dense; v poorly graded: fine to medium grained same as above; dense POORLY GRADED SAND (SP) trace yellowish brown; very dense; wet; suba graded: fine to coarse grained WELL GRADED SAND WITH CLAY yellowish brown; medium dense; wet; s graded; fine to coarse grained MELL GRADED SAND WITH CLAY yellowish brown; dense; wet; s graded; very fine to fine grained CLAYEY SAND (SC), medium yellow white, and black; medium dense; wet; s graded; fine to coarse grained same as above; dense Total depth of boring 120 feet.	wet; subangular; silt; medium ngular; poorly (SW-SC); medi ubangular; well ent n with red and b pper 6 inches are A Y (SP-SC); ubangular; poor vish brown with i	um łack	feet. Mit batches (3/11/98 t at 75 feet drilling d feet and : sampling Lost circ recovered Hole aba	ulation, nev e
IS = SPLI IS = STAT									SITE				FINAL LOG			HOLE NO.	8-20A



	0		TE	CU		AL L	06	PRO.	JECT				JOB		SHEET	NO.	HOLE NO.
	U									Noi	theast Ex	pansion		NEX	1 0		FB-22
SITE							C	OORDINAT	res	NT	70770 F	E 4020		ANGLE	FROM HC		TAL
BEGUN				PSF-		FR			ORILL M		79779 E	54828 HOLE SIZE	SAMPLE	HAMMER	WEIGHT/	90 FALL	TOTAL DEPTH
5/1			5/7/		Ditte		Rizer/Grav				g 1500	3 7/8 in		140 lb/			144.3
GROU	_			1	GROU			GED BY:	1.9		5 1000	<u> </u>		140 10/	<u> </u>		
2	76.	7	¥. ¥.	1									N. Kie	Id/SAI	С		
	Π								1	T							
SAMP. TYPE AND NO.	SAMPLE	0 + .	RECO ATT. L	UE (S VERY .IMITS	%	90	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFIC	ATION	W CI DI LA	OTES (IATER HARAC RILLING ABORA ESTING	LEVELS, STER OF G AND TORY
	╟┤		20	40	60	<u>80</u>		270.7							Ha	and aug	er to 7 feet to underground
SS 1 SS 2 SS 3 SS 4 SS 5 SS 6 SS 7 SS 6 SS 7 SS 8 SS 9 SS 10 SS 11 SS 12 SS 13 SS 14 SS 16 SS 17 SS 17		· · · · ·					6-7-12 7-14-14 6-7-8 8-17-23 9-14-16 10-20-22 12-15-20 6-11-14 8-11-12 8-12-13 14-19-20 14-19-19 12-17-17 11-14-15 10-12-13 10-11-14 13-15-16 12-12-14	268.2 266.7 265.2 263.7 262.4 262.2 260.7 259.2 257.7 256.2 254.7 253.2 251.7 250.2 248.7 247.2 245.7 244.2			with dark red poorly graded probable fill no recovery CLAYEY SA medium dens medium grain LEAN CLAY grained sand orange; hard; grained: abun POORLY GR zones are clay light red; medium same as abow trace mica CLAYEY SA wisps; medium to medium gr same as abow trace mica CLAYEY SA wisps; medium to medium gr same as abow damp; trace n no recovery CLAYEY SA wisps; dense; medium grain POORLY GR zones are clay bands of clay wisps; medium fine to medium cLAYEY SA wisps; medium fine to medium cLAYEY SA wisps; medium fine to medium cLAYEY SA wisps; medium fine to medium poORLY GR	ADED SAND WITH ey; light reddish yello ilum dense; damp; sul m grained e; light yellowish brov e; light brownish yello ND (SC); light brown m dense; dry; subangu ained; trace mica e e; light yellow with lighica nica ND (SC); light brown damp; subangular; po led; bottom of the inte ADED SAND WITH ey sand; light brownis m dense; moist; suban m grained ND (SC); light brown m dense; moist; suban	ense; mois ned; trace with dark poorly grav d silt and d city; sand i CLAY (S ww grading pangular; p wn with wh ow with wh ish yellow wish yellow gate red and ish yellow gular; poorly grade ryal is less CLAY (S bown with 1 h yellow gular; poorly grade ryal is less CLAY (S bown with 1 h yellow gular; poorly grade ryal is most; need	t; subangu heavies; red zones ded; fine to very fine ark yellows s very fine P-SC) som downwarc oorly grad downwarc oorly grad dite wisps; ite wisps; with white white ban with white d; fine to <u>clayey</u> P-SC) som with white rly graded; with white rly graded; P-SC) som ght red subangula	int int int int int int int int int int	terferen th crush l in fror rface. tucher lo neve mate mple?). tucher lo tucher lo	was plugged er run that
18			. 0	1 t	; 1	1	9-10-12	242.7_		1:14	dark orange b	e; light yellowish brow ands: medium dense:	trace mica				
SS				۱ ۴	۱ 	1 			1		same as above	e; clay content increas	es with de	pun; grain s			
SS = SF PS = ST							SITE				FINAI	LOG			но	LE NO. FE	B-22
																	



(GEOTECHNICAL L	OG	PROJE		Nor	theast Expansion	JOB NO. NEX	1	ET NO.	HOLE NO. FB-22
<u> </u>		<u> </u>	<u></u>		101	theast Expansion		<u> </u>	OF 4	FD-22
SAMP. TYPE AND NO. SAMPLE	+ ATT. LIMITS %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND ATORY
19	20 40 60 80	9-12-14	241.2-		-14	decreases; medium brownish red with w	white wisps; wet;			
SS 20		9-12-14	220.7	-	1	subrounded: trace lower coarse grains same as above; medium brownish red				
SS		9-10-13	239.7_	-		no recovery; catcher looks normal				
21 SS		6-9-10	238.2_	-		CLAYEY SAND (SC); light yellow and	medium vellow	ish		
22			236.7_	- 40-	$\langle \rangle$	brown; medium dense; moist; subangul	ar; poorly graded			
SS 23		9-12-16		40-	Į.	same as above; interlayered with sand w brown, medium orange, and medium ye	rith clay; light llow; black wisp	s		
SS	AO; ¦ ¦	10-12-13	235.2_	_	КA	(Mn?): trace heavies POORLY GRADED SAND WITH CL	AY (SP-SC); ligh	it		
24			233.7_	_	L K	yellowish brown; medium dense; moist; graded: fine to medium grained: trace k WELL GRADED SAND WITH CLAY	subangular; poo	s		
SS 25		12-14-21	232.2_	-	1	well GRADED SAND with CLAT brown; dense; moist; subangular; well g coarse grained	raded; fine to			
SS 26	0	14-17-16	252.2	45 —	M	POORLY GRADED SAND WITH CL	raded: fine to	it		
SS		3-8-16	230.7_	-	-4	medium grained; trace lower coarse gra	ins T (SP-SM)			
27			229.2	-		medium brown; medium dense; wet; sul graded; fine to upper lower coarse grain	ed			
SS 28		17-18-21		_	1	POORLY GRADED SAND WITH CLA medium brown; dense; wet; subangular;	AY (SP-SC); poorly graded;			
SS	▲ O	17-16-18	227.7	-	ß	fine to coarse grained same as above; fine to medium grained				
29 SS	0	13-16-22	226.2	50 -	И	POORLY GRADED SAND (SP) trace	rlav: medium			
30		15-10-22	224.7	-		brown; dense; wet; subangular; poorly g medium grained	raded; fine to			
SS 31	0	17-22-20		-		same as above; trace silt; fine to upper n	nedium grained			
SS		11-13-18	223.2_]	h	POORLY GRADED SAND WITH CLA	Y (SP-SC);			
32	0	17.12.16	221.7_	55-	1	medium brown; dense; wet; subangular; fine to lower medium grained				
SS 33		16-13-15	220.2	-		CLAYEY SAND (SC); medium brown; wet; subangular; poorly graded; fine to r grained; some caved crushed stone	medium dense; nedium coarse			
SS 34	0 🔺	15-23-32	220.2	-	Й	POORLY GRADED SAND WITH CLA medium brown; very dense; wet; subang	Ar (Sr-SC),			
SS	0 A	23-24-36	218.7_	-	4	graded: fine to medium grained POORLY GRADED SAND (SP) trace of	clay; medium			
35			217.2	-		brown; very dense; wet; subangular; poc lower coarse grained				
SS 36		15-23-3T	216.7	60 -		same as above; trace silt; fine to coarse gravel	grained; trace fin	e		
ŜS	\diamond	23-26-28	215.7_	-		same as above; fine to medium grained				
37			213.8_	1		•				
SS 38		12-12-11]]		POORLY GRADED SAND WITH CLA medium brown; medium dense; wet; sul	AY (SP-SC); bangular; poorly			
22		13-16-11	212.3_	65 -	//	graded; fine to medium grained CLAYEY SAND (SC); medium yellow dense; wet; subangular; poorly graded; f	ish brown; mediu	ım		
39 · SS		13-16-11	210.8_			grained same as above				
40			209.3	-	<i>[</i> , ,					
SS 41		3-4-4		-	$\langle \rangle$	same as above; with a few thin sandy cla grayish brown zones; loose; fine to uppe	ay interbeds and er medium graine	d		
SS	▲ · · · · · · · · · · · · · · · · · · ·	4-6-7	207.8_	4	1	same as above; medium dense; angular;	fine to lower			
42 SS		3-6-8	206.3_	70-	A	coarse grained LEAN CLAY WITH SAND (CL); medi	um brownish			
43			204.8_	4		yellow and reddish brown; stiff; wet; me sand fraction is fine grained	dium plasticity;			
SS 44	▲ O	4-8-8			1	CLAYEY SAND (SC); medium yellow dense; wet; subangular; poorly graded; f	ish brown; mediu Tine to medium	រពា		
SS	0	14-21-24	203.3_		KA	grained POORLY GRADED SAND WITH CL4	AY (SP-SC);			
45			201.8_]	6	medium yellowish brown; dense; wet; se graded: fine to lower medium grained	upangular; poorly		1015110	<u> </u>
	T SPOON; ST = SHELBY TUBE; TIONARY PISTON; PB = PITCHER	SITE				FINAL LOG			HOLE NO.	B-22
5-31A	HONART FIGTON, PD = PHONER									

.



GEOTECHNICAL LO	G		Nor	theast Expansion	OB NO. NEX		ET NO. OF 4	HOLE NO. FB-22
	COUNT ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASSIF	FICATION			LEVELS, CTER OF IG AND ATORY
20 40 60 80 35	16-19		K	same as above; fine to medium grained				
	200.3			same as above				
<u>-</u> O¦ ▲ 23-	22-16		1	same as above; fine to upper medium grain	ned			
	-3-6 197.3_	- 80-	X	CLAYEY SAND (SC) with 0.2 ft thick lea	an clay interbed	ds;		
	9-10 195.8			medium yellowish brown; medium dense; poorly graded; fine to medium grained; cla charcoal fragments	wet; subangula ay layers have	ar; 		
	194.3_	-		LEAN CLAY (CL) trace sand with sandy of med brownish yellow; v stiff; wet; med pla fraction is fine grained	clay interbeds; asticity; sand			
- φ ₆₋₁	10-10	-		LEAN CLAY WITH SAND (CL); med bro stiff; moist; med plasticity; sand fraction is	ownish yellow; s v fine to fine	; v		
▲ 9. 1	192.4_	85-		grained same as above; portions are sandy; med gr brownish yellow	ayish yellow to	5		
- A (7-1	190.6_			LEAN CLAY (CL) trace sand with few thi sand; med brownish yellow; v stiff; moist;	in layers with			
	-6-9 189.1_			sand is v fine to fine grained CLAYEY SAND (SC); It brown with v It				
	187.2	-		med dense; wet; subangular; poorly graded	i; fine to med			
	8-14	90-		POORLY GRADED SAND WITH CLAY brown with It orange zones; med dense; we poorly graded: fine to med grained; trace c	et; subangular;			
	12-24			CLAYEY SAND (SC); med reddish brown subangular; well graded; fine to lwr cse gra	n; dense; wet;			
▲ O 13-	13-14	-	N	POORLY GRADED SAND WITH CLAY zones are clayey; It yellowish brown with r	ned brown			
- ▲ 6	-8-9 182.7_	05_		zones; med dense; wet; subangular; poorly med grained CLAYEY SAND (SC); some zones are sau	nd with clay;	_/		
	-6-8 181.2	-		med reddish brown with v lt brown zones; subangular; poorly graded; fine to med gra black mottles (Mn?)	med dense; we ined; trace cse	et.		
	8-11 179.7_			same as above; med reddish brown with It well graded; fine to lwr cse grained; black trace heavies	brown zones; zones (Mn?);	Л		
◆ ◆ 5-	7-11 178.2_			same as above; med reddish brown with v poorly graded: fine to med grained: trace n same as above; med reddish brown with v	nica	<u> </u>		
	-5-8 176.7_	100-		WISPS POORLY GRADED SAND WITH SILT (SP-SM); It			
	175.2_	-		reddish brown with v lt brown zones, med subangular; poorly graded, fine to med gai heavies; trace mica	ined; trace			
	35-50 173.7_	-		SILTY SAND (SM); sand with silt zones; with v lt brown zones; med dense; wet; sul graded; fine to med grained; trace heavies;	bangular; poorl	vn ly _		
	-50/4 in 172.2_			Contain silicified chips POORLY GRADED SAND (SP) trace cla with clay; It brown with It orange zones; v	dense; wet;	/ h		
	170.9	105		subangular; poorly graded; fine grained; trattace mica	ace heavies;	קב		
	169.2	-		same as above no recovery; catcher looks normal				
	167.7	-		POORLY GRADED SAND (SP) trace cla with clay; It brown with It orange zones; v subangular; poorly graded; fine grained; tr	dense; wet;			
	34-41	110-		trace mica same as above with it gray lean clay wisps				
0	27-35	-		POORLY GRADED SAND WITH SILT (zones trace silt; with It greenish gray lean orange with It brown zones; v dense; wet;	clay wisps; It			
▲O 13-	16-38			poorly graded; fine grained; trace heavies; same as above		-/		
0 4 28-	34-49 163.2	-	凉	same as above; with some clayey zones	<u></u>			
		1					HOLE NO.	
STATIONARY PISTON; PB = PITCHER	•			FINAL LOG			<u> </u>	B-22



~				00	PROJ				JOB NO.	101121	ET NO.	HOLE NO.
G	SEOTEC	HNIC		UG			Nor	rtheast Expansion	NEX	4	OF 4	FB-22
AND NO. SAMPLE	▲ N-VALU	ERY %		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION			LEVELS, CTER OF G AND TORY
	20 40	60	<u>80</u>	19-35-40				POORLY GRADED SAND (SP) trace	silt: some zones			
S 2 3			▲ O 1	19-33-40	n 160.2_	-		with silt; It brown with it orange zones subangular: poorly graded: fine graine same as above; trace clay; some zones heavies; most of the sample is slough	; v dense; wet; d: trace mica			
S	ф.,	, ,		14-35-50		-		same as above with It yellow clay wisp)S			
4 S 5	1	0		21-33-49	157.2_ 155.7_	- 120		POORLY GRADED SAND (SP) trace band and wisps of gray clay; It orange v dense; wet; subangular; poorly grade	with It brown zon	nes;		
S 6			: : : :	6-9-15 8-8-10	154.2_	-	K	heavies: trace mica POORLY GRADED SAND WITH CL reddish brown with It brown zones; me subangular, poorly graded; fine grained	AY (SP-SC): me	/		
S 7 S		4 4 7		6-6-9	152.7_	-		Sloughed material contains shell fragm CLAYEY SAND (SC) some zones are reddish brown; med dense; wet; suban fine grained; trace beavies; trace mica	ents sand with clay; n gular; poorly grad	led; /		
8 S 9		1 1 1	•	79 in-5/3 in	-11 -11 149.7_	125-		same as above; med yellowish brown; turritella shell fragments same as above; med reddish brown; tra	black wisps (Mn?	?); 		
S D S	; ▲ . ; ▲:	•		P10-14-19 P11-16-20	149.7_	-		same as above; with It greenish gray cl black pellets (Mn?) same as above; abundant turritella shel				
5 				7-10-18	146.7_	- 130-	Â	same as above; med dense				
5	• • • •	•	0	6-15-41	145.2_	-		same as above; v dense; fine to med gr shells	ained; no turritell	a		
3		0	-	13-17-14	143.7_	-		LEAN CLAY WITH SAND (CL); It g greenish gray mottles; hard; wet; low p	reenish brown wit lasticity; sand is f	th It fine		
5			Ó WF	V9 in-1/3 i	142.2_ 8 140.7_	135-		prained: trace med grains SILTY SAND (SM); It brownish yellor subangular; poorly graded; fine grained	d; trace mica			
5		Ö	•	17-9-14 4-12-23	139.2_	_		POORLY GRADED SAND WITH SII silicified sand chips; It yellowish brown subangular: poorly graded; fine grained LEAN CLAY WITH SAND (CL); mee	n; med dense; wei d: trace mica 1 reddish brown w	vith		
			0	12-19-23	137.7_	-		It grayish green wisps; hard, wet; med fine grained: trace med grains; trace m CLAYEY SAND (SC); It orange with and It green interlaminated clay; dense	plasticity; sand is ica dark orange band	s		
		▲ ·	· c	14-21-29	136.2_ 134.7_	140-		poorly graded; fine grained; trace mica same as above; med reddish brown wit interlaminated clay; fine to med graine	h lt green			
	0	:		4-50-50/3	134.7_ 133.5_	-		same as above; bottom 0.1 ft is sand (0 reddish brown and med brown with 11 brown; y dense; 0.3 ft from bottom of	brown and yellow			
		-	•	49-50/4 in				thick silicified fine to med sand WELL GRADED SAND (SW) trace cl brown; v dense; wet; subrounded; well cse grained; trace mica: Congaree	lay, it orange and graded; fine to ly	lt vr	Hole grou grout mix	ted with per 3Q5
								Total depth of boring 144.3 feet.				
	· · ·		:									
	1 - 1 	; ,	2 7 1									
	, , ,	1 1 1	: :									
	: . 1 :	, ,	1									
SPLIT	T SPOON; ST =	SHELBY 1	TUBE;	SITE				FINAL LOG			HOLE NO.	B-22



<u> </u>	~			~		A I I	00	PRO.	ECT				JOB		SHEET	NO.	HOLE NO.
	Ģ	jE(DTE	CHI	NIC		.OG			No	theast Ex	pansion		NEX	1 0		FB-25
SITE							00	ORDINAT	ES					ANGLE	FROM HO		TAL
				PSF-P							79242 E					90	
BEGU	1	-	OMPLE		DRILLEF	2		C				HOLE SIZE		HAMMER		FALL	TOTAL DEPTH
5/20	5/9	8	5/28/				rbitt/Grav	es	Fa	ilin	g 1500	3 7/8 in		140 lb/.	30 in		165.5
GROU	ND	EL.		H/EL. C	GROUN	D WATE	R LOG	GED BY:									
2	<u>89</u>	.1	¥ / ¥ /										<u>N. Kic</u>	Id/SAI	<u>C</u>		
	Π																
ш		▲	N-VALU	je (Sf	PT)			z		S					N	OTES (ON:
٦	Ш	0	RECO	/FRY	%		≥Ę	잂늡	z	l₽					W	ATER	LEVELS,
a Q	SAMPLE						BLOW	¥Ш	H	GRAPHICS	DESC	RIPTION AND CL	ASSIFIC	ATION		RILLING	TER OF
SAMP. TYPE AND NO.	3	+	ATT. LI	MITS	%		шо 1	ELEVATION IN FEET	DEPTH IN FT	R R					Ū	ABORA	TORY
l o								-							T	ESTING	6
	\prod		20 4	10 1	60	80		289.1	· ·							and ava	er to 7 feet to
			1	1 1	r F	1 1			.						ch	neck for	1
			1	1	1	1									in	terferen	ces.
			1	:	i 1	1			-	1							
			i	1	1	1			-	1							
			i	1		i.				-							
				1	1	1			5-	-							
			1	1													
			1			1											
SS	Ĭ		4	; 🗕	: O	1	9-20-34			\square	white mottles	ND (SC); light red ar ; very dense; damp; s	nd light ora ubangular	nge with			
			1	1	1	φ'		280.6		\mathbb{Z}	graded: fine t	o medium grained e; light red; dense					
SS 2			-	ר י	1	Ŷ	15-17-21		-	$\langle \rangle$	same as abov	e; light red; dense					
SS			1	1	4 1	lo	11-16-20	279.1	10-	KA	POORLY GR	ADED SAND WITH	ICLAY (S	P-SC) ligh			
3			1	1		5 5	11-10-20	277 (-	10	red and light	orange with a white, y subangular; poorly g	verv clean l	band of san	nd:		
SS			¦ ▲	:	0	1	10-16-16	277.6 <u>.</u>	1.	\mathbb{M}	\ arainad: traca	haaviac					
4			1	۱ ۱		1		276.1			CLAYEY SA with very light	ND (SC); with sand v at yellow band; dense; i; fine to medium grai	with clay zo damp; sub	ones; light i angular;	red		
SS			A	1	0	1	8-10-10		1 .	\mathbb{N}							
5			i r	- -	:	i I		274.6	-	14	dense: fine gr	e, some zones are sin ained; trace medium; ADED SAND WITH brown mottles; mediu	trace mica				
SS 6					:	1	5-7-10		15-	ΙИ	red with dark	brown mottles; medi	um dense;	moist;			
SS			! ▲ .	0	:	1	6-11-17	273.1.	- 1	И	<u>subangular: p</u> CLAYEY SA	oorly graded; fine to I ND (SC) trace gravel	medium gr	ained ige and red			
7				1	1	1		271.6	-		with light bro	ND (SC) trace gravel which yellow zones a e; damp; subangular;	nd white w	ispy clays; ded: mediu	m		
SS					Ģ	1	10-15-15	271.0	- I	M	A to coarse gras	ned: trace gravel: silic O (SM) with interlami	cuted chips				
8			i.		0	1		270.1			red light yell	ow and light purplish	i grav: med	ium dense:			
SS 9			1	1 1	ļ	1	9-10-15		20-		\trace mica	gular; poorly graded; f					
ļ	A		i	1	•	1	·	268.6	20-	\square	same as abov zones	e; light red with very	light pinki:	sh brown			.
			1	:		,			-	1	201103						
1				1	:	i I			•	1							
1			1	;	:	1			-	$\left\{ \right\}$							
SS	IJ			🎽 O	1		17-19-23				CLAVEVSA	ND (SC) with silty sa	and lamina	e: light red			
10						1	11-17-25	262.6	25-		and light broy	wnish orange; dense; i I; fine to medium grai	moist: suba	ingular:			
	Π		1	1	1			263.6	 	FA	poorly graded	i; fine to medium grai	neo, trace	mica			
			1		1	1											
. 			1	:	: :	1			-	1							
				•	1	1			-	1							
SS	μ		. ▲	. O	1 -	1	12-18-18		-	.	SILTY SAND	(SM) with clayey sa	nd zones a	nd a layer o	of		
11			1	4	1	1		258.6	30-		light red lean	clay with sand; light w, and light orange with	red, light p	urple, light			
	Π		1	1 i	1	i i		20.0	1.	┟┷┷┥	wisps; dense;	damp; subangular; p	oorly grade	d; fine to			
			1	:	1	: :			.		medium grain	nea					
			1	1	:	1 1									ļ		
1			1	1 1	:	1 1			.	1							
SS	╘	4	N I	1	0	1 1	7-7-9		· ·	t T	same as abov	e; some zones are cla	yey; some	zones are			
50 - 0		TSP	ON; ST	= 900			SITE		1	نانا					нс	DLE NO.	
			RY PIST								FINAT	LOG				FI	3-25
	•						<u></u>									_	



•

	GEOTECHNICAL L	00	PROJE		-		JOB NO.	SHEET		HOLE NO.
		.00			Nor	theast Expansion	NEX	2 0	DF 5	FB-25
SAMP. TYPE AND NO. SAMPIF	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60 80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF G AND ATORY
12			253.6-			sandy silt; multicolored bands with red, brown, and light gray; medium dense; v	yellow, orange,			
SS 13	▲ O	9-13-16	248.6_	- - - 40 - -		CLAYEY SAND (SC); light brownish y wisps; medium dense; damp; subangula fine to medium grained	yellow with white			
SS 14		8-10-16	243.6_	- 45 — -		SILTY SAND (SM) some zones are silt with clay stringers; light red and light or yellow and white mottles; medium dens subangular; poorly graded; fine to mediu mica	ange with light e; damp;			
SS 15		13-17-19	238.6_	- 50 -		CLAYEY SAND (SC) with silty zones; red, medium yellowish brown, and whit subangular; poorly graded; fine to mediu mica; bottom of interval is wet	e dense moist			
SS 16		11-19-22	233.6_	55	Ű	same as above; light orange, medium re yellow, and medium yellowish brown w clay; wet; no mica observed	d, light brownish ith white wispy			
SS 17		12-19-24	228.6_	- - 60 - -	<u>N</u>	POORLY GRADED SAND WITH CLA clay laminae; light brown, light yellow, dense; wet; subangular; poorly graded; f grained	and light purple,			
SS 18	0	16-24-33	223.6_	 	T/2	CLAYEY SAND (SC) with a band of sa medium orange with white clay pellets; subarigular; poorly graded; fine to mediu	very dense; wet;			
SS 19	▲ O	16-25-25	218.6_	- - 70 - -		POORLY GRADED SAND WITH CLA very thin clay stringers; medium reddish wet; subangular; poorly graded; fine to r trace heavies	brown; dense;			
SS	0	11-22-26		-	R	same as above; medium red and light br	own			
	IT SPOON; ST = SHELBY TUBE; TIONARY PISTON; PB = PITCHER	SITE	I		<u></u> .	FINAL LOG		н	DLE NO.	B-25
	TOTAL FUTUR, PD = PITURER	<u> </u>								



	OF 5 FB-25 NOTES ON: WATER LEVELS,
	WATER LEVELS,
Image: Construction of the second	CHARACTER OF DRILLING AND LABORATORY TESTING
20 40 60 80 213.6	
SS 21 208.6_ 200.6_ 200	
SS 22 203.6 85 CLAYEY SAND (SC) with light brownish yellow lean clay stringers; medium orange, light brown, and dark yellowish brown, medium dense; wet; subangular, poorly graded; fine to medium grained; trace coarse grains; trace heavies	
SS 23 90 90 90 90 90 90 90 90 90 90 90 90 90	
SS 24 193.6 95 95 95 95 95 95 95 95 95 95 95 95 95	
SS 25 188.6 100 - Same as above; light red and light brown with light yellow bands	
SS 26 18-28-29 183.6 105 CLAYEY SAND (SC); light brownish yellow with light brown zones; very dense; wet; subangular; well graded; fine to coarse grained	• . • .
SS 27 178.6_110: WELL GRADED SAND (SW) trace clay; light brown; very dense; wet; subrounded; well graded; fine to coarse grained; trace heavies	
SS O 32-49-50 same as above	
SS = SPLIT SPOON; ST = SHELBY TUBE; SITE FINAL LOG H	ноје NO. FB-25

.



(GEOTECHNICAL LOG	PROJECT		1	SHEET NO. HOLE NO.
		·	Northeast Expansion	NEX	4 OF 5 FB-25
SAMP, TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) O RECOVERY % + ATT. LIMITS % 20 40 60 80	ELEVATION IN FEET DEPTH IN FT	SOH DESCRIPTION AND CLAS	SIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING
28		173.6_			
SS 29	▲ \$ 8-15	-27 168.6_ ^{120 -}	CLAYEY SAND (SC); dark brown wi zones; dense; wet; subangular; poorly g medium grained; lignite present; trace	raded; fine to	
SS 30	▲O 11-28	-50 163.6_ 125 -	POORLY GRADED SAND WITH CL borderline clayey sand; light to dark bro orange; very dense; wet; subangular; po lower medium grained; lignite present; mica	own and medium orly graded; fine to	
<u>\$\$</u> 31	O ▲	in 159.8130 	same as above (slough?); not enough sa brown and medium orange	umple to jar; light	
SS 32	▲ • 24-18	-22 	CLAYEY SAND (SC) with zones of sa brownish yellow and light orange with clay, dense; wet; subangular; poorly gra medium grained; trace heavies	light green wirns o	
SS 33	▲ 6.7-	13 148.6140 	SILTY SAND (SM) some zones are cla orange with light green wisps; dense; w poorly graded; fine grained; trace heavi	et; subangular;	
SS 34	◆ 8-10	13 143.6_ 145 - -	CLAYEY SAND (SC); medium orange wispy clays; medium dense; wet; suban graded; fine grained	with light green gular; poorly	
SS 35	A 95-30-5	138.9_ 150 - - -	same as above; light yellowish brown a light green wispy clays; very dense; ver mica; trace black staining (Mn?)	y fine grained; trace	
SS	▲ · · · · · · · · · · · · · · · · · · ·		LEAN CLAY (CL) with interbedded sa	nd; light green with	
	T SPOON; ST = SHELBY TUBE; TIONARY PISTON; PB = PITCHER	re	FINAL LOG		HOLE NO. FB-25



G	SEOTECHNICAL I	LOG	PROJ				JOB NO.		ET NO.	HOLE NO
					No	rtheast Expansion	NEX	5	OF 5	FB-
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS %	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SSIFICATION		NOTES WATER CHARA DRILLIN LABOR TESTIN	ON: LEVELS CTER O IG AND ATORY
36	20 40 60 80		133.6-			medium orange sand stringers; hard; y plasticity; sand is fine grained; black r	vet; medium			
<u>SS</u> 37		_50/5_in_	129.7_	- - 160 - -	zz	CLAYEY SAND (SC) with clean sand orange and medium yellow with light dense; wet; subangular; well graded; fi clayey slough at top of recovered inter Congaree		ı ed;		
SS 38		37-41-41	123.6_	165 -		POORLY GRADED SAND WITH CL medium brown with dark brown wisps subangular; poorly graded; fine to med heavies: trace mica; Congaree Total depth of boring 165.5 feet.	AY (SP-SC); very dense; wet; ium grained; trace		Hole abar grout mix	ndoned w per 3Q5
						an a	•	414	ı .	
	POON: ST = SHELBY TUBE: JARY PISTON: PB = PITCHER	SITE		1		FINAL LOG		нс		



	EOTECL			PROJ		•			JOB NO.	SHEET	NO.	HOLE NO.
L	EOTECH					Noi	theast Ex	pansion	NEX		DF 5	FB-27
SITE			C	OORDINAT	ES				ANG	LE FROM H		TAL
DECUM	APSF COMPLETED						78900 E	56660 HOLE SIZE	SAMPLE HAMME	FR WEIGHT	<u>90</u>	TOTAL DEPTH
BEGUN				-				3 7/8 in	1	1b/30 in	/////L	155.5
4/28/98 GROUND E		GROUND WAT	orbitt/Grav	GED BY:	ra	11111	g 1500	5 //8 10	1401	0/30 In		155.5
297.	57 /			010 01.				B. Gelinas/S	AIC: C. Ro	thamme	r/WSI	RC
	<u> </u>				<u></u>			Di Otimubio				
SAMP. TYPE AND NO. SAMPLE	▲ N-VALUE (○ RECOVER + ATT. LIMIT	Y % S %	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESC	RIPTION AND CL	ASSIFICATION			LEVELS, CTER OF G AND TORY
 - -	20 40	60 80		297.6		$\left - \right $					land aug	er to 6 feet to
SS 1 SS 2 SS 3 SS 4 SS 6 SS 6 SS 7 SS 8 SS 9 SS 10 SS 11			15-25-26 14-12-12 11-9-8 8-5-5 3-8-15 4-13-17 21-19-9 10-25-26 21-29-20 12-29-46 21-29-20	290.1 288.6 287.1 285.6 284.1 282.6 281.1 279.6 278.1 276.6	10		poorly gradec same as abov medium dens same as abov SILTY SANE wet; subangui CLAYEY SA light brown, a subangular, p same as abov light brown, a same as abov brownish red dense; wet same as abov clay layers; m zones; very de 20 ft depth	e; trace fine gravel; m	m grained pime black zones; ined treat t	clir ir ight ilar; loose; red, red, ed and dium ry white nt at	land aug heck for iterferen	
SS 12 SS			17-22-29	267.3_	30-		wet; fine to m	e; with some light gra ledium grained ND (SC) with lean cl		poon;		
	SPOON; ST = SH		SITE				TATAT A Y	TOC		HC	DLE NO.	3-27
PS = STATI	IONARY PISTON:	PB = PITCHER	<u> </u>				<u>FINAI</u>	<u> </u>			<u></u>	<u>ו 4-</u> נ



<u> </u>	SEOTE	СНИ			PROJ		. -		JOB NO.		ET NO.	HOLE NO.			
ى ب را						}	No	rtheast Expansion	NEX	2	OF 5	FB-2			
AND NO. SAMPLE		VERY 9	16 Vo	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CL	ASSIFICATION		NOTES WATER CHARAG DRILLIN LABORA TESTING	LEVELS, CTER OF IG AND ATORY			
3	20 4	40 6	<u>0 80</u>)	262.0_		\mathbb{Z}	light yellowish brown to reddish bro	wn and light gray to	0					
5S 14			0	13-23-23	258.2_	40-		purple clay layer in tip of spoon; der poorly graded; fine to medium grain same as above; few clay laminae; m with light gray clay laminae							
S 5				<u></u>	252.3_	252.3 45 - 45 - 45 - 45 - 45 - 45 - 45 - 45									
S 6	• O 11-12-1				247.8_	50 -		same as above; medium yellowish b	rown; medium dens	e					
S 7			0	30-26-24	242.7_	55-		POORLY GRADED SAND (SP) tra brown; dense; wet; subangular; poor medium grained	ice clay; light yellov ly graded; fine to	vish					
S 8		▲				Q <u>10-10-15</u>		238.8_	- 60 -		CLAYEY SAND (SC); dark yellow dense; wet; subangular; poorly grade grained	sh brown; medium sd; fine to medium			3
S 9	4 4 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0		24-39-40	231.1_	65 -		same as above; medium yellowish b	rown; very dense		• ·				
S 0		0		27-29-32	226.1_	70-		same as above; dark yellowish brow well graded; fine to coarse grained	n with black specks	•					
= SPLI	T SPOON; ST	= SHELI	BY TUBE					FINAL LOG			HOLE NO.	B-27			



Ģ	SEOTI	ECHI	NICAL	LOG	PROJ		Nor	theast Expansion	JOB NO. NEX	1	et no. of 5	HOLE NO. FB-2
SAMP. 17PE AND NO. SAMPLE	▲ N-VA O REC + ATT.	OVERY	%	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLA	SSIFICATION			LEVELS, CTER OF IG AND ATORY
SS 21	20	40	60 80 • • •	30-28-32	221.1_			POORLY GRADED SAND WITH S orange; very dense; wet; subangular;	ILT (SP-SM); dari poorly graded	ĸ		
SS 22			0	15-17-18	216.1_	80-		WELL GRADED SAND WITH SILT (SW-SM); dark yellowish brown; der well graded; fine to very coarse grain	TAND GRAVEL Ise; wet; subangula ed	ır;		
SS 23	▲ 3-5-9				211.1_	85 -		SANDY LEAN CLAY (CL); dark ye wet; medium plasticity; trace of coars	llowish brown; stil be sand	T;		
SS 24	▲ • 6-7-9			6-7-9	206. I_	90 - -		SANDY FAT CLAY (CH); dark yell with black; very stiff; moist; high pla	owish brown; mott sticity; Mn present	led		
5S 25	▲ · · · · · · · · · · · · · · · · · · ·		▲ · · · · · · · · · · · · · · · · · · ·		201.1_	95 –		SILTY SAND (SM); medium yellowi dense; wet; subangular; well graded;	ish brown; mediun fine to coarse grain	n ned		
SS 26				6-8-9	196.1_	- 100		CLAYEY SAND WITH GRAVEL (S yellowish brown with white mottles; a subrounded; well graded; fine sand to	medium dense; we	t; ns		
S 7		0		▲ 25-42-56	191.1_	105 -		WELL GRADED SAND WITH SILT (SW-SM); medium yellowish brown; subangular; well graded; medium to y with gravel	verv dense: wet:			
SS 28		: : : : :		6-7-15	186.I_	110-		CLAYEY SAND WITH GRAVEL (S brown with tan and white mottles; me subrounded; well graded; fine to very	edium dense; mois	1 I;		
			LBY TUBE; B = PITCHER					FINAL LOG			HOLE NO. F	B-27



	250	TE	<u>~UN</u>		A.I. I.	00	PROJ				JOB NO.	1	ET NO.	HOLE NO.
L C	GEO	IE	CHL			.UG			Nor	theast Expansion	NEX	4	OF 5	FB-27
SAMP. TYPE AND NO. SAMPI F	0 R + A	ECOV	JE (SF /ERY ' MITS '	% %	~~~	BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION			LEVELS, CTER OF IG AND ATORY
SS 29	2	<u>0 </u>	<u>io (</u>	<u>60</u>	80	Ф13-12-17				SILTY SAND (SM) with clay, medium	yellowish brown) ;	·	
SS				8 4 1 1 1 1 4 4 1 4		25-36-55	181.1_	120-		POORLY GRADED SAND (SP) trace dense; moist; rounded; poorly graded; f	clay: white: very			
30] 1 1 1 1 1 1 1 1 1 1 1		12:	86-70-55	176.1_	125 -		POORLY GRADED SAND WITH SIL	T (SP-SM): light			
31 			1 1 1 1 1 1 1 1 1	; 1 1 1 1 1 1 1 1 1		0-10-7-11	171.1_	- - - 130-		tannish white; very dense; moist; round fine to very fine grained				
32			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	8 2 2 4 2 4 6 8 8 8 8 9	, , , , , , , , , , , , , , , , , , ,	8-11-18	166.1_			dense				
SS 33			i 1 2 4 5 1 3	с 			161.1_	- - - 140 –		ELASTIC SILT WITH SAND (MH); li with white; very stiff; moist; medium pl				
SS 34			2 2 3 4 4 1 1 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Y		19-81-70	156.1_	-		SILTY SAND (SM); medium yellowist very dense; moist; subrounded; poorly g fine grained; silts are elastic	i brown with whi graded; fine to ve	te; ry		
SS 35	0			8 4 5 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	20-22-23	151.1_	145 - -		same as above; with clay; dense		-		
SS 36			I I I I I I I I I I I I	t I I I I t I I		012-14-19	146.1_	150-		CLAYEY SAND (SC); very dark greer moist; subangular; poorly graded; very micaceous, green clay	nish black; dense; fine grained,		HOLE NO.	
SS = SPL PS = STA						SITE				FINAL LOG				B-27
L														



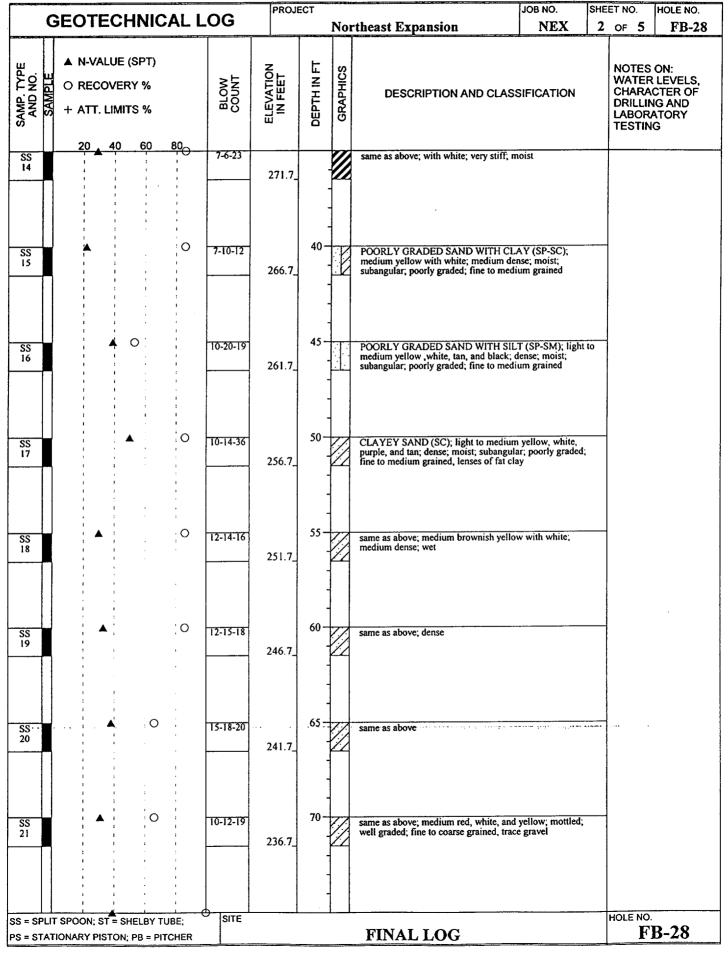
	GEOT	ECHN			OG	PROJ		Nor	theast Expansion	JOB NO. NEX		ET NO. OF 5	HOLE NO. FB-27
SAMP. TYPE AND NO. SAMPLE	▲ N-VA ○ REC + ATT.	ALUE (SP OVERY 9 . LIMITS 9	%		BLOW	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLAS	SIFICATION	NOTES ON: WATER LEVI CHARACTER DRILLING AN LABORATOR TESTING		
	20	<u>40 6</u>		0	27-34-55				Total depth of boring 155 feet.	<u></u>		Broke do	own spoon b ottle sample
	1	1											ndoned wit x per 3Q5.
	1 1 1 1	1 1 1 1	1 ; ,										
	k J T		:										
	F L L	:	•										
		:	•										
	1 : 1	, , ;											
	1 2 8 6	:	: 1 ;										
	1	1 	. · ·										
	1	4	. 1							•			
	- 	: : : :	· · · · · · · · · · · · · · · · · · ·										
	1 1 1	1 • 1	: 1 1 1 1										
	8 8 1	: • •	: 1 : 1	1									
	1												
		1											
	- 1 1												
	6 6 5	:	. 1										
	, , ,	:											
	· · · · · ·		: 1 · 1	~*		<u>.</u>		·	······································				
	:	- - 	. 1		•								
	, 1 1	:	· 1										
	 	4 4 7 1	· · ·										
	8 1 1	1 : :	· 1								i		
	; ;	1	. 1										
SS = SPLI		ST = SHEL	BY TUB	E;	SITE				FINAL LOG			HOLE NO.	B-27

.



		00	PROJ	PROJECT JOB NO. SI							0.	HOLE NO.			
G	EOTECH	INICA		UG			Noi	theast Exp	pansion	1	NEX	1 OF	5	FB-28	
SITE					ORDINAT	ES					ANGLE	FROM HOP	RIZON	ΓAL	
	APSF	-NE						78382 E			1		90		
BEGUN	COMPLETED		2		D	DRILL MAKE AND MODEL HOLE SIZE SAMPLE HAMMER WE								TOTAL DEPTH	
4/29/98	5/4/98		J Cor	·bitt/Grav	es	s Failing 1500 3 7/8 in 140 lb/30								161.5	
GROUND EL	L. DEPTH/EI	L. GROUN			GED BY:			د I	· · ·	• • · · · · · · · · · · · · · · ·			1		
308.2	2 ♀ / ♀ /								C . J	Rotham	nmer/W	/SRC			
	<u>+ /</u>												<u> </u>		
P. TYPI D NO. MPLE	H O RECOVERY % O RECOVERY % H O RECOVERY %						DESCRIPTION AND CLASSIFICATION						NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING		
	20 40	60 8	30		308.2										
SS 1 SS 2 SS SS 3 SS 4 SS 5 SS 6 SS 7 SS 8 SS 10 SS 11 SS 12 SS 13				6-12-13 6-10-12 10-17-23 10-13-17 8-14-19 9-14-19 13-18-27 15-27-37 9-10-15 6-12-22 6-7-11 9-13-21	300.7. 299.2_ 297.7_ 296.2_ 294.7_ 293.2_ 291.7_ 288.7_ 287.2_ 285.7_			wet; subangul gravel same as above same as above same as above same as above same as above fine to very cc same as above same as above same as above same as above same as above classes above same as above same as above classes above same as	e; dense e; medium dense; trac e; dense e; dark reddish brown parse grained; sandy c e; e; very dense e; with gravel e; dark brownish red v ragments, trace gravel ND (SC); dark red wi e; wet; subangular; we	with yellor and with yellor lay lenses	nained, trac	rse rse	east of	et 2 feet to f CPT. er to 6 feet to ces.	
	SPOON; ST = SH DNARY PISTON;			SITE	276.7_			FINAI	LOG			НОСІ	ENO. FI	3-28	
	MART PISTON;	ro = ruC		<u> </u>				1.11.121							







Ģ	θE	ΟΤΕ	CHN	NICA	AL L	.OG	PROJI		Nor	theast Expansion	JOB NO. NEX		TNO. OF 5	HOLE NO. FB-28
SAMP. TYPE AND NO. SAMPLE							NOLTER SOLUTION AND CLASSIFICATION							ON: LEVELS, CTER OF G AND ATORY G
SS 22		20	<u>40 (</u>	60 4	<u>BO</u>	0 16-21-18	231.7_		2	same as above				
SS 23			8 1 1 4 5 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	 	1 1 2 1 1 1 1 1 1 1 1 1 1 1	OWR/3 in 9/3 in-10-16	226.7_	80		SILTY SAND (SM) with clay; medium yellow; medium dense; wet; subrounde medium to very coarse grained, trace gr	i dark brownish d; well graded; ravel, Mn presen	ıt		
SS 24					· • •	28-25-34	221.7_	85		same as above; medium yellowish brov subangular; poorly graded; fine to medi	vn; very dense; ium grained			
SS 25		1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0		54-50-50/4 ir	1 216.7_	- 90 - - -		same as above; with gravel; with white; very coarse grained	; well graded; fin		from surf	n the hole ace, I to ream it rect situatio
SS 26		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3 1 1 1 1 1 1 1 1 1 1 1 1	0	P 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	27-50-50	211.7_	- 95 — -		same as above; medium brownish yello white, and black streaks; poorly graded grained, Mn present	w with orange, ; fine to medium			
SS 27			0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	15-14-15	206.7_	- - 100 - -		same as above; medium dense				
SS 28		1 ; , , , , , , , , , , , , ,	F I I I I I I I I I		12(28-38-29	201.7_	- 105 . -		same as above; medium yeltowish brow dense; well graded; lithic fragments	vn with white; ve	ry		
SS 29		, ; ; ; ; ; ; ; ; ; ;		0	- 1 4 4 5 4 4 4 4 4 4 4 1 1 1 4	30-43-40	196.7_	- - 110 - - -		POORLY GRADED SAND WITH SIL yellowish orange; very dense; wet; suba graded; fine to medium grained	T (SP-SM); dark ingular; poorly	c		
S = SPLIT						SITE				FINAL LOG	·			B-28



	GEOTECHNICA		PROJECT			JOB NO.	SHEET NO.	HOLE NO.
C C	SEUTECHNICA			No	rtheast Expansion	NEX	4 OF 5	FB-28
SAMP. TYPE AND NO. SAMPLE		BLOW	ELEVATION IN FEET DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	SIFICATION	CHARA DRILLI	R LEVELS, ACTER OF NG AND ATORY
SS	20 40 60 8	29-35-50/4 n			same as above; with coarse sand			
30 SS 31		22-24-22	191.7_ 120 186.7_		SILTY SAND (SM); dark yellowish or subangular; poorly graded; fine to medi	ange; dense; wet; um grained		
SS 32		Ф <u>12-14-16</u>	125		CLAYEY SAND (SC); dark yellowish dense; wet; subangular; poorly graded; grained	orange; medium fine to medium		
SS 33		• <u>8-9-10</u>	130 · 176.7_	-	same as above; medium yellowish brow	'n		
SS 34		w 12/8 in-1/4 i n-3			ELASTIC SILT (MH); medium yellowi white; soft; moist; medium plasticity	sh brown with		
SS 35		Ф₆₋₁₆₋₂₉ -	171.7_ 170.2_		SILTY SAND (SM); light medium brow red; dense; wet; subrounded; poorly gra- grained, silts are elastic	vn with white and ded; very fine	1	
<u>SS</u> 36		_50/4 in_	140- 166.7_		no recovery			
SS 37		122	145- 161.7_		WELL GRADED SAND WITH GRAV yellowish brown; very dense; wet; subro graded; medium to very coarse grained	EL (SŴ); light unded; well		
SS 38		Ф <u>10-12-12</u>	150- 156.7_		SILTY SAND (SM); light greenish yelle medium dense; moist; subangular, poor to fine grained, silts are elastic	ow with orange; ly graded; very fi	ne	
	T SPOON; ST = SHELBY TUBE FIONARY PISTON; PB = PITCH				FINAL LOG			B-28



6	GEOTECHNICA		PROJECT			JOB NO.	SHEET		
<u> </u>	SEUTECHNICA			Nor	theast Expansion	NEX	5 0	5 FB-2	8
SAMP. TYPE AND NO. SAMPLE		BLOW	ELEVATION IN FEET	DEPTH IN FT GRAPHICS	DESCRIPTION AND CLASS	SIFICATION		OTES ON: ATER LEVELS, HARACTER OF RILLING AND ABORATORY ESTING	
SS 39		BO			same as above; light yellowish brown; v	ery dense			
39 		▲ 0 19-43-51	151.7_ 1 146.7_	60	same as above Total depth of boring 161.5 feet.			shandanad wi	•••
					Total deput of borning to 1.3 reet.		gr	ble abandoned wit but mix per 3Q5.	u
SS = SPLIT	T SPOON; ST = SHELBY TUE	BE; SITE					НО		
PS = STAT	NONARY PISTON; PB = PITC	HER			FINAL LOG			FB-28	
							the second second	the state of the s	



	GEOTECHNICAL LOG							PROJ	ECT				JOB	NO.	SHEET	NO.	HOLE NO.
	G	EO	IEC	71 1	NIC	AL L				No	rtheast Ex	pansion		NEX	1 OF		FB-30
SITE							C	OORDINAT	ES					ANGLE FROM HORIZONTAL			
				SF-l				<u></u> .			79371 E	55388 HOLE SIZE				90	
BEGUN			MPLEI	- 1	DRILL	ER		[C				HAMMER		FALL	TOTAL DEPT		
	/98		5/12/9				Rizer/Grav		Fa	ilin	g 1500	3 7/8 in		140 lb/.	30 in		179.4
GROU				I/EL.	GROU	IND WAT	ER LOG	GED BY:									
2	<u>84.1</u>		¥ / ¥ /										N. Kie	id/SAI	<u>C</u>		
]	_									
SAMP. TYPE AND NO.		▲ N	-VALU	E (S	PT)			Z.	ե	S						OTES (
l≿ð	E	0 R	ECOV	ERY	%		BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS			1001010	ATION			LEVELS, TER OF
e P	AM								H H	₹	DESC	RIPTION AND CL	ASSIFIC	ATION			G AND
A	Ø	ŦΑ	TT. LIN	WI15	70			11=	l ä	ő							TORY
			_	_					-						16	STINC	2
		20) 40	0	60	80		284.1							н	nd aug	er to 6 feet t
		· 1	1		1	1									ch	eck for	
		1 1	t 1		1 ·	I I									int	erferen	ces.
		I	1		1	1				1							
		i			1	1			· ·	1							
		i	į		6 1	i t			· ·	1							
ł		1							5-	$\left \right $							
1		1	1			1			.						1		
		י י	1			1											
SS		A.	1		¦0	1	7-9-9		.	Π	POORLY GR	ADED SAND WITH	CLAY (S	P-SC); ligh	nt		
1		ہ ا	:		; i r	Σ.		275.6_	·	10	fine to mediu	ADED SAND WITH im dense; wet; subang m grained: trace heav	ies: trace n	ny graded;			
SS 2			:			-	2-3-8		•		POORLY GR	ADED SAND (SP) to ht reddish brown: med	race clay; s lium dense	ome zones : moist:			
		.▲ İ	ç)	:	1	5-6-6	274.1_	10-	l	subangular, p	oorly graded; fine to i	nedium gr	ained; muc	h		
SS 3			1		•	8 1			.		same as abov	oorly graded; fine to r ube: no useful sample e; light brown; wet; no	o bentonite	observed	1153/		
SS		. A j	Ċ	>	÷	1	5-6-9	272.6_	ł	H		e; moist; some zones a					
4		ļ	1	_				271.1_]							
SS				0	1	1	7-12-19	271.1	- 1		same as above	e; very light brown wi	th light bro	own areas;			
5					-	Å		269.6_	-		dense; trace n						
SS 6		1	– 1		1	0	13-15-15	_	15-	\square	CLAYEY SA	ND (SC); light orange medium dense; moist	e and light	red with lip ar: poorly	ght		
_		1			1 (φ'	71310	268.1_	-	$\langle A$	araded: fine to	a medium arained					
SS 7		1	- :		1 1	۲ ۱	7-12-19			$\langle \rangle$	and medium of	e; with sandy lean clay brange with light yello	y zones; m w and whi	te zones;			
SS			. I		1 1	Ģ	7-9-11	266.6_		Ĥ	dense: trace lo	ower coarse e; medium red with lip					
8		ł	1		4	1		765 1	-	\mathbb{N}	zones; mediu	n dense	5				
SS		- A	1		1	0	6-8-10	265.1_	-	1	same as above	e, with sandy lean clay	zones; m	edium			
9			1		1	1		263.6	20-	$\langle \rangle$	brownish red;	fine to lower coarse a	grained; tra	ice mica			
	Π		• •		1	1		202.0	-								
		1 1	1		-	, 1			_								
		r F	1		1	i I											
		•	1						-	1							
SS		L L	4	•	1	¦0	16-16-26		-	1	same as above	e; medium brownish y	ellow with	medium r	ed		
10		1	1		1 1	1 1 ·		258.6	. 25-	$\langle A$	zones; dense;	fine to medium grain	ed with coa	arse grains		, .	
	Π	1	1		1	1		220.0	-	ГЧ							
		1	1		;	1			_								
					E E	I			-								
		1							-								
SS			≜			; (13-15-21		-	1		; medium red with w	hite wisps;	fine to			
11		1	1			1		253.6_	30-	VA	medium grain	ed					
	Π	1	1		1 5	1	I	200.0_	-								
		1	1		7 8	1			-								
		1	1		1 1	1 1			-								
		I I	1		t I	1			-								
SS				۸	i c		47-50/4 in	240.0	-	7	same as above	; medium brownish r	ed with wh	ite wisps:	!		
				A			SITE	249.3_	L	<u> </u> Z A						E NO.	
SS = SF							SILE				ETINI A T	TOC					3-30
PS = ST	ATIO	NAR	PISTO	DN; PE	8 = PI1	CHER					FINAL	<u>, rog</u>				<u>r1</u>	JU



		06	PROJE				JOB NO.	SHEET NO.	HOLE NO.			
	GEOTECHNICAL L	.00			Nor	theast Expansion	NEX	2 OF 5	FB-30			
SAMP. TYPE AND NO. SAMPIF	▲ N-VALUE (SPT) ○ RECOVERY % + ATT. LIMITS % 20 40 60 80	BLOW COUNT	ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	DESCRIPTION AND CLASSIFICATION					
12						very dense						
SS 13		17-21-22	243.6_	- - - 40 -		same as above; with interlaminated clear brownish yellow with white wispy clays; brown zones and light red zones; dense	n sands; medium dark yellowish					
SS	• • •	27-42-42		-				Driller	s depth for the 5 ft. interval			
14			238.6_	- 45 - -		same as above; dark red; very dense; we grains	t; trace coarse	was sh ft.)	allow (43-44.5			
				-								
SS 15		17-21-22		50-	1	WELL GRADED SAND WITH CLAY borderline clayey sand; medium brown; subangular; well graded; fine to coarse g	(SW-SC) dense; moist;					
			233.6_	50-	-12	subangular; well graded; fine to coarse g	rained					
SS 16		18-27-27	228.6_	- - 55 -		same as above; some zones are clayey sa brown and medium purplish brown with very dense; some zones are wet	nd; medium light brown zon	es;				
				-		·						
SS 17		14-22-25	223.6_	- 60 -	<u> </u>	same as above; medium brownish yellov white wisps; dense; wet; trace heavies	v with occasional					
				-								
SS 18		8-14-20	218.6_	65	Z	CLAYEY SAND (SC) with interlayered medium brownish yellow; dense; wet; su graded; fine to coarse grained	ibangular; well	·				
SS 19	o▲	14-18-22	213.6_	- - 70 -	<u> </u>	WELL GRADED SAND WITH CLAY zones are clayey; medium brownish yeld subangular; well graded; fine to coarse g	w: dense: wet:					
				-		·						
SS		12-16-14			\square	CLAYEY SAND (SC); medium browni	sh yellow; mediu					
4	IT SPOON; ST = SHELBY TUBE;	SITE		FINAL LOG					HOLE NO. FB-30			
PS = STA	TIONARY PISTON; PB = PITCHER					FIIIAL LUG						



G	2EO	TE	NIC	AL L	06	PROJECT JOB NO. SH Northeast Expansion NEX 3							HOLE NO.	
						.00			3	OF 5	FB-30			
SAMP. TYPE AND NO. SAMPLE	H N-VALUE (SPT) C RECOVERY % C NECOVERY %						ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS		NOTES ON: WATER LEVELS, CHARACTER OF DRILLING AND LABORATORY TESTING		
20		<u>J 4</u>	<u>U</u>				208.6-		Z	medium dense; wet; subangular; well gr	aded: fine to coa	rse		<u> </u>
SS 21				, , , , , , , , , , , , , , , , , , ,		- 5-8-9	203.6_			same as above; bottom 0.3' have tan lean light yellowish brown with light yellow bottom of the interval; poorly graded; fin grained; top of tan clay is about 0.3 ft at interval	n clay interbeds; (tan) clay at the ne to medium			
	1			0	1									
SS 22		- - - - - - - - - - - - - - - - - - -			 	8-16-24	198.6_	85 - - -	P	POORLY GRADED SAND WITH CLA zones are clayey; light brownish yellow; subangular; poorly graded; fine to mediu stains (Mn?)	VY (SP-SC) some dense; wet; um grained; blacl	e k		
	1	1		1				-						
SS 23	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	 	•		8 F 7 F 8 F 8 8	18-28-27	193.6_	- 90	ľ	same as above; very dense; no black stai	ns			
SS 24		ן 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	•	0		18-23-24	188.6_	- 95 -	ľ	same as above; medium yellowish brown zones; dense; moist	n clayey sand			
SS 25	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8				1	17-27-32	183.6_	- 100 - -	<u> </u>	POORLY GRADED SAND WITH CLA zones are clayey sand; light yellowish br brown with occasional white wisps; very subangular; poorly graded; fine to mediu mottles (Mn?)	own and light dense; wet;			
SS 26	1 1 1 1 1 1 1 1 1		0		4	4-48-50/5 u	n 1 <u>78</u> .7_			POORLY GRADED SAND (SP) trace c with very light brown and light red zones subangular, poorly graded; fine to mediu heavies	s; very dense; we	t I	, ·	
SS 27		1 9 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	•			39-30/3 in	174.2_	- 110 - -		POORLY GRADED SAND WITH CLA zones are trace clay; light brown with ve light reddish brown zones; very dense; w poorly graded; fine to medium grained; b (Mn?); trace heavies	ry light brown an et: subangular:	e id		
\$S	1	1		U 1	Ó	30-34-23		-	::/	WELL GRADED SAND WITH CLAY	(SW-SC)			
SS = SPLIT						SITE						н	IOLE NO.	
PS = STATI	IONARY	PISTO	DN; PB	s = PIT	CHER		· · · · · · · · · · · · · · · · · · ·			FINAL LOG			<u> </u>	B-30



GEOTECHNICAL LOG						.OG								EET NO. HOLE NO.		
W. HALVE (SPT) O RECOVERY % HATT. LIMITS % MO MO MO MO MO MO MO MO MO MO							ELEVATION IN FEET	DEPTH IN FT	GRAPHICS	DESCRIPTION AND CLASS	NC W					
_28	i	<u>20 4</u>	10 1 1	60	80		168.6-		-12	clay content varies from trace to clayey; orange with light brown bands; very der subrounded; well graded; fine to coarse						
SS 29			1 1 1 1 1 1 1 1 1 1 1 1 1	- - - - - - - - - - - - - - - - - - -	0	20-16-15	163.6_	120-		mottles (Mn?) CLAYEY SAND (SC); medium reddisł brown wisps; dense; wet; subangular; p to medium grained; black wisps (Mn?)	t brown with ligh corly graded; fine	nt c				
\$\$ 30		1 4 4 1 1 1 1 1 1 1 1 1 1 1 1	2 4 5 7 1 1 1 1 1	0		25-39-41	158.6_	125-		POORLY GRADED SAND WITH SIL' brownish yellow; very dense; wet; subar graded; fine grained	T (SP-SM); light ngular; poorly					
SS 31					 	18-30-39	153.6_	- 130- -		no recovery; catcher torn out of spoon						
\$\$ 32				1 1 1 1 1 1 1 1 5 5 7 1	0	14-14-16	148.6_	- 135 -		CLAYEY SAND (SC); medium yellowi dense; wet; subangular; poorly graded; f grained	sh brown; mediu ine to medium	ım				
SS 33		0	1 4 8 8 8 8 7 7 1 1	1 1 1 1 1 1 1 1 1 1		21-29-32	143.6_	- - 140 -		POORLY GRADED SAND WITH SILT medium yellow with medium orange and and very light green clay wisps; very der subangular; poorly graded; fine grained	Г (SP-SM); d light brown zor ise; wet;	nes				
SS 34			 	4 5 6 6 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		PII-12-15	138.6_	- 145 	<i></i>	CLAYEY SAND (SC); medium browni dense; wet; subangular; poorly graded; f	sh yellow; mediu ine grained	m `				
SS 35 36 SS 37		•		F I I I I I I I I I I		910-15-22 98-13-24 912-14-19	133.6_ 132.1_	- 150 - -		LEAN CLAY WITH SAND (CL) some light green with medium to dark orange medium plasticity; sand is fine to coarse SANDY LEAN CLAY (CL) with interbu- green and reddish brown with medium o wet; medium plasticity; fine to medium p	zones; hard; wet; grained edded sand; light orange sands; har grained	; 				
SS 38 SS = SPLI	TSPO					17-20-25 SITE	130.6_ 129.1	-		CLAYEY SAND (SC) with sandy lean of reddish brown with light green clay wisp subangular; well graded; fine to coarse	ilay zones; mediu s; dense; wet;		HOLE NO.			
PS = SPLI										FINAL LOG				B-30		



.

State Northeast Expansion NEX S or 5 FB-30 # Log b State A NVALUE (SPT) O RECOVERY % S	CEOTEOL		PROJECT	<u></u>	JOB NO.	SHEET NO. HOLE NO.			
U A N-VALUE (SPT) V State State <thstate< th=""> State Stat</thstate<>	GEOTECH	INICAL LOG		Northeast Expans	1				
SB O A 127.6 127.6 127.6 127.6 127.6 126.8 WELL GADDE SAND WITH CLAY (SW-SC) days gray. WELL GADED SAND WITH CLAY (SW-SC) days gray. With a boxes prime are abromade. 100.6 WELL GADED SAND WITH CLAY (SW-SC) days gray. With a boxes prime are abromade. 100.6 160- 160- 160- 100.6	W LON CON CON CON WY CON CON CON CON CON CON CON CON CON CON								
33 O A 2530 Th 127.6, 126.8, 126.7, 126.8, 127.7, 126.8, 126.7, 126.8, 126.7, 126.8,	20 40	60 80							
	20 40 SS 39 SS	<u>60 80</u> 18-21-36	127.6_ 126.8_ 160- 165- 165- 170-	 grained same as above; dark grained WELL GRADED S WELL GRADED S content varies widel and light orange; ve fine to coarse graine probable Congaree a 	AND WITH CLAY (SW-SC) clay y with depth; light brown, light gray, ry dense; wet; subangular; well grad, d; larger grains are subrounded; at bottom of spoon				
			j [
	SS = SPLIT SPOON: ST = SHE	LBY TUBE SITE	tl			HOLENO			
				FINAL LO	G				